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5090
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February 28, 2011

Mr. Scott Smale
DoD Branch Supervisor
Bureau of Corrective Actions
Nevada Division of Environmental Protection
901 S. Stewart Street, Suite 4001
Carson City, Nevada 89701-5249

SUBJECT: FINAL WELL UTILIZATION PLAN, NAVAL AIR STATION FALLON, FALLON, NEVADA

Dear Mr. Smale,

Provided for your information is the final version of the Well Utilization Plan for Naval Air Station (NAS) Fallon.

The purpose of the Well Utilization Plan is to:

- Evaluate the suitability of the wells listed in the groundwater well inventory for continued groundwater measurement and water quality monitoring,
- Identify a monitoring well network based on construction and placement of new and existing monitoring wells, and
- Identify wells that are recommended to be plugged.

This Well Utilization Plan evaluates and expands on the previous monitoring well inventory to ensure that all monitoring wells comply with and adhere to State of Nevada Administrative Code regulations and guidelines. This final version includes responses to comments received on the draft Well Utilization Plan from the Bureau of Corrective Actions from the Nevada Department of Environmental Protection.

5090
Ser JE30.MQ/0423
February 28, 2011

Please call me at (619)532-4176 if you have any questions regarding this submittal.

Sincerely,

R. MICHAEL QUESADA
Lead Remedial Project Manager
By direction of the
Commanding Officer

Enclosure: Final Basewide Well Utilization Plan, Naval Air Station Fallon, Fallon, Nevada, prepared by Tetra Tech EM Inc., under NUS CLEAN contract N62467-04-D-0055, Delivery Order 0300, dated February 2011.

Copy to:

Ken Tedford, Mayor City of Fallon (w/ enclosure - Executive Summary)
Stanely Wiemeyer, U.S. Fish and Wildlife (w/ Executive Summary)
Brad T. Goetsch, Churchill County Manager (w/ Executive Summary)
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Ken Powell, Tetra Tech EM Inc.
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NAVFAC Southwest, Admin Record

Final

Basewide Well Utilization Plan

Naval Air Station Fallon
Fallon, Nevada

February 2011

Prepared for:
Department of the Navy
Naval Facilities Engineering Command, Southwest
San Diego, California

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Prepared under:
Naval Facilities Engineering Command
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Contract Task Order 300

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Final

Basewide Well Utilization Plan

Naval Air Station Fallon
Fallon, Nevada
February 2011

Contract Number N62467-04-D-0055
Contract Task Order 300
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Prepared for:

DEPARTMENT OF THE NAVY

REVIEW AND APPROVAL

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ACRONYMS AND ABBREVIATIONS

ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
avgas	Aviation gasoline
bgs	Below ground surface
BLM	Bureau of Land Management
CAP	Corrective action plan
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
DERP	Defense Environmental Restoration Program
DoD	Department of Defense
FS	Feasibility Study
HSA	Hollow stem auger
IRP	Installation Restoration Program
LD	Lower Diagonal
NAAS	Naval Air Auxiliary Station
NAC	Nevada Administrative Code
NAS	Naval Air Station
NAVD	North American Vertical Datum
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDEP	Nevada Division of Environmental Protection
NEDD	Navy Environmental Data Delivery
NIRIS	Naval Installation Restoration Information System
ORNL	Oak Ridge National Laboratory
PA/SI	Preliminary Assessment/Site Inspection
PVC	Polyvinyl chloride
RI	Remedial investigation
SAP	Sampling and analysis plan
SARA	Superfund Amendments and Reauthorization Act
SC	Specific conductance
SOP	Standard operating procedure
SulTech	A Joint Venture of Sullivan Consulting Group and Tetra Tech EM Inc.

TDS	Total dissolved solids
Tetra Tech	Tetra Tech EM Inc.
UST	Underground Storage Tank
UST-R	UST Restoration

EXECUTIVE SUMMARY

Development of an effective well utilization plan is essential for long-term management of existing and future environmental efforts at Naval Air Station (NAS) Fallon in Fallon, Nevada. The Navy conducted extensive remedial investigation (RI) activities and basewide groundwater monitoring in 2007 and 2008. The results of the RI activities are documented in a series of reports currently being developed. The well utilization plan focuses on continued basewide groundwater monitoring and has been designed to accomplish the following objectives:

- Evaluate the suitability of the wells listed in the groundwater well inventory (SulTech 2006) for continued groundwater monitoring.
- Identify a monitoring well network based on construction and placement of new and existing monitoring wells.
- Identify wells that are no longer useful to the NAS Fallon Installation Restoration Program (IRP) and that should be plugged.

This well utilization plan evaluates and expands on the previous monitoring well inventory (SulTech 2006) to ensure that all monitoring wells comply with and adhere to State of Nevada Administrative Code (NAC) Chapter 534, "Underground Water and Wells," including Nevada Revised Statutes 2005 Chapter 534 and the Nevada Division of Environmental Protection (NDEP), "Guidance Document for Design of Groundwater Monitoring Wells" (NDEP 1996). Existing wells that met these criteria were redeveloped or repaired if possible to ensure that they are in good condition and are capable of producing representative water quality samples. Existing wells and new wells installed in 2007 and 2008 were used for groundwater monitoring during the remedial and petroleum sites investigations. New monitoring wells were also constructed in 2008 for basewide groundwater monitoring. Both existing and new wells were evaluated for inclusion in the ongoing monitoring well network as part of the scope of this well utilization plan.

Wells were also evaluated for plugging as part of the well utilization plan. Monitoring wells deemed not to comply with State of Nevada regulations and codes and that were poorly constructed, damaged, or unusable for groundwater quality sample collection are not considered part of the "permanent" basewide monitoring well network and should be plugged.

After existing and new wells had been evaluated against these criteria, a total of 283 wells are recommended for inclusion in the monitoring network at NAS Fallon, and a total of 153 wells are recommended for plugging. An additional 233 wells are identified but not discussed or categorized further in the well utilization plan. These include extraction wells, bioslurp wells, injection wells, sparge wells, and product recovery wells that may be useful as remedial system components and will be considered in future remedial designs and evaluations.

Specific uses for wells included in the network for 2011 are as follows:

- 49 wells are scheduled for semiannual basewide water quality sampling
- 38 wells will be used in the basewide network as supplemental monitoring wells for water quality sampling if needed for future characterization efforts
- 99 wells will be used for semiannual water level and, if floating fuel is present, product thickness monitoring
- 97 wells and piezometers may be used in the network for future water level and product thickness monitoring related to remedial strategy development.

Some wells have more than one use. For example, they may be used both for water level monitoring and water quality sampling.

Data logging (pressure transducer) instruments have been installed in 60 monitoring wells to continuously measure fluctuations in groundwater level and temperature to further assist with the current basewide groundwater investigation. The pressure transducer data loggers, along with 7 in-situ flow sensors that measure groundwater velocity and flow direction, are downloaded on a quarterly basis and are recalibrated as required. Data logger results will be included in future basewide monitoring reports.

The groundwater monitoring well network consists of wells located upgradient, crossgradient, downgradient, and beyond the leading edge of contaminant plumes at the active IRP sites and at strategically placed basewide locations. The monitoring well network is dynamic, and some groundwater sampling locations may be modified based on the results of the RI and continued groundwater monitoring. For example, some of the basewide monitoring wells have already been scaled back after the first year of semiannual groundwater monitoring for water quality trends and plume stability. After scheduled sampling events, the Navy will continue to evaluate the integrity of the wells and continuously reassess which wells should be used for future monitoring. Any changes in the groundwater monitoring network will be documented and discussed with Navy and state representatives before they are implemented.

1.0 INTRODUCTION

Naval Air Station (NAS) Fallon is located 7 miles southeast of Fallon, Nevada (Figure 1-1). Groundwater monitoring under the Installation Restoration Program (IRP) has been ongoing at NAS Fallon since the 1980s, starting with a preliminary assessment/site inspection (PA/SI) in 1988 that identified sites with potential environmental impacts and recommended these sites for inclusion in a remedial investigation (RI) and feasibility study (FS) (Ecology & Environment Inc. 1989). The RI commenced at NAS Fallon in September 1988, and an RI report was finalized in 1994 (Oak Ridge National Laboratory [ORNL] 1994). The RI satisfied three critical categories of information needs: (1) verification of impacts; (2) characterization of the extent and concentration of chemicals in soil and groundwater at each site; and (3) assessment of potential migration of chemicals away from the site in groundwater, surface water, or other media of concern at levels harmful to human health or the environment. Since the RI was completed in the mid-1990s, several supplemental investigations and interim remedial or corrective actions have been conducted, some sites have been closed with either no further action or with limited groundwater compliance monitoring, and groundwater monitoring has continued throughout the 2000s. A more comprehensive summary of all previous activities at the IRP sites can be found in the *Data Summary and Recommendations Report Related to Focused Feasibility Study for IR Sites* (Battelle 2003). In addition to the IRP sites, two additional underground storage tank (UST) sites have been added to the program for monitoring. They include UST Restoration (UST-R) Site 1 (Building 395 Area), and UST-R Site 2 (Building 806 Area). The location of each of the sites is shown on Figure 1-2. A third UST-R site is also being considered for inclusion in the IRP. It consists of a 750-gallon fuel tank within the boundary of the New Fuel Farm (IRP Site 2).

The IRP identifies 32 sites at NAS Fallon (Figure 1-2). Sixteen IRP sites have been closed as no further action with concurrence from the Nevada Division of Environmental Protection (NDEP). Three additional landfill sites (IRP Sites 20, 21, and 22) have been closed with limited action in the form of re-grading the existing landfill cover and groundwater monitoring. Two sites (IRP Sites 4 and 18) are currently entering the decision phase with no further action (closed) proposed as the preferred alternative for Site 4 and limited surveillance and monitoring proposed for Site 18.

Eight active IRP sites and two UST-R sites have recently undergone additional characterization. Three sites were recently added to the IRP: Site 28, the Northeast Runway Jet Fuel Spill which will be addressed under CERCLA, and UST-R Site 4 (Building 201 Area) and UST-R Site 5 (Building 314 Area) which will be addressed under the State of Nevada's corrective action program. These sites will require further investigation to delineate the extent of the contamination. Results will be documented in future RIs and corrective action plans (CAP).

After a thorough review of existing soil and groundwater data, the Navy implemented an updated RI in 2007 and 2008 to assess the current environmental conditions and potential associated risks at the following active IRP and UST sites:

- Site 1, Crash Crew Training Area

- Site 2, New Fuel Farm
- Site 3, Hangar 1 Area
- Site 4, Transportation Yard
- Site 6, Defuel Disposal Area
- Site 14, Old Vehicle Maintenance Shop
- Site 16, Old Fuel Farm
- UST-R Site 1 (Building 395 Area)
- UST-R Site 2 (Building 806 Area)

Results are currently being compiled into a series of RI and petroleum storage tank site reports due to be finalized in 2011. An RI addendum/FS report is being prepared for Sites 1, 14, and 16 (which were grouped into the Southern Operable Unit [OU]), and a second RI addendum\FS report is being prepared for Sites 2/4 and 3 (which were grouped into the Northern OU). Sites included in the Southern and Northern OUs were grouped together as a result of their respective proximity, hydrogeologic conditions, and similar nature of groundwater contaminants. A Contaminant Investigation Report for Abandoned Fuel Sites is being completed for UST-R Site 1 (Building 395 Area), UST-R Site 2 (Building 806Area), and Site 6. After these reports are completed, final remedies will be selected and decision documents will be prepared.

In conjunction with the RI, the Navy initiated a basewide groundwater monitoring effort in early 2008. Existing wells in the previous monitoring well inventory (SulTech 2006) were further evaluated and expanded for inclusion in this basewide well utilization plan under this basewide effort. All upcoming basewide monitoring will be documented in biannual reports. The basewide program's primary objectives are to:

- Assess plume stability, characteristics, and trends at active sites.
- Provide post-closure monitoring at closed sites.
- Provide sentinel groundwater monitoring at base boundaries.

In addition, the Navy will ensure that the well network recommended in this well utilization plan is maintained according to Nevada Administrative Code (NAC) Chapter 534 for future IRP activities.

1.1 PURPOSE AND SCOPE OF THE WELL UTILIZATION PLAN

The purpose of this well utilization plan is to evaluate the suitability of the wells listed in the groundwater well inventory (SulTech 2006) for continued groundwater measurement and water quality monitoring, to identify a monitoring well network based on construction and placement of new and existing monitoring wells, and to identify wells that are recommended to be plugged. This well utilization plan report evaluates and updates the previous monitoring well inventory (SulTech 2006) to ensure that all monitoring wells comply with and adhere to the State of NAC Chapter 534, "Underground Water and Wells," and the NDEP "Guidance Document for Design of Groundwater Monitoring Wells" (NDEP 1996). Existing wells that met these criteria were redeveloped, if possible, to ensure that the wells were in good condition and were capable of producing water quality samples that would be representative of actual chemical conditions in groundwater.

Existing wells and new wells installed in 2007 and 2008 were used for groundwater monitoring during the remedial and petroleum sites investigations. New monitoring wells were also constructed in 2008 for basewide groundwater monitoring. Both existing and new wells were evaluated for inclusion in the ongoing monitoring well network as part of the scope of this well utilization plan.

Many field activities that were conducted in support of developing the basewide monitoring well network and implementing basewide groundwater monitoring are discussed in this well utilization plan. These activities include well redevelopment, well repair, monitoring well installation and development, installation of pressure transducers, and land survey considerations. A summary of these activities is discussed in Section 2.2 of this report.

1.2 DESCRIPTION OF NAS FALLON

This section describes NAS Fallon, its history and mission, and provides a summary of the IRP.

1.2.1 Facility Description

NAS Fallon is located 7 miles southeast of Fallon, Nevada, the county seat of Churchill County (Figure 1-1). Reno, Nevada, lies 60 miles west of Fallon. The main station comprises 8,583 acres and is located in the central part of the Carson Desert, commonly referred to as the Lahontan Valley, one of Nevada's top agricultural areas. NAS Fallon includes airfield and maintenance facilities, public works and supply facilities, and housing. An additional 14 parcels (four of which are used as aerial weapons training ranges) are located in the general vicinity of the main station.

1.2.2 NAS Fallon History and Mission

NAS Fallon was originally established as a military facility in 1942, when the Civil Aviation Administration and Army Air Corps constructed four airfields in Nevada as part of the Western Defense Program. In 1943, the Navy assumed control of the facility, and on June 10, 1944,

Naval Air Auxiliary Station (NAAS) Fallon was commissioned. The facility provided training, servicing, and support to air troops sent to the facility for combat training. After a brief period of inactivity during the late 1940s and early 1950s, Fallon was placed in caretaker status until it was designated as an auxiliary landing field for NAS Alameda in 1951.

NAAS Fallon was re-established on October 1, 1953. From 1958 to 1972, the station was designated Van Voorhis Airfield in honor of a Medal of Honor recipient from Fallon. The station was expanded and upgraded in the early 1960s to prepare aircrews for Vietnam duty. On January 1, 1972, NAAS Fallon was upgraded to its current status of NAS Fallon.

NAS Fallon's mission is "To provide the most realistic integrated air warfare training support available to carrier air wings, Marine air groups, tenant commands, and individual units participating in training events including joint and multinational exercises." NAS Fallon is currently the only Navy facility where advanced integrated Carrier Air Wing Strike training can take place. Military aircraft from the Navy, Air Force, Marine Corps, and Nevada Air National Guard all train at NAS Fallon. The station includes four air-to-ground training ranges, an electronic warfare range, a 14,000-foot runway, and clear flying weather for more than 300 days per year. NAS Fallon is home to the Naval Strike and Air Warfare Center, the Strike Fighter Weapon Detachment, Fighter Squadron Composite 13, and Construction Battalion Unit 303. As of 2006, the NAS Fallon base population is about 3,000 active duty and civilian Department of Defense (DoD) personnel. NAS Fallon is an active base with no plans for closure or transfer.

Historical contaminant releases associated with operations at NAS Fallon include jet fuel (JP-4, JP-5, and JP-8), oil, aviation gasoline (avgas), gasoline, antifreeze, hydraulic fluid, solvents, paint, pesticides, and industrial and municipal garbage. Most of the jet fuel spills or leaks occur during aircraft fueling and refueling operations and fuel disposal. In addition to fuel-related contamination, solvents, oils, and other wastes associated with aircraft operations and maintenance at NAS Fallon have released substances into the soil, surface water and sediment, air, and groundwater (Agency for Toxic Substances and Disease Registry [ATSDR] 2003). Many of these contaminants are commingled. Response to these releases falls within the scope of the Defense Environmental Restoration Program (DERP), developed by DoD to take appropriate response actions to investigate and, where necessary, address releases of hazardous substances or pollutants and contaminants, and correcting other environmental damage.

1.2.3 Installation Restoration Program

The IRP is designed to ensure that DoD facilities, through the DERP, comply with environmental legislation outlined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of December 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) of October 1986. The purpose of the Navy's IRP is to reduce the risk to human health and the environment from legacy waste disposal operations and hazardous material spills at Navy facilities in a timely and cost-effective manner consistent with DERP requirements. The focus is on moving an IRP site from identification and investigation to cleanup and closure. IRP activities are conducted in accordance with the guidelines, rules, and criteria set forth in CERCLA, the National Oil and Hazardous Substances

Pollution Contingency Plan (NCP), and other applicable environmental laws and their implementing regulations.

As stated in Section 1.0, the IRP identified 32 sites at NAS Fallon, with three additional sites (a petroleum encroachment area near the landfill Sites 21 and 22 and two additional UST-R tank sites within the Site 2 area) recently added to the IRP. Sixteen IRP sites have been closed with no further action and three landfill sites (IRP Sites 20, 21, and 22) have been closed with limited action. Two sites (IRP Sites 4 and 18) are currently entering the decision phase with no further action (closed) as the preferred alternative, and eight active IRP sites and two UST-R sites are currently in the RI/FS or CAP phase. This document was completed to ensure that wells included in the NAS Fallon network recommended in this well utilization plan are maintained according to NAC 534 for future IRP activities.

1.3 ENVIRONMENTAL SETTING

1.3.1 Topography and Drainage

There is very little topographical relief at NAS Fallon except that formed by the built-up areas of runways, taxiways, aircraft parking aprons, and along some drains. The topography at NAS Fallon is generally flat, with approximately 20 feet of change in elevation from northwest to southeast. Figure 1-3 shows the topography and significant drainage features across the station. Surface water flows southeast toward the Stillwater Lakes, a chain of small lakes, ponds, and marshes in the northern half of the Carson Desert (Stillwater Wildlife Management Area). Shallow groundwater beneath the facility generally flows toward Carson Lake, located about 3 miles south of the facility. Much of the area around the facility is irrigated, and there are a number of ditches, canals, and drains. Irrigation ditches in the vicinity of NAS Fallon are generally less than 5 feet deep and do not intersect the shallow aquifer. The drains are typically 8 to 10 feet deep and in some cases intersect the shallow aquifer to accept discharge of shallow groundwater as well as surface water. The ditches and drains may serve as recharge areas for the shallow aquifer during the irrigation season when flows are high. Drains also act to remove excess water from regional farmland.

Topography and surface water drainage in the area have been substantially modified, and all drainage at the site is via manmade drains. Four primary surface water distribution systems are located at or in the vicinity of NAS Fallon (see Figure 1-3). They include the west-to-east trending New River drain north of Wildes Road, the L-Line Canal in the northern part of the facility, Lower Diagonal (LD) No. 1 drain in the central portion, and LD drain in the southern portion. All four of these surface water systems converge 2 miles east of the station boundary and feed into the Stillwater Point Diversion drain, eventually draining into the Stillwater National Wildlife Refuge and the Stillwater Point Reservoir (Figure 1-1). In addition, there are also several small, lateral drains, including the E4X drain that is adjacent to and east of Site 16. The unlined drains accept discharge of shallow groundwater as well as surface water.

1.3.2 Climate

NAS Fallon is located in an arid region with a high evaporation rate; annual precipitation averages about 4 to 7.5 inches per year. The normal maximum daily temperature during June and July is approximately 90°F, while the minimum daily temperature during January and February is approximately 16°F (ORNL 1994). Prevailing wind patterns are from west to east. Winds rarely blow from NAS Fallon toward the community of Fallon (ATSDR 2003).

1.3.3 Land Use

NAS Fallon administers 8,583 acres, while training ranges use an additional 234,124 acres of land. NAS Fallon includes airfield and maintenance facilities, public works and supply facilities, and housing. An additional 14 parcels (four of which are used as aerial weapons training ranges) are located in the general vicinity of the main station.

The Fallon Range Training Complex encompasses more than 13,000 square miles and includes four geographically separate training ranges (B-16, B-17, B-19, and B-20), three Range Air Surveillance System sites, a tracking system (tactical aircrew combat training system), a threat simulation system, and special use airspace. The Fallon Range Training Complex airspace overlies portions of Washoe, Lyon, Churchill, Pershing, Mineral, Nye, Lander, and Eureka counties. Most of the lands under the Fallon Range Training Complex airspace are public lands administered by the Bureau of Land Management (BLM).

Approximately half of all the land area at the main station is leased out for non-military uses. The safety buffer zone surrounding the airfield is leased out to ranchers as part of the Navy's Agricultural Outlease Program (ATSDR 2003). Eleven parcels of land are leased out, and some of the lessees grow alfalfa, rye, barley, and corn. Most of the leased land is used for irrigated pasture for cattle. These agricultural parcels, totaling about 3,900 acres, are located in the northwestern, northeastern, and southeastern corners of the station and off the western end of runway # 7 (Dames & Moore 1988).

The City of Fallon is the largest population center in the area, with approximately 7,500 people. Approximately 23,980 people live in the surrounding unincorporated parts of Churchill County (U.S. Census Bureau 2000). The Fallon Shoshone-Paiute tribe, with approximately 1,300 members, maintains more than 8,200 acres of land in the area. The population for both the City of Fallon and the county has been slowly increasing (USGS 2001). A small number of residences are located within a 1-mile radius of NAS Fallon; however, the area immediately adjacent to NAS Fallon is mostly undeveloped or used for agriculture.

Most of the land surrounding NAS Fallon is either open brush or irrigated farmland. Alfalfa is the main irrigated crop in the Lahontan Valley. Non-irrigated land is sparsely vegetated with greasewood, rabbit brush, salt grass, and marsh grasses (USGS 2001). Much of the area immediately surrounding the station is irrigated; several irrigation ditches are used to deliver water and drainage canals to remove excess water (ORNL 1992).

1.3.4 Hydrogeologic Setting

NAS Fallon is located within the Lahontan Valley groundwater basin. There are four principal aquifer systems in the Lahontan Valley. First-encountered groundwater occurs in the unconfined shallow alluvial aquifer. The natural hydraulic gradient in the shallow alluvial aquifer is toward the south-southeast. A groundwater elevation contour map for NAS Fallon is shown in Figure 1-4. The shallow aquifer is approximately 10 to 18 feet thick and is encountered at depths ranging from about 4.5 to 13 feet bgs at NAS Fallon. More commonly, depths to groundwater range from about 5 to 10 feet bgs. Depths to groundwater in the northwestern section of NAS Fallon in the vicinity of Sites 2/4, 3, and UST-R Site 1 range from about 6 to 10 bgs. Depths to groundwater range from about 4.5 to 13 bgs in the vicinity of Site 6 and Site 21, located in the northeastern area of NAS Fallon. In addition, depths to groundwater range from about 5.5 to 8 feet bgs in the southwestern area of NAS Fallon near UST-R Site 2 and Site 20. Depths in the vicinity of Sites 1, 14, and 16 range from about 4.5 to 9.5 bgs. Depths to groundwater below 10 feet bgs are generally the result of wells installed in bermed areas. The principal sources of recharge to shallow groundwater are precipitation, infiltration of irrigation water, and leakage from unlined drains. Groundwater in the shallow aquifer is of poor quality, with high levels of total dissolved solids (TDS) ranging from hundreds to over 50,000 milligrams per liter, and is not relied on for domestic or commercial use.

Beneath the shallow alluvial aquifer are two additional basin-fill aquifers (intermediate and deep) and a basalt aquifer. On a regional basis, the boundary between the intermediate and shallow aquifer is about 25 to 50 feet below ground surface (bgs) and is chemical instead of physical (Glancy 1986). However, the boundary at NAS Fallon is marked by a relatively impermeable layer of clays and silts believed to represent lacustrine sediments and occurs at approximately 18 to 23 feet bgs (ORNL 2000). The intermediate aquifer is confined with an upward vertical gradient.

1.4 ORGANIZATION OF REPORT

This report has been organized as follows:

- Section 1 provides a discussion of the purpose and scope of the well utilization plan, describes the facility history and mission, provides a brief description of the IRP, and provides summary of the environmental setting. Facility location and IRP site maps are provided on Figures 1-1 and 1-2. Figure 1-3 shows ground surface topography and drainage features and Figure 1-4 provides a groundwater elevation contour map.

- Section 2 presents and discusses the monitoring well network, including an evaluation of the well inventory and description of field efforts completed to develop the well utilization plan. Table 2-1 and Figure 2-1 are included to describe and show wells that are monitored for water quality or other physical properties, such as water level and temperature. Figures 2-2 through 2-5 show the well locations that are actively being monitored for water quality or water level by geographical quadrant. Figures 2-6 through 2-10 show the locations of wells recommended for plugging. In addition, Tables 2-2 and 2-3 respectively provide well construction and other information for wells recommended to be plugged and other structures requiring further evaluation. Tables 2-4, 2-5 and 2-6 detail results of well redevelopment and repair of existing wells and data collected during installation and surveying of new wells. In addition, Table 2-7 presents groundwater levels collected semiannually since 2008 and the respective groundwater elevation data through calendar year 2010.

- Section 3 provides the findings of the well utilization plan, current monitoring well network, and recommendations for wells to plug. Summary Tables 3-1 and 3-2 are included.

- Section 4 lists the references used for this report.

- Appendix A includes relevant Standard Operating Procedures for Field Activities performed to develop the well utilization plan,

- Appendix B contains development forms for existing and new wells,

- Appendix C contains lithologic logs and well completion reports for wells included in the network and for well to be plugged, and

- Appendix D contains the Department of the Navy responses to comments from the NDEP.

2.0 MONITORING WELL NETWORK

The historical well inventory at NAS Fallon has consisted of wells installed over a 20-year period in support of site characterizations, compliance monitoring, and interim remedial actions. These wells have consisted of monitoring wells, observation wells, piezometers, and wells used previously for RIs and pilot studies. The Navy has concluded that only the monitoring wells that comply with State of Nevada regulations and guidelines, are in good condition, and are useful for present and future activities should remain. As a result, all of the monitoring wells in the Phase II groundwater well inventory (SulTech 2006) have been compared with State of Nevada criteria and guidelines, as discussed in Section 2.1. Section 2.2 is a detailed discussion of field efforts that were conducted to develop the well utilization plan.

2.1 EVALUATION AND EXPANSION OF MONITORING WELL INVENTORY

Several types of field documentation from NAS Fallon were compiled and compared with NAC 534 for underground water and wells standards. This documentation included boring logs, well completion reports, construction documentation, and field data for existing monitoring wells. The monitoring well assessment at NAS Fallon revealed that a number of the wells do not meet NAC 534 standards. Common issues of noncompliance with NAC 534 standards for monitoring wells include undersized or oversized casing diameter; absence of a bottom casing cap; inadequate or absent gravel pack, bentonite, or cement surface seals; the lack of or significant damage to surface pads; and the absence of a steel protective casing with locking cap. Although not suitable for monitoring water quality, small-diameter wells and piezometers can be retained for measuring water levels and floating fuel product thicknesses. During the well inventory evaluation, repairs were attempted if well construction issues were considered minor. However, a number of wells were damaged beyond repair or did not develop properly and therefore did not meet the standards required for them to be included in the NAS Fallon monitoring well network. Some wells that met NAC construction criteria and guidelines but have no current use were also included in the monitoring network as supplemental wells. Supplemental wells may be used for water quality monitoring in the future as characterization efforts change or remedial designs are implemented.

Figure 2-1 is a map showing the basewide monitoring network for those wells deemed acceptable for future use. Figures 2-2 through 2-5 are supplemental quadrant maps of the northwest, northeast, southwest, and southeast portions of NAS Fallon that show the recommended active monitoring wells used for water quality and water level monitoring. Table 2-1 is a list of wells that are recommended to be the NAS Fallon monitoring well network going forward. More specifically, Table 2-1 provides well construction details, information on when the well was developed, repaired, whether it is a replacement well or a new well location, and the number of times a given well was sampled from 1988 through 2010.

Figure 2-1 and Table 2-1 also indicate if the well is to be used for basewide water quality monitoring, water level monitoring, product thickness monitoring, or as a supplemental well. The well locations designated with blue fill color correspond to the wells that are currently being sampled for water quality on a semiannual basis; all of these "blue" wells that are sampled for water quality are also measured for water levels at the time of sampling. The orange fill color denotes a larger subset of additional wells where water level measurements are collected semiannually, but are not currently being sampled for water quality. Both the well locations indicated with orange and yellow fill (indicated on the legend as "Supplemental Wells") meet all of the criteria described in State of Nevada Administrative Code (NAC) Chapter 534, "Underground Water and Wells," including Nevada Revised Statutes 2005 Chapter 534 and the NDEP "Guidance Document for Design of Groundwater Monitoring Wells". Any well indicated by blue, orange, or yellow fill could be added to the "active well list," depending on the goals and objectives set by the Navy, in coordination with the state.

The wells and piezometers represented with pink fill are wells that are being kept for measuring water levels and, in some cases, floating fuel product thicknesses in support of current and future

remediation strategies. Although these wells may not meet all of the NAC 534 standards, such as optimal well diameters for sample collection, they are suitable measuring points for observing changes in water levels and floating fuel product thicknesses. For example, in the vicinity of IRP Sites 2 and 4, many of the GTI-series wells (pink fill designations) are measured and skimmed weekly as part of the ongoing Site 2 removal action. Similarly, in the vicinity IRP Site 16 and the E4X drain, the SPZ-/DPZ-series piezometers and stilling well (orange fill designation) would not be appropriate for groundwater quality monitoring but are key components of measuring water level and temperature variations along the E4X drain.

Figure 2-6 shows those wells that were deemed not acceptable for any future use and therefore should be plugged; Figures 2-7 through 2-10 show the locations of these wells for each quadrant. Table 2-2 provides a list of the wells recommended for plugging. Notes are provided in Table 2-2 that discuss the reasons for plugging recommendations. Table 2-3 is a list of wells, piezometers, and remedial system components at NAS Fallon that are related to past environmental programs. They include extraction wells, bioslurp wells, injection wells, sparge wells, product recovery trenches or other remediation or recovery wells. Many of these items were identified during the groundwater well inventory (SulTech, 2006) and were excluded from discussion in the inventory at that time. Other wells were found during subsequent field investigations. The 233 items included in Table 2-3 may require further evaluation as some of the components could potentially become useful for remediation in the future. These items are not discussed further in the basewide well utilization plan.

The following sections detail activities related to development of the well utilization plan at NAS Fallon.

2.2 WELL UTILIZATION PLAN DEVELOPMENT

Figure 2-1 indicates how each monitoring location in the basewide network will be used in the future and Figures 2-2 through 2-5 show the recommended active monitoring wells used for water quality and water level monitoring in calendar year 2011. Monitoring locations and wells were selected to provide adequate spatial coverage to characterize groundwater-surface water interactions and groundwater velocities at certain locations, and to assist in contaminant transport tracking and analysis. Sentinel wells were placed in basewide locations to study direction of groundwater flow and groundwater quality as it enters and exits NAS Fallon. Sentinel wells were also located in the vicinity of canals and drains to study groundwater-surface water interactions and assess any influences on contaminant migration.

2.2.1 Well Redevelopment and Rehabilitation

Well redevelopment is defined as restoring a well to its most efficient condition by various treatments or construction methods (Driscoll 1986). Deteriorating well performance can be caused by:

- Reduction in well yield resulting from chemical incrustation, biofouling, or formation materials clogging the well screen.

- Plugging of the formation around the well screen by fine particles.
- Well failure as a result of pumping sand, which may be associated with improper selection of sand filter pack, screen placement, or slot size.
- Structural collapse of the well casing or screen, which may be either human- or weather-induced.

Before recent efforts, many of the existing (historical) wells at NAS Fallon had not been sampled for about 4 or more years. Proper development is especially important at NAS Fallon as the shallow groundwater system is easily affected by runoff into wells that have been improperly constructed or that have become damaged over time. Well screens can be quickly affected by siltation because of the fine-grained nature of shallow silts and sands.

Wells that were determined to comply with state criteria and would likely be included in the monitoring well network were redeveloped before they were sampled for the RI or the basewide monitoring program. Redevelopment enables the current integrity of the well to be evaluated by measuring general groundwater characteristics and parameters, such as pH, specific conductance (SC), turbidity, and temperature, as well as fluctuations in water levels, to determine how readily these parameters stabilize. In addition, redevelopment helps to ensure that high-quality samples representative of actual groundwater conditions are collected. Water may stagnate in the borehole when wells are not sampled for a considerable period of time. Under these conditions, groundwater samples collected may not be representative of the actual chemical quality of the groundwater in the formation. To ensure that the groundwater quality is representative, groundwater within the well was agitated during well development by surging the well casing and purging out sediment-laden water until water quality parameters have stabilized. Standard operating procedures (SOP) for well development used at NAS Fallon are included in Appendix A. Well development forms are included in Appendix B. Table 2-4 shows redevelopment details, including well construction, depth to water prior to and after development, and notes recommending whether or not the well should be repaired, plugged, or replaced.

During fall 2007, more than 100 existing monitoring wells at NAS Fallon were investigated for redevelopment (Table 2-4). Several of the wells could not be redeveloped because of product or an obstruction in the well. Wells that were in good condition will continue to be monitored for floating product and water levels. Of the wells that were investigated for redevelopment, 20 were recommended to be plugged because they could not be developed or a construction issue was identified during development.

2.2.2 Well Repair

Also during fall 2007, a number of wells were repaired to correct minor construction issues (Table 2-5). Repairs were made to extend the useful life of wells that would otherwise require replacement. Examples of well repairs consisted of adding new polyvinyl chloride (PVC) risers to flush-mount wells, adding cement to a well annulus to promote greater integrity from runoff,

or adding a new cement pad to prohibit moisture or runoff from entering a well. Locks were also applied to all aboveground wells to prevent tampering.

2.2.3 Utility Clearance

Subsurface utilities were clearly identified and marked at all locations where intrusive activities were performed. All clearances needed for drilling and well repair were obtained in accordance with the Navy's established procedures and requirements. Locations of new wells or repairs were marked in the field with either rebar or a wooden stake, and the locations were marked on a map. The map was submitted to a utility location subcontractor and also to the NAS Fallon resident officer in charge of construction at least 2 weeks before intrusive field activities began. Tetra Tech worked with the Navy and the location subcontractor to obtain permits required before intrusive activities began.

2.2.4 New Well Installation and Development

A number of new monitoring wells were installed in 2007 and 2008 at key locations as part of the updated RI and in preparation for continued basewide groundwater monitoring (Table 2-6). New well locations were selected based on (1) data gaps identified during a review of previous data and field screening evaluations (SulTech 2007), and (2) a review of existing well construction logs to determine if existing wells in key locations were constructed properly for current sampling methods and quality requirements, as discussed in Section 2.1 of this report. In general, the new monitoring wells were designed so that the well is screened across the water table. After construction, the wells were developed using traditional purge and bail techniques and were then sampled by micropurge techniques. The Nevada Department of Water Resources was provided all required notices before new wells were installed.

The following sections describe the methods and procedures used in installing and developing these monitoring wells, as presented in the RI addendum work plan/sampling and analysis plan (SAP) (SulTech 2007). Additional detail on well installation, development, and sampling is provided in the SOPs found in Appendix A of this report.

2.2.4.1 Monitoring Well Installation

New wells to be used for the RI or basewide monitoring were installed and developed from August 2007 to October 2008. A listing of these wells, construction details, and development dates is included in Table 2-6. Well development forms for new wells are included in Appendix B-2. Lithologic logs and well completion reports are included in Appendix C-1.

All of the new monitoring wells were completed in the first saturated zone encountered. Monitoring wells were installed in boreholes drilled by hollow-stem auger (HSA) methods and conform to the general procedures described below. In some cases individual well designs as specified in the SAP were altered to ensure the well was screened at the appropriate depth because depth to groundwater at NAS Fallon is relatively shallow. However, regardless of

construction differences, an adequate seal was installed to prevent surface water from infiltrating into the well.

Each of the new monitoring wells was constructed of 2-inch diameter, flush-jointed PVC casing and factory-slotted screen. The screen intervals for the new wells ranged from 8 to 15 feet long and were positioned such that the wells were screened above and below the observed static water level in the borehole, if possible. The screens have 0.010- to 0.020-inch openings, depending on lithology. Centralizers were not necessary because of the shallow nature of the wells at NAS Fallon. Additional information regarding well construction is discussed in the work plan/SAP for the RI (SulTech 2007) and Appendix A of this report. Settlement of grout was checked 24 hours after it was placed. If needed, grout was added to bring the top back to ground surface.

For well locations where an aboveground completion was practical, the top of the PVC well casing was cut approximately 2.5 feet above ground surface and protected with an aboveground steel protective casing with a lockable lid. A concrete pad was also poured on the ground surface around the casing. The surface casing was extended approximately 36 inches above the ground surface. Steel protective posts were installed around the surface casing when necessary to protect the wellhead from vehicular damage. For well locations that required a flush mount completion, the PVC casing was cut approximately 0.5 foot bgs and a traffic rated vault placed within a concrete pad around the casing. A small notch was cut on the north side of the top of each PVC casing as a reference for future water level measurements. Each well casing has an airtight lockable cap to prevent infiltration of surface water.

2.2.4.2 Monitoring Well Development

Each monitoring well was developed to promote passage of water from the native formation, through the filter pack, and into the well casing (SulTech 2007). A minimum of 24-hours after placement of a grout seal, each well was developed according to American Society for Testing and Materials (ASTM) standards (including surging and pumping) and SulTech SOPs. At a minimum, a volume equal to the amount of any water used during drilling and monitoring well installation, plus three times the borehole volume (defined as the volume of water in the casing as well as in the pore space of the filter pack), was removed during development.

The pH, SC, turbidity, and temperature were regularly monitored during monitoring well development. Development continued until these parameters were stable over three readings and the required volume had been removed. The readings were considered stable when they did not change by more than 10 percent over three consecutive readings. Development data were recorded on well development forms (Appendix B).

Development water was placed in drums and labeled. The drums were moved to a central storage location until analytical data were received from the laboratory. When the data had been received, groundwater was shipped off site to an appropriate facility based on the levels of contamination detected.

2.2.5 Monitoring Well Dedicated Equipment

Dedicated sampling equipment was installed in selected wells as part of the basewide groundwater monitoring program. This dedicated monitoring equipment includes pressure transducers that provide continuous records of groundwater level fluctuations and low-flow stainless steel bladder pumps for groundwater sampling. The locations of the wells equipped with pressure transducers are shown in Figure 2-1. Dedicated monitoring equipment used for the various monitoring wells are also listed in Table 2-1.

Dedicated bladder pump systems were placed in all monitoring wells sampled as part of the basewide monitoring program. Dedicated stainless steel bladder pumps use low-flow micropurge methodology that ensures that the groundwater samples are selected at discrete zones with minimal disturbance. These systems ensure that groundwater quality samples are representative and that cross-contamination does not occur, since the individual micropurge pumps remain dedicated to individual wells. In addition, they eliminate the need for equipment rinsate samples.

Sixty pressure transducers were installed in selected monitoring wells to provide basewide coverage of groundwater fluctuations and to determine variations in groundwater level trends at the active IR sites and adjacent to the surface water drains. All of the pressure transducers are also equipped with temperature probes to measure fluctuations in water temperatures as well as water levels. Six of the pressure transducers in the vicinity of the E4X drain are also equipped with SC probes to quantify and determine fluctuations in SC and TDS. These measurements, coupled with the groundwater quality data, provide information on trends in groundwater concentrations, movement, and seasonal variations.

In addition to the dedicated equipment in the monitoring wells, in-situ velocity flow sensors were installed at Site 6 and Site 16 in 2008 to collect continuous groundwater velocities and flow direction data. One velocity sensor is installed at Site 6 and six velocity sensors are installed in the vicinity of Site 16 and the E4X drain. The groundwater velocity sensors heat the subsurface soils and the groundwater to between 20° and 30°Celcius above ambient conditions in the immediate area of the sensor. Heated groundwater flows through the natural formation soils and around the velocity sensor. Cooler water comes in contact with the surface along the upgradient face of the velocity sensor and warmer water trails around the downgradient face of the velocity sensor. The water temperature is measured as resistance in millivolts, with the millivolt signals transmitted to and stored in the datalogger at the surface. Each sensor records data on an hourly basis, the hourly groundwater temperature readings are compiled and averaged over 12-hour periods, and the data are downloaded quarterly. The measured differences in heat flow are reduced by an algorithm and converted to three-dimensional groundwater velocities based on the changes in water temperature around the circumference and length of the velocity sensor probe and on the time difference between the upstream and downstream measurements. Groundwater velocities are expressed in feet per year (ft/year) or feet per day (ft/day), the flow direction is expressed as an azimuth with respect to magnetic north in degrees, and the vertical flow direction is expressed with respect to horizontal in degrees.

2.2.6 Land Survey

All of the new and existing (historical) monitoring wells that are included in the monitoring well network were surveyed for horizontal and vertical position by a Nevada-licensed professional land surveyor in 2008. Wells that were modified, such as those that have been converted from flush mounts to aboveground completions, were resurveyed after they were repaired. All survey data are included in the Oracle database for NAS Fallon, as well in the Navy Environmental Data Delivery (NEDD) and Naval Installation Restoration Information System (NIRIS) database. The horizontal and vertical position of each point was established using known control monuments and benchmarks in coordination with base personnel. The horizontal position of each well was established to accuracy of 0.10 foot and the vertical position was established on the PVC riser to an accuracy of 0.01 foot. Horizontal coordinates were referenced to accepted control points that have been used in the past for investigations at NAS Fallon. Land survey coordinates are reported in Nevada State Plane Coordinates, Zone West 2703 in North American Vertical Datum of 1988 (NAVD 88), using Geoid Model 99 CONUS as a distance along the y-axis (northing) and x-axis (easting), and are reported in latitude and longitude. Vertical coordinates are referenced from known benchmarks and given in feet above mean sea level. Groundwater levels are measured from the surveyed top of well casing. Groundwater level measurements have been collected semiannually in over 100 monitoring wells or piezometers since 2008. The groundwater elevation data collected from 2008 through 2010 are provided in Table 2-7.

2.2.7 Monitoring Wells Recommended for Plugging

Monitoring wells that were not found to be in compliance with State of Nevada regulations and codes and were poorly constructed, damaged, or unusable for groundwater quality sample collection will not be considered part of the basewide monitoring well network and should be plugged.

Other criteria used in selecting wells and piezometers for plugging included their position relative to contaminant plumes. Certain wells or piezometers remained in the monitoring network for possible use during future remedial activities, even with minor construction problems or that did not meet the criteria to be used as monitoring wells, if they were within a plume or close to the leading edge of a plume. In addition, in some cases, older wells that were acceptable for use as monitoring wells but that were not downgradient or in the immediate area of a contaminant plume were retained as supplemental wells for potential future collection of water level or water quality data.

A list of wells and piezometers recommended to be plugged is provided in Table 2-2, and the locations of these wells are shown on Figures 2-6 through 2-10.

The purpose of plugging piezometers and wells is as follows:

- Prevent contamination spills or discharges from entering boreholes or damaged well casing.

- Eliminate physical hazards.

- Reduce the potential for stormwater runoff to enter boreholes.

General requirements for plugging a well are provided in NAC 534.420. If the casing in a well breaks free, the borehole should be plugged as outlined in NAC 534 under the section Boreholes: Plugging (NAC 534.4731). This method will be preferred and used for the majority of wells plugged at NAS Fallon.

- Wells should be overdrilled using an HSA or threaded steel pipe with teeth on the bottom of the casing, which is spun over the casing to be pulled. Once the casing is removed, the borehole should be completely sealed by pumping bentonite and cement grout through a tremie pipe starting from the bottom of the hole and brought to the surface as the auger flights are slowly removed. The auger flights will be removed only as grout is placed to ensure that no portion of the hole collapses. After the initial grout emplacement, the level of cement in the boreholes will then be checked after a 12-hour period to observe whether any formation loss has occurred. If loss has occurred, cement grout in each borehole will again be brought level with the ground surface. Each plugged borehole location will then be temporarily staked and clearly marked. After an additional period of at least 24 hours and not more than 48 hours, each borehole will be checked to be sure further formation loss has not occurred.

In the event that well locations either cannot be overdrilled or the well cannot be pulled from the ground, the following procedure will be followed:

- Plugging by Pressure Grouting with Monitoring Well in Place**:** The licensed drilling subcontractor will follow regulations outlined in NAC 534 under the section Monitoring Wells: Plugging (NAC 534.4365). However, discussion with the Division of Water Resources indicates that it considers most monitoring well casings installed at NAS Fallon too small to perforate and therefore perforation should be avoided. A representative from the Division of Water Resources should be consulted on a case-by-case basis for monitoring wells or structures with a diameter larger than 2 inches.

In the event that a small-diameter piezometer is pulled from the ground and the hole completely collapses, the following procedure should be followed:

- Small Diameter Well Point Removal and Plugging of the Borehole: The licensed drilling subcontractor will follow regulations outlined in NAC 534 under the section Boreholes: Plugging (NAC 534.4731).

In the event that a small-diameter well point that has no bentonite seal or sanitary cement seal is pulled from the ground and the borehole completely collapses, no further plugging of the hole is required per Nevada Department of Water Resources (Tetra Tech [March 2009]).

3.0 WELL UTILIZATION PLAN SUMMARY

This well utilization plan evaluated the suitability of existing wells listed in the Groundwater Well Inventory (SulTech 2006) for continued groundwater monitoring and also identified the NAS Fallon monitoring well network in the future. This plan also identified wells that are recommended to be plugged. Adherence to the plan ensures that all monitoring wells at NAS Fallon comply with and adhere to NAC Chapter 534, "Underground Water and Wells," using standardized methods to sample existing and new monitoring wells that comply with Nevada Revised Statutes 2005 Chapter 534 and the NDEP, "Guidance Document for Design of Groundwater Monitoring Wells" (NDEP 1996).

Existing wells that met these above criteria were redeveloped to ensure that the wells were in good condition and were capable of producing representative water quality samples. Existing wells with minor construction issues but that are considered useful to the IRP were repaired. Wells that could not be developed or that had significant construction issues were either recommended for plugging or were replaced. All new wells installed as part of the RI or basewide monitoring program comply with NAC Chapter 534.

Monitoring wells deemed not to comply with State of Nevada regulations and codes or were found to be unusable for groundwater quality sample collection are not considered part of the permanent basewide monitoring well network and are recommended to be plugged.

Based on the evaluation in this plan, a total of 283 wells are to remain in the monitoring network at NAS Fallon and a total of 153 wells are recommended for plugging. Table 3-1 is a summary of results of field activities related to development of the well utilization plan. Table 3-2 summarizes the number and function of wells that are actively being used for groundwater monitoring, existing supplemental wells that comply with the NAC 534 standards and can be used for future groundwater monitoring, as well as those wells that are recommended to be plugged. Specific groundwater monitoring strategies for the various IRP sites will be components of the remedial design, in accordance with the cleanup process documented in CERCLA. The long-term spatial coverage of the monitoring wells will be tied to the remedial action objectives and resultant cleanup and monitoring strategies that are defined in the remedial design, following the Record of Decision for the various IRP Sites. Table 3-3 shows an additional 233 wells and other items that will be considered for use in future remedial designs and evaluations.

Specific uses for wells included in the network for calendar year 2011 are as follows:

- 49 wells are scheduled for semiannual basewide water quality sampling
- 38 wells will be used in the basewide network as supplemental monitoring wells for water quality sampling if needed for future characterization efforts
- 99 wells will be used for semiannual water level and, if floating fuel is present, product thickness monitoring

- 97 wells and piezometers may be used in the network for future water level and product thickness monitoring related to remedial strategy development.

The monitoring well network is dynamic. The Navy will modify the monitoring well network, as necessary, to ensure that the wells used for future IRP activities at NAS Fallon follow NAC 534 standards. The current basewide groundwater monitoring program is intended to determine the stability of contaminants, monitor whether they are migrating off base, and to further develop and refine the basewide conceptual model. Any proposed changes to the basewide monitoring well network, analytical suite, or frequency will be documented in biannual monitoring reports and discussed with the state.

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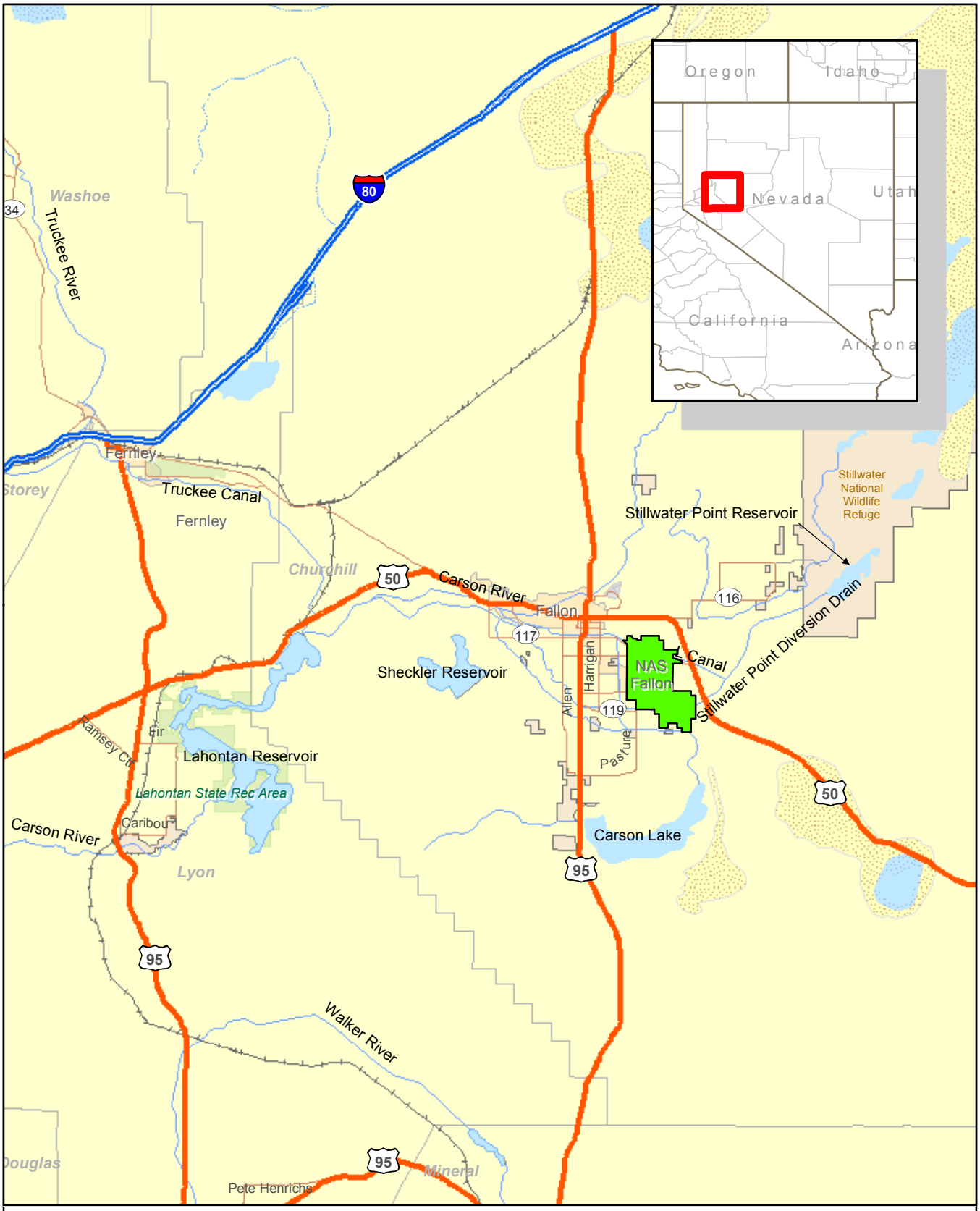
FIGURES



NAS FALLON BASE BOUNDARY

N

6 3 0 6 Miles

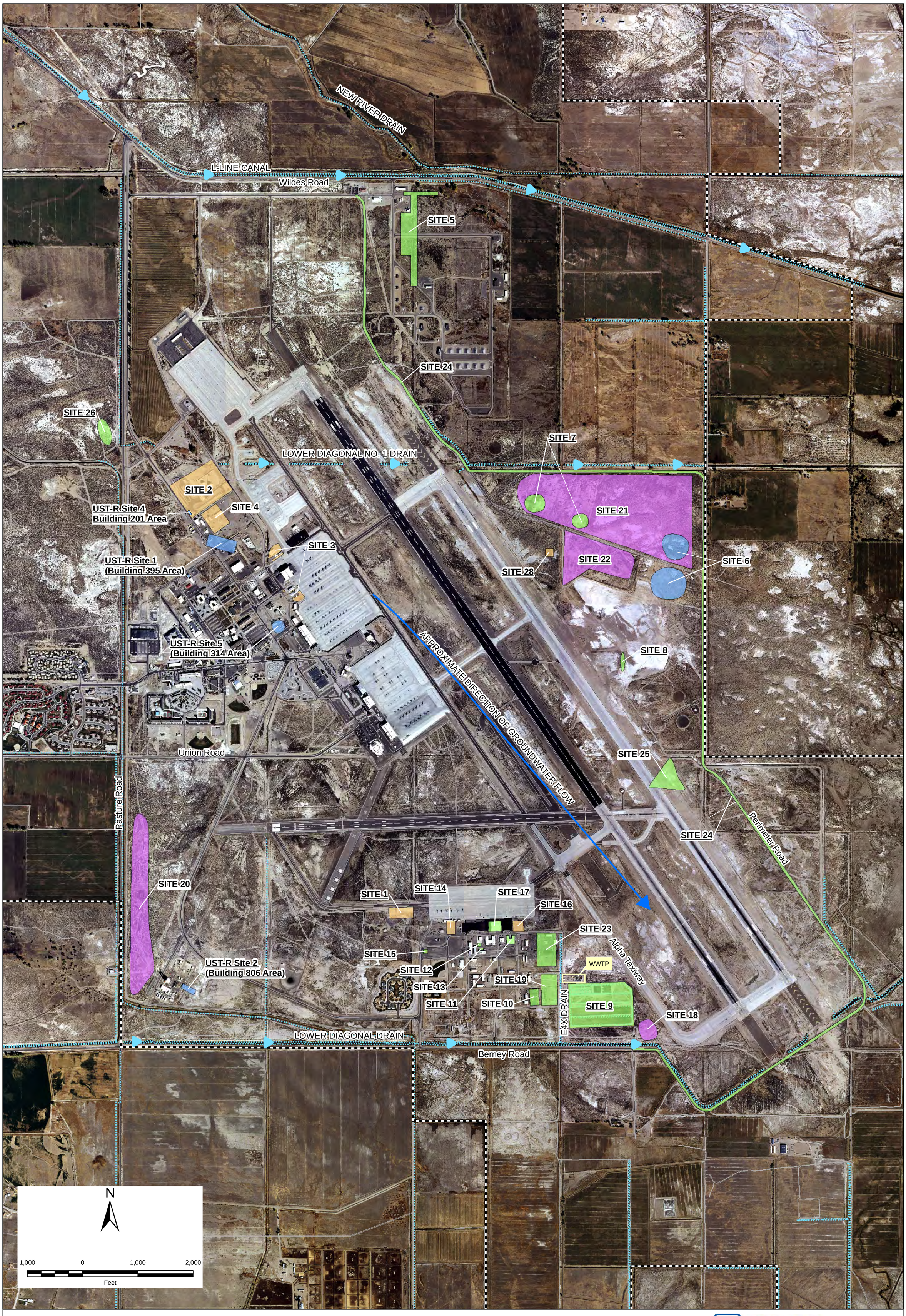
TETRA TECH EM, INC.

Naval Air Station Fallon

U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 1-1
FACILITY LOCATION MAP

01/20/09 C:\NAS Fallon\BasewideGWmonitoring\mxd\location_map_fig1-1.mxd TtEMI-MO M.Handley



DRAINAGE DITCH WITH SURFACE WATER FLOW DIRECTION

ACTIVE IRP SITE BOUNDARY

CLOSED IRP SITE BOUNDARY

ACTIVE UST SITE BOUNDARY

LANDFILL SITES WITH CONTINUED LIMITED MONITORING

ROADS

NAS FALLON BOUNDARY

WWTP - WASTEWATER TREATMENT PLANT

TETRA TECH EM, INC.

Naval Air Station Fallon

U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 1-2
INSTALLATION RESTORATION PROGRAM SITE LOCATIONS

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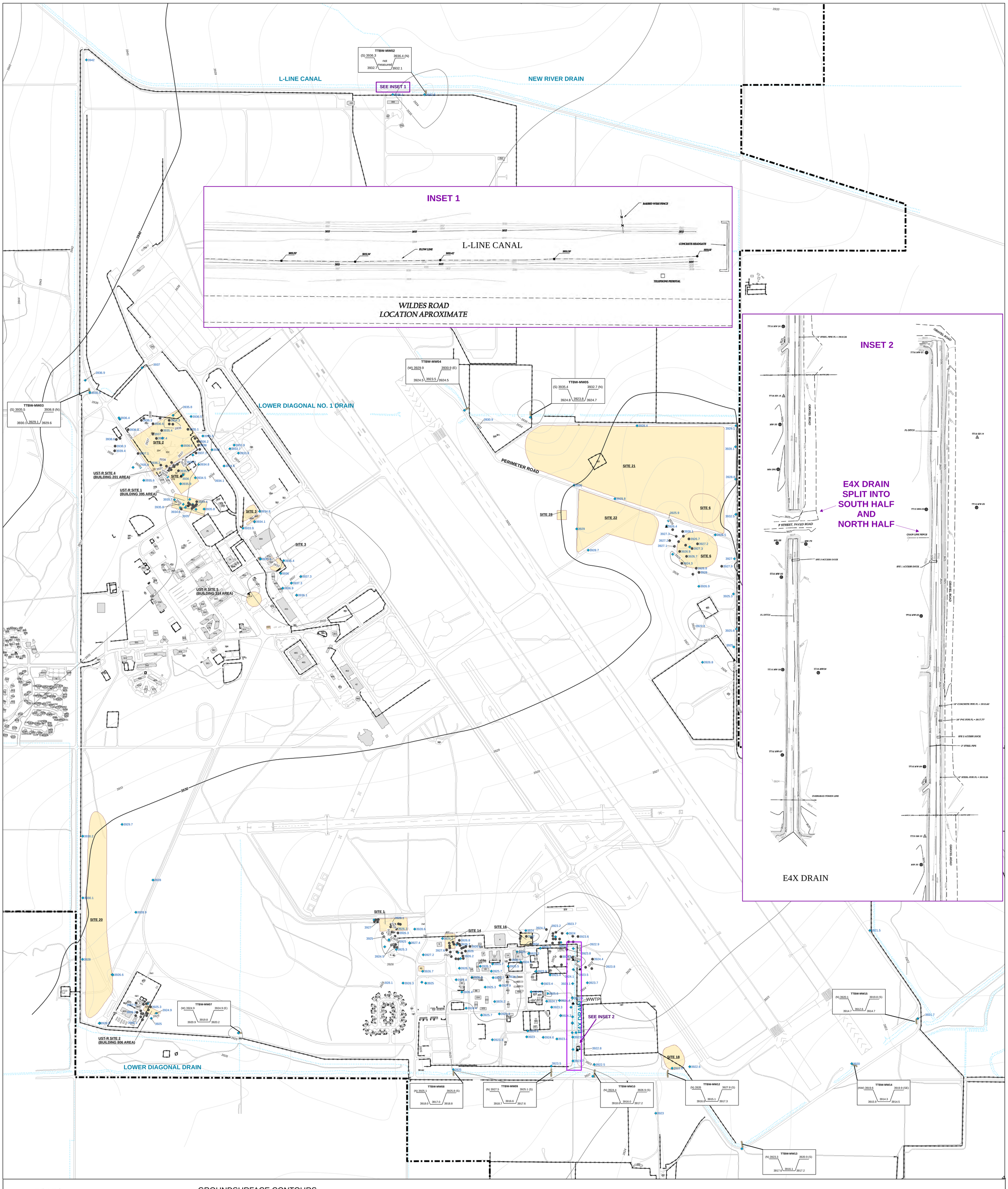


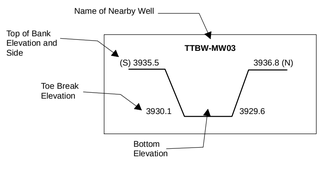
ROADS
FENCES
DRAINAGE DITCH
NAS FALLON BOUNDARY
BUILDING
SITE 1 SITE BOUNDARY

WWTP - WASTEWATER TREATMENT PLANT

GROUNDSURFACE CONTOURS
USGS (1985) AND SURVEY (2008)
10-foot
5-foot
1-foot

SOIL BORING AND GROUND SURFACE ELEVATION
SURFACE LOCATION
VELCITY SENSOR
MONITORING WELL AND GROUND SURFACE ELEVATION
OTHER CHANNEL SURVEY LOCATION

Typical Channel Cross Section Detail



N

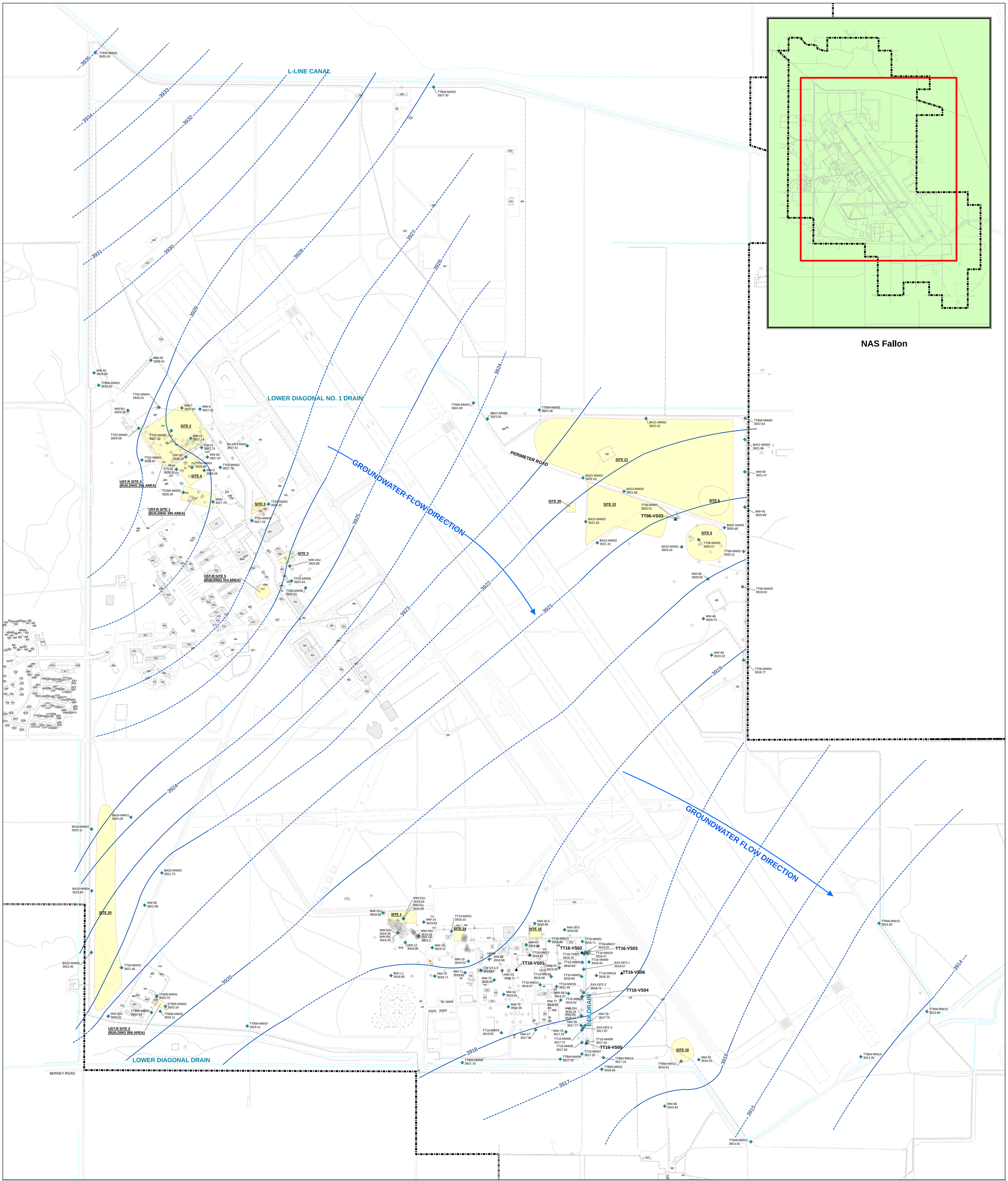
500 0 500 1,000
Feet

TETRA TECH EM, INC.

Naval Air Station Fallon
U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 1-3
TOPOGRAPHY
AND DRAINAGE FEATURES

2009-06-21 C:\NAS Fallon\BasewideGWmonitoring\mxd\BasewideMap_TOPO_FIG1-3.mxd TtEMI-MO Michelle Handley



ROADS
FENCES
DRAINAGE DITCH
NAS FALLON BOUNDARY
BUILDING
SITE 20 SITE BOUNDARY

MONITORING WELL WITH GROUNDWATER ELEVATION
EXISTING MONITORING WELL
VELOCITY SENSOR
WATER LEVEL CONTOUR FOR THE SHALLOW AQUIFER
WATER LEVEL CONTOUR DASHED WHERE INFERRED

N

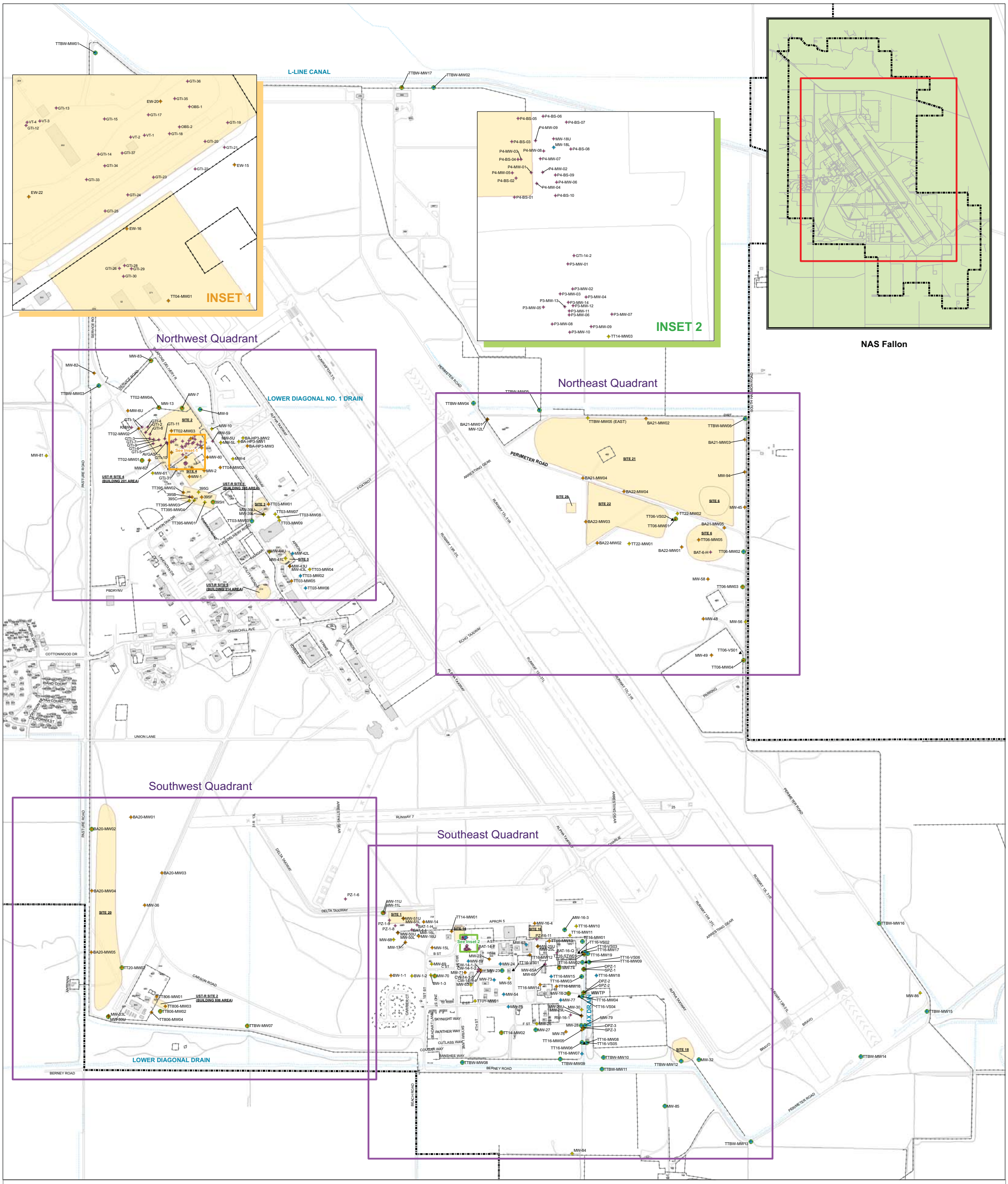
1,000 0 1,000 2,000
Feet

TETRA TECH EM INC.

Naval Air Station Fallon
U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 1-4
GROUNDWATER ELEVATION CONTOUR MAP, SPRING 2010

2011-2-18 C:\NAS Fallon\BasewideGWmonitoring\2010mxd\FIG3-1_BasewideMap_wlMARCH10.mxd TtEMI-MO Michelle Handley



ROADS
FENCES
DRAINAGE DITCH
NAS FALLON BOUNDARY
BUILDING
SITE 17 SITE BOUNDARY

MONITORING WELL SAMPLED SEMIANNUALLY FOR WATER QUALITY
OBSERVATION WELL USED FOR SEMIANNUAL WATER LEVEL MONITORING
SUPPLEMENTAL MONITORING WELL INCLUDED IN THE BASEWIDE MONITORING WELL NETWORK (NOT CURRENTLY SAMPLED FOR WATER QUALITY)
SUPPLEMENTAL OBSERVATION WELL FOR WATER LEVEL/PRODUCT MEASUREMENTS (NOT CURRENTLY USED BUT AVAILABLE FOR FUTURE REMEDIATION MONITORING, IF NEEDED)
VELOCITY SENSOR (DOWNLOADED QUARTERLY)
MONITORING WELL OR PIEZOMETER EQUIPPED WITH A PRESSURE TRANSDUCER

WWTP - WASTEWATER TREATMENT PLANT

N

1,000 0 1,000 2,000
Feet

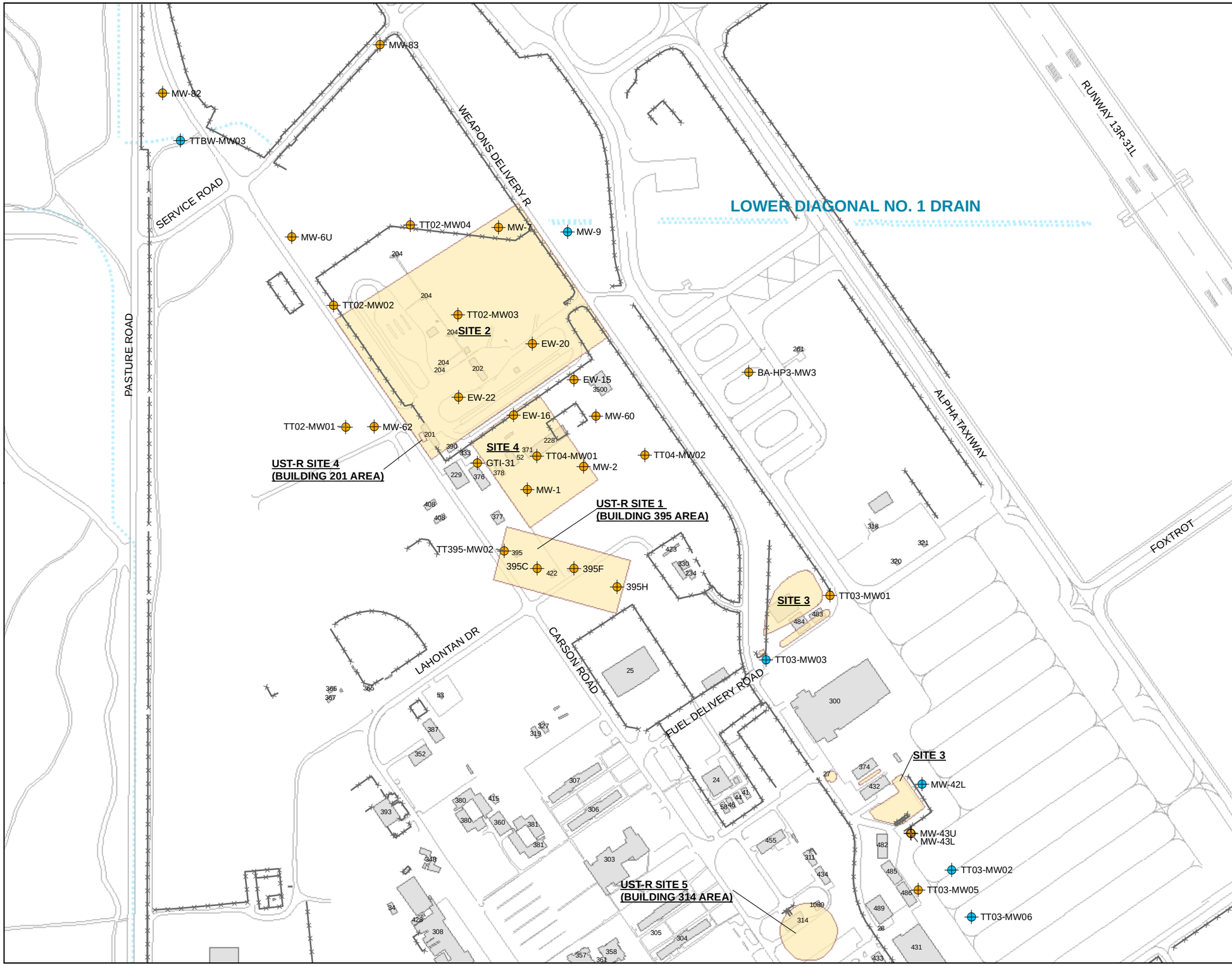
TETRA TECH EM INC.

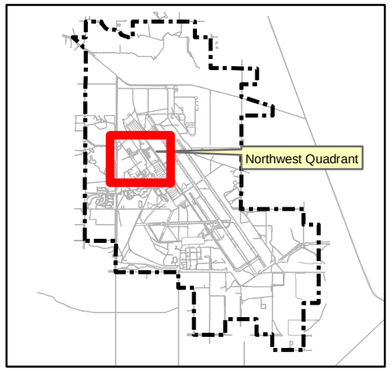
Naval Air Station Fallon
U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 2-1
MONITORING WELL NETWORK LOCATION MAP

Basewide Well Utilization Plan

2009-02-21 C:\NAS Fallon\Basewide\GIWmonitoring\mxd\Basewide Map_BIG_FIG2-1.mxd TEMI-MO Michelle Handley





Monitoring Well Sampled Semiannually for Water Quality

Observation Well Used for Semiannual Water Level Monitoring

Roads

Fences

Drainage Ditch

Building

NAS Fallon Boundary

SITE 17 Site Boundary

N

400 0 400

Scale in Feet

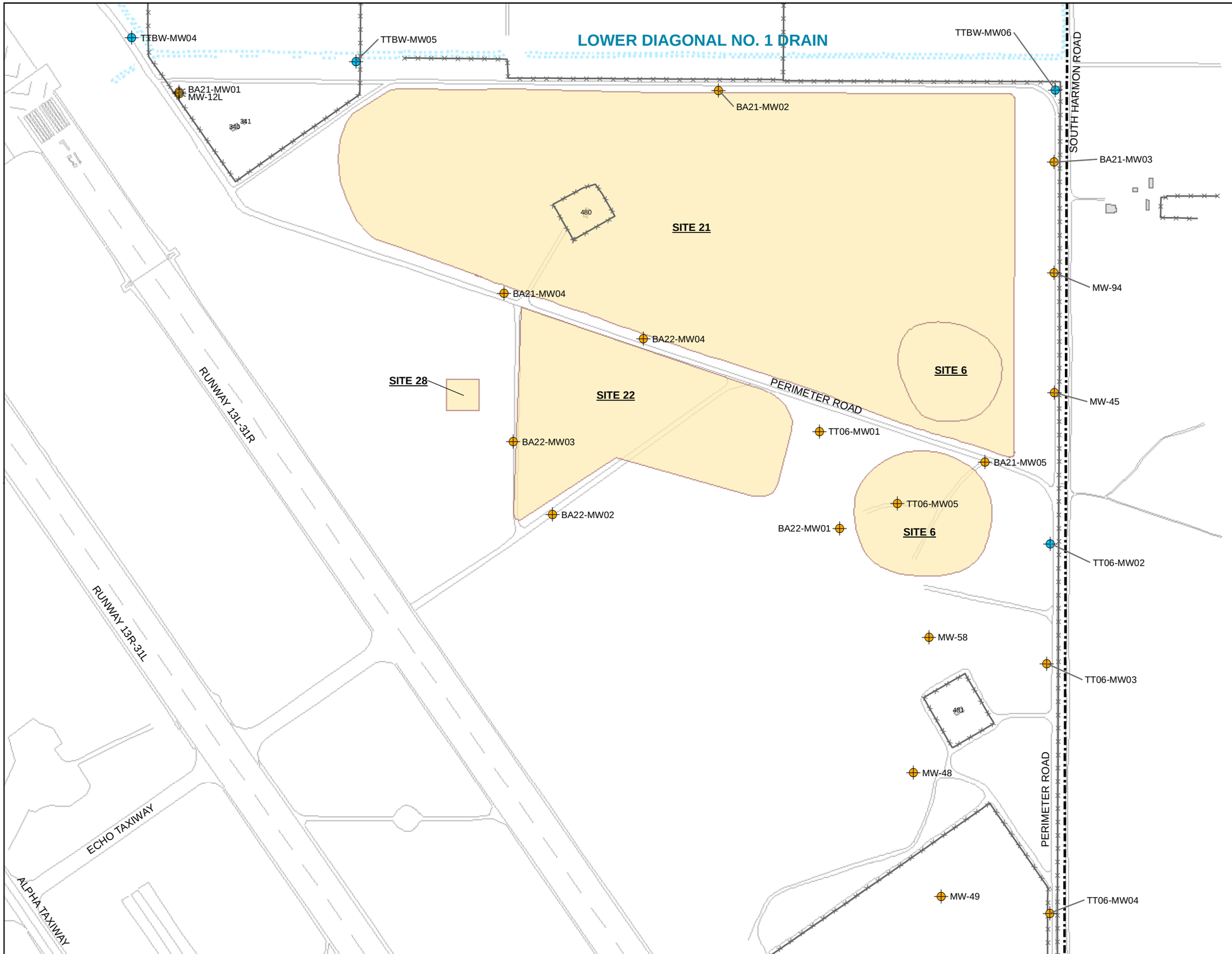
TETRA TECH EM INC.

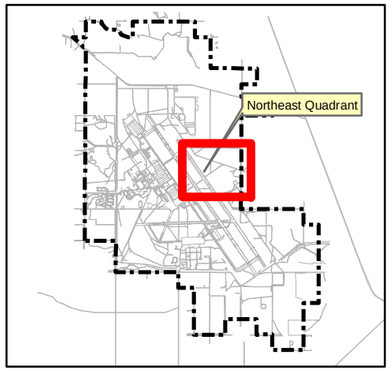
Naval Air Station Fallon

U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 2-2
MONITORING WELL NETWORK LOCATION MAP NORTHWEST QUADRANT

Basewide Well Utilization Plan





Monitoring Well Sampled Semiannually for Water Quality

Observation Well Used for Semiannual Water Level Monitoring

Roads

Fences

Drainage Ditch

Building

NAS Fallon Boundary

SITE 17 Site Boundary

N

450 0 450

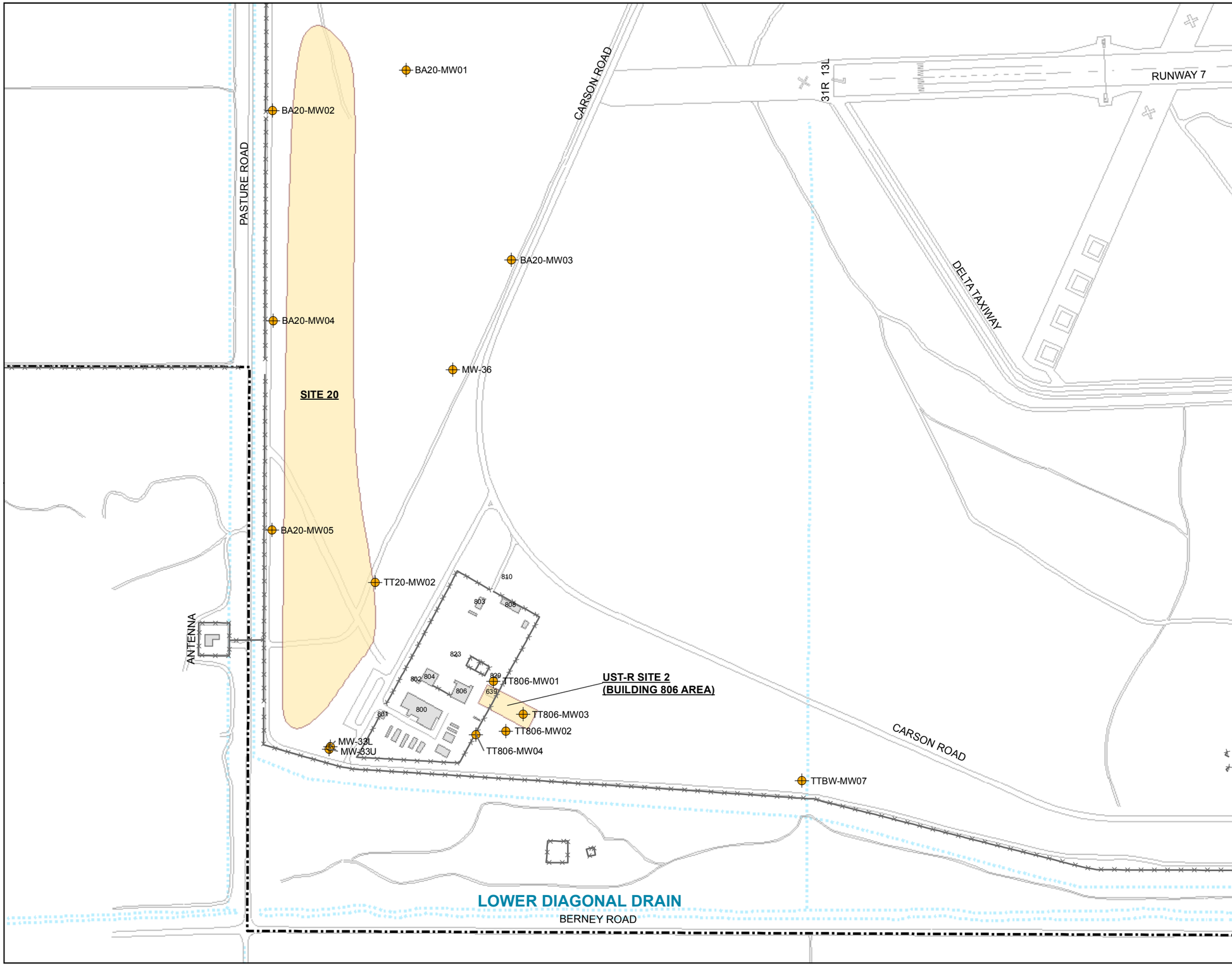
Scale in Feet

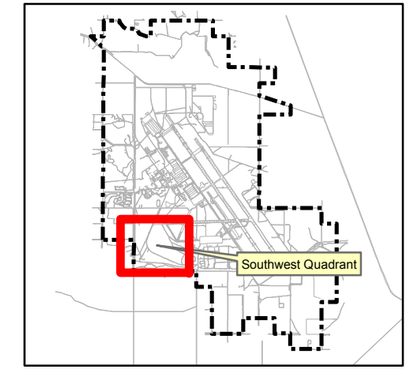
TETRA TECH EM INC.

Naval Air Station Fallon
U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 2-3
MONITORING WELL NETWORK LOCATION MAP
NORTHEAST QUADRANT

Basewide Well Utilization Plan





Observation Well Used for Semiannual Water Level Monitoring

Roads

Fences

Drainage Ditch

Building

NAS Fallon Boundary

SITE 17 Site Boundary

N

450 0 450

Scale in Feet

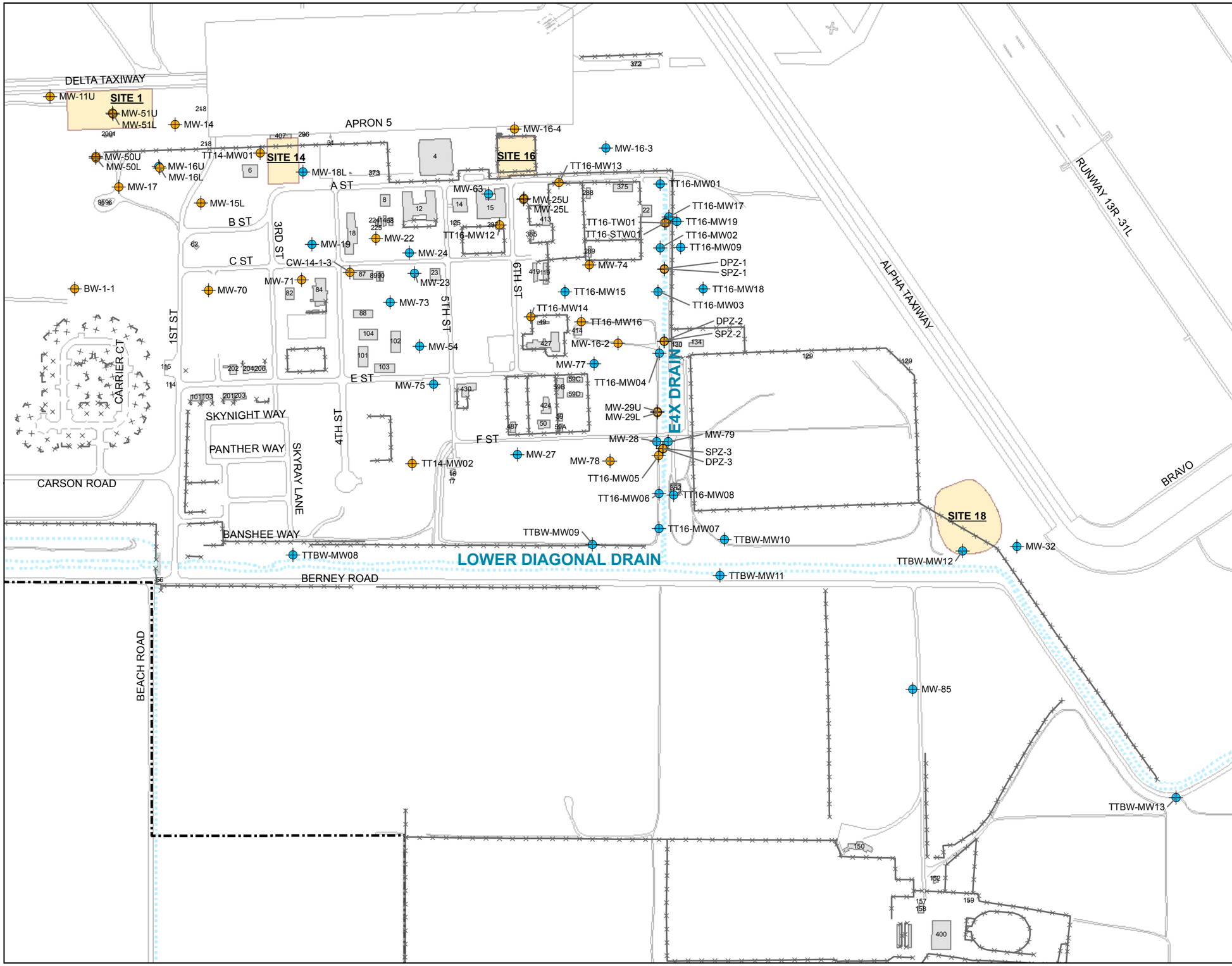
TETRA TECH EM INC.

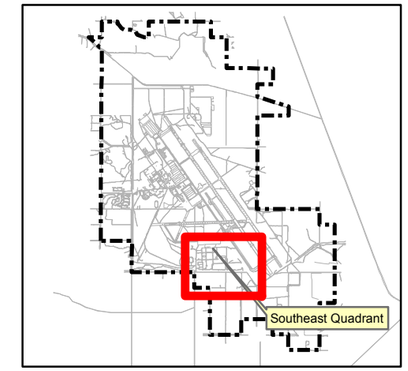
Naval Air Station Fallon

U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 2-4
MONITORING WELL NETWORK LOCATION MAP
SOUTHWEST QUADRANT

Basewide Well Utilization Plan





Monitoring Well Sampled Semiannually for Water Quality

Observation Well Used for Semiannual Water Level Monitoring

Roads

Fences

Drainage Ditch

Building

NAS Fallon Boundary

SITE 17 Site Boundary

N

500 0 500

Scale in Feet

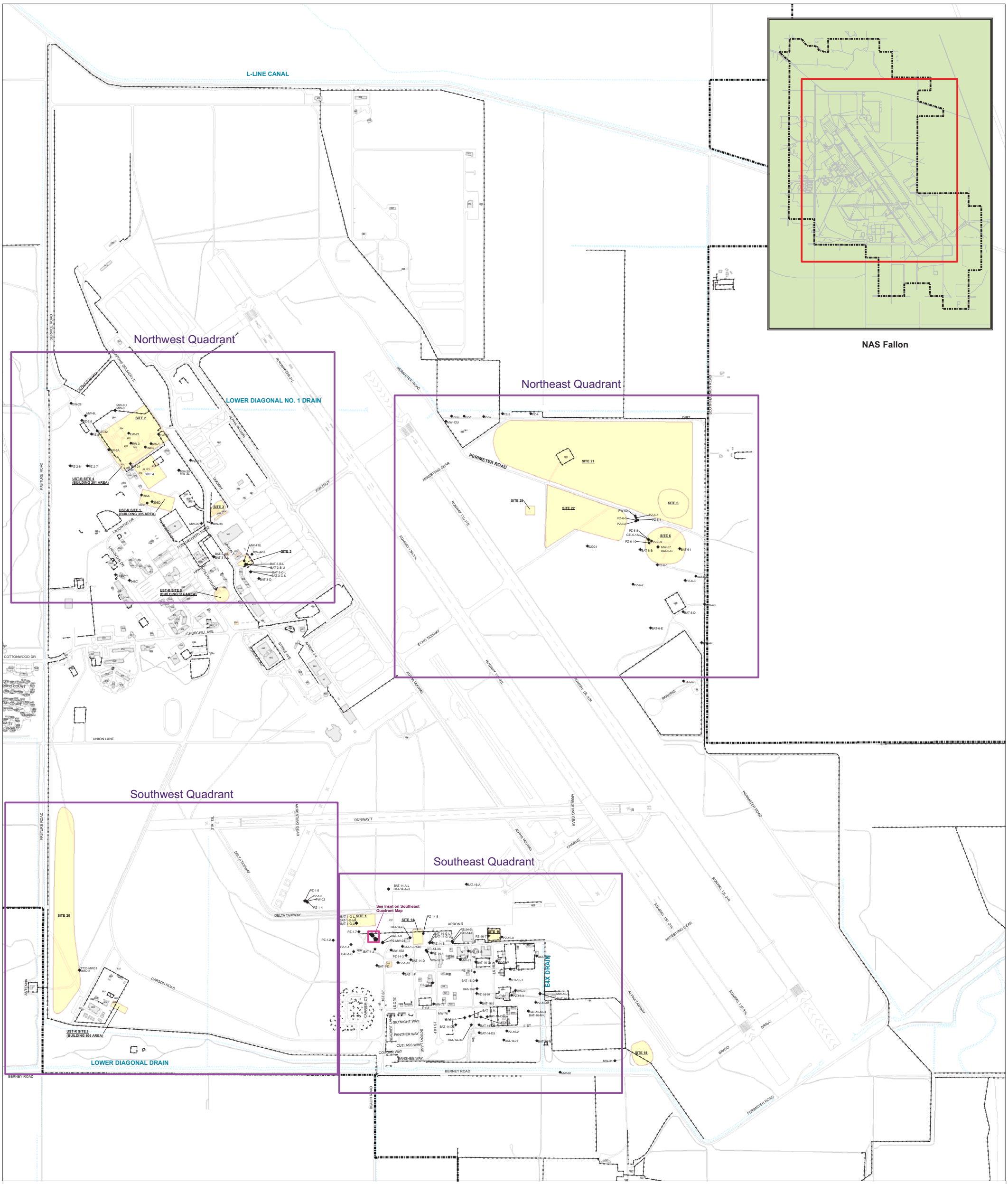
TETRA TECH EM INC.

Naval Air Station Fallon

U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 2-5
MONITORING WELL NETWORK LOCATION MAP
SOUTHEAST QUADRANT

Basewide Well Utilization Plan



TETRA TECH EM INC.

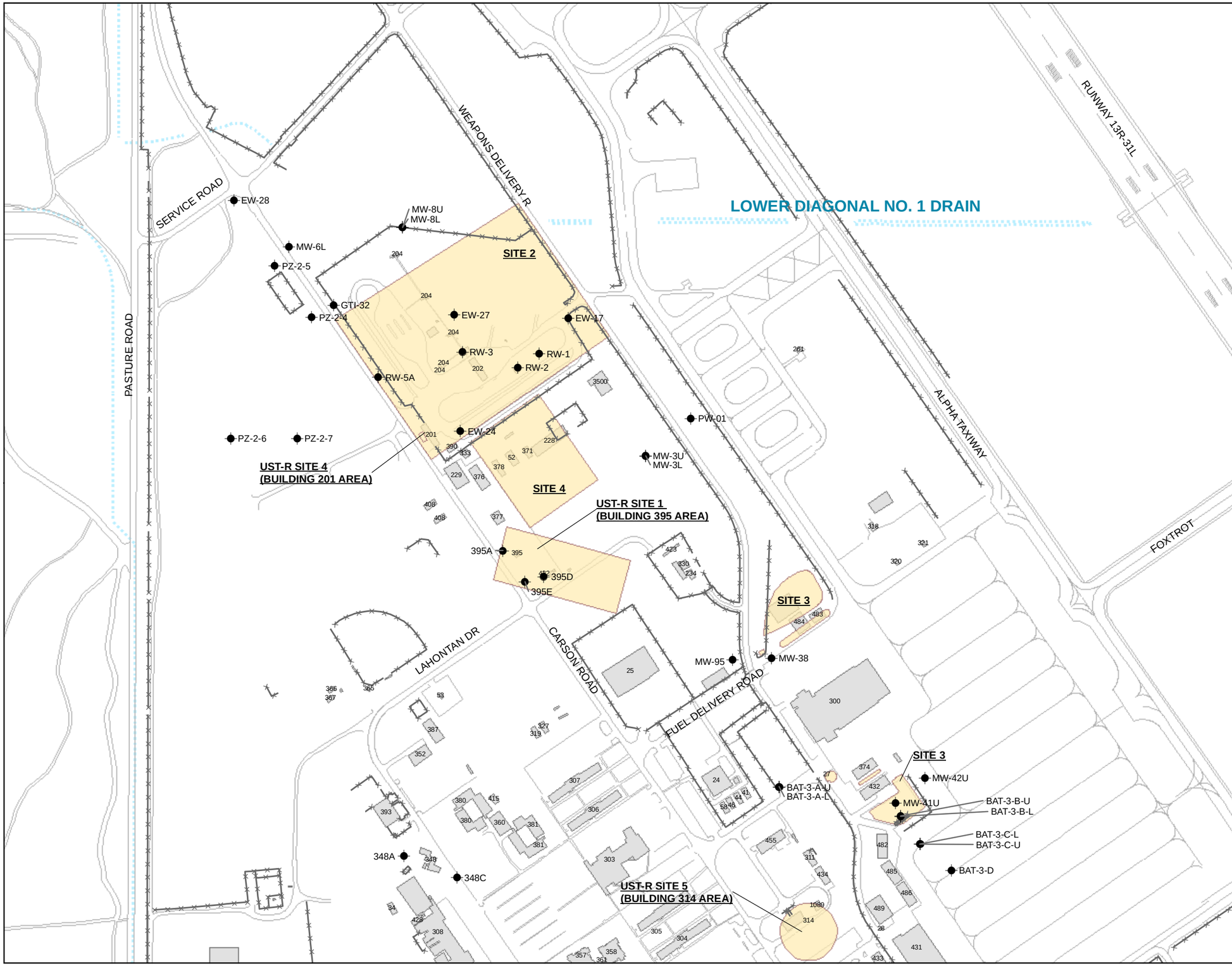
Naval Air Station Fallon

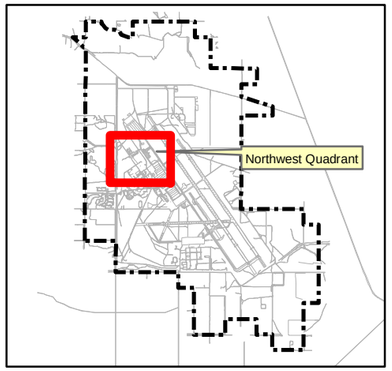
U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 2-6
LOCATIONS OF WELLS TO PLUG

Basewide Well Utilization Plan

2007-09-05 C:\NAS Fallon\BasewidesGW\monitoring\mxd\BasewideMap_BIG.mxd TEMI-MO Michelle Handley





Existing Monitoring Well to be Plugged

Roads

Fences

Drainage Ditch

Building

NAS Fallon Boundary

SITE 17 Site Boundary

N

400 0 400

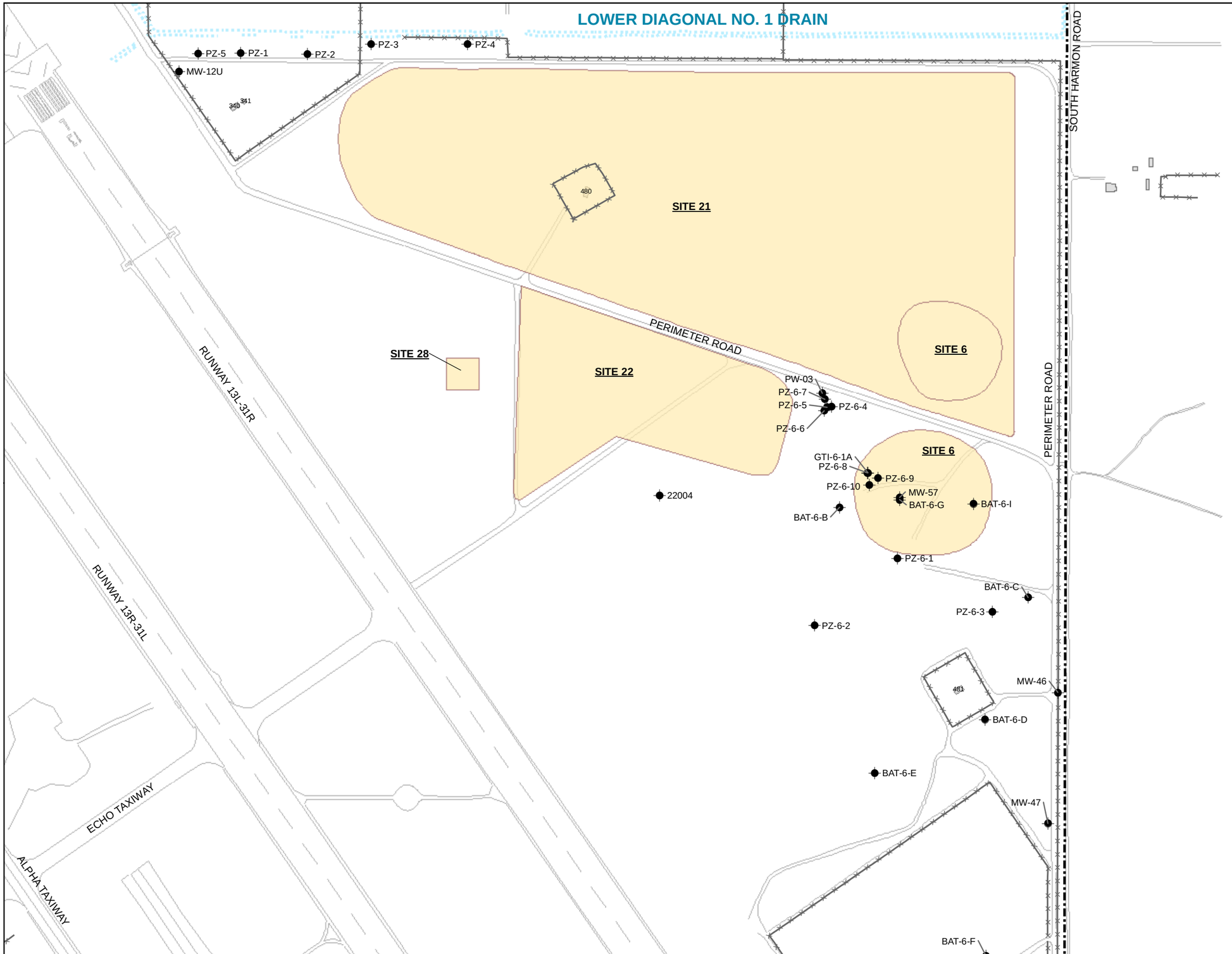
Scale in Feet

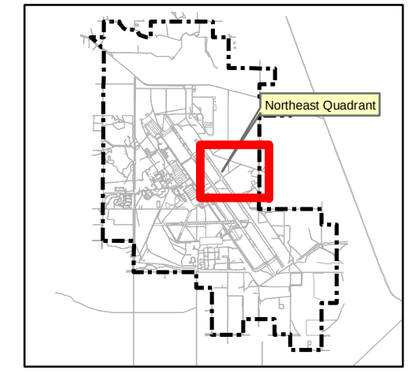
TETRA TECH EM INC.

Naval Air Station Fallon
U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 2-7
LOCATIONS OF WELLS TO PLUG
NORTHWEST QUADRANT

Basewide Well Utilization Plan





Existing Monitoring Well to be Plugged

Roads

Fences

Drainage Ditch

Building

NAS Fallon Boundary

SITE 17 Site Boundary

N

450 0 450

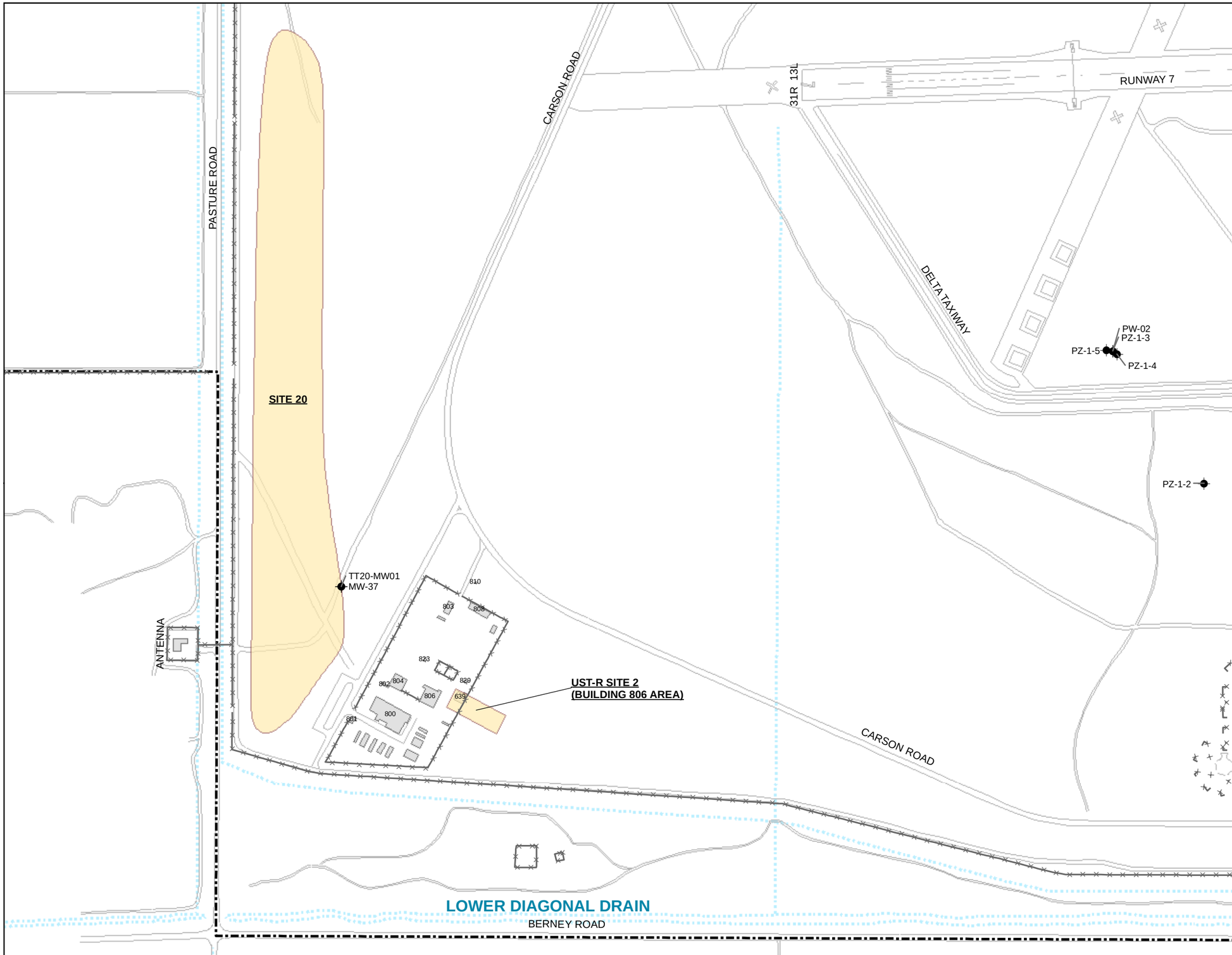
Scale in Feet

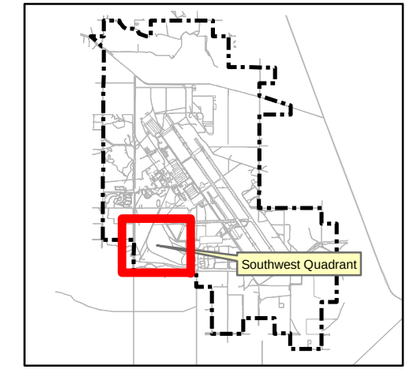
TETRA TECH EM INC.

Naval Air Station Fallon
U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 2-8
LOCATIONS OF WELLS TO PLUG NORTHEAST QUADRANT

Basewide Well Utilization Plan





Existing Monitoring Well to be Plugged

Roads

Fences

Drainage Ditch

Building

NAS Fallon Boundary

SITE 17 Site Boundary

N

450 0 450

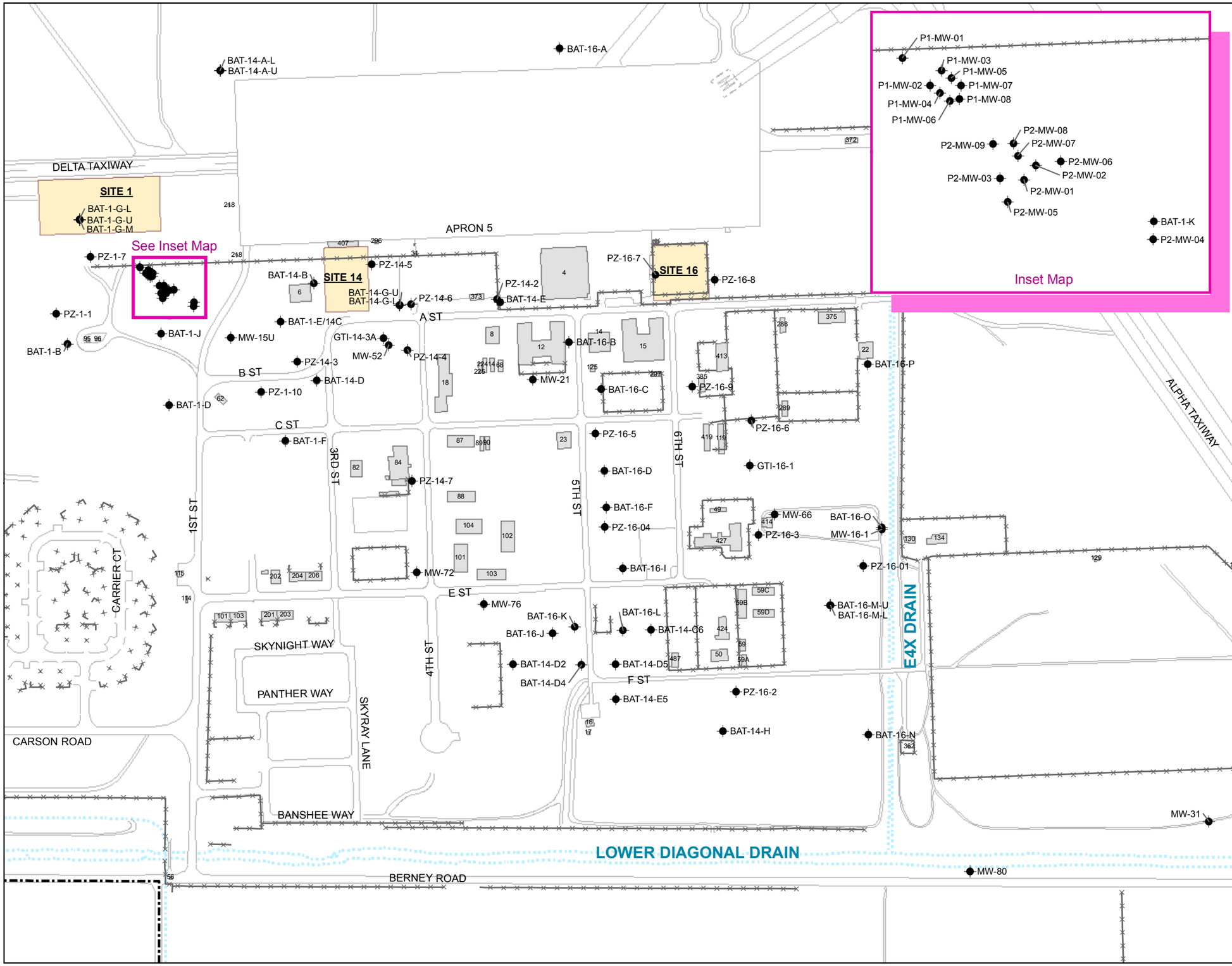
Scale in Feet

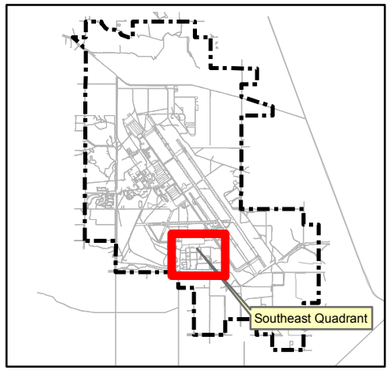
TETRA TECH EM INC.

Naval Air Station Fallon
U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 2-9
LOCATIONS OF WELLS TO PLUG SOUTHWEST QUADRANT

Basewide Well Utilization Plan





Existing Monitoring Well to be Plugged

Roads

Fences

Drainage Ditch

Building

NAS Fallon Boundary

SITE 17 Site Boundary

N

350 0 350

Scale in Feet

TETRA TECH EM INC.

Naval Air Station Fallon

U.S. Navy, NAVFAC Southwest, San Diego, CA

FIGURE 2-10
LOCATIONS OF WELLS TO PLUG
SOUTHEAST QUADRANT

Basewide Well Utilization Plan

TABLES

WELL INVENTORY LEGEND
Naval Air Station Fallon, Fallon, Nevada

AGC	above ground completion
amsl	above mean sea level
AR	Administrative Record
bgs	below ground surface
D	damage
diam	diameter
Draft GW Pilot Study 2003	*Draft Groundwater Pilot Study.* Battelle. 2003
"Fallon NAS Wells" document	A folder labeled "Fallon NAS Wells" was obtained from the Navy and it contains loose leaf information without reference to reports or specific field efforts.
Final GW Pilot Study 2004	*Final Groundwater Pilot Study.* Battelle. 2004
ft	feet
Frac	fraction
GW	groundwater
ID	identification
in	inches
KMW	Kinder Morgan Well
M. Place	Phone conversation with Matt Place of Battelle who was on-site and oversaw well installation
MW	monitoring well
N	no
N/A	not applicable
NAC	Nevada Administrative Code
NAD 83	North American Datum of 1983
NASF	Naval Air Station Fallon
MWL	Master Well List
None	The information was not contained in the Master Well List
O	Other - this notation is used for well logs. In the instance where "O" is indicated there is not a dedicated well log, but there is a generic well log and a table containing well construction information. Specifically, this reference is to the "BAT" wells.
ORNL	Oak Ridge National Laboratory
PVC	polyvinylchloride
PZ	peizometer
regs	regulations
RR	remediation or recovery
SATO Report	"Soil and Groundwater Sampling at 4th and C Street," and "Soil and Groundwater Sampling of 3 Monitoring Wells Placed North of the Base Housing Area." January and February 2005, respectively. Sato Environmental Consultants, Inc.
SS	stainless steel
TBP	to be provided
TOC	top of casing
Trend analysis	"Trend Analysis and Updated Plume Assessment for Naval Air Station Fallon, Nevada," Battelle October 31, 2003.
UTM	universal transverse Mercator, designated as North (N) and East (E)
xls	Excel
Y	yes
150RPRINT MONITORING WELLS document	A two page document with a leading line "150PRINT MONITORING WELLS" contains a list of location coordinates and elevations.
2004/2005 Survey	Survey information obtained from survey (Lumos and Associates - Fallon, NV) efforts in August or October, 2004 or February 2005

Electronic File Color Code:

R	Red Text: Well damaged beyond repair, well is not found, or well is dry and silted in
O	Orange Text: Likely opportunity to repair the well
P	Pink Text: Though found, the well has been abandoned and cannot be used for further investigations
G	Green Text: Though listed in "Other items on site" point is screened and could be used as a monitoring well if a waiver was sought

Notes:
"Assigned" site vicinity was determined by TTEMI based on RI/Master List site and professional interpretation.
The document listed in the "AR listed in NASF Master Well List" is the document identifier (i.e. Doc #139), which corresponds to the labeling system in the AR.
2004/2005 TOC elevations were surveyed in the North American Vertical Datum of 1988.

TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Site 1																		
BAT-1-H	Y	9/18/1997	AGC	2	3929.23	PVC	0.75	17.75	17.75	3.75	14-17.75	Natural Sand	Well diameter is less than 1-inch and does not fit NAC criteria, but may be useful for monitoring during remedial design and remediation	Supplemental well for delineating the eastern extent of the Site 1 free product plume	None	N/A	0	N/A
BAT-1-I	Y	9/18/1997	AGC	2	3926.79	PVC	0.75	10.25	10.25	3.75	6.5-10.25	Silica Sand	Well diameter is less than 1-inch and does not fit NAC criteria, but may be useful for monitoring during remedial design and remediation	Supplemental well for delineating the eastern extent of the Site 1 free product plume	None	N/A	4	9/1/1999
BW-1-1	Y	10/18/2004	**2.777**	12	**3930.853**	PVC	2	13.40	13.40	10	3.4-13.4	20/30 Sand Pack	Well redeveloped on 9/6/07, Installed surface completion and bollards on 09/10/07	Basewide water level measurement	None	N/A	0	N/A
BW-1-2	Y	10/18/2004	**2.77**	12	**3929.121**	PVC	2	14.2	14.20	10	4.2-14.2	20/30 Sand Pack	Well redeveloped on 9/6/07, Installed surface completion and bollards on 09/10/07.	Monitor nature & extent of contamination for RI; keep as supplemental well for basewide.	None	N/A	2	12/1/2007
BW-1-3	Y	10/18/2004	**2.96**	12	**3928.396**	PVC	2	14.00	14.00	10	4-14	20/30 Sand Pack	Well redeveloped on 9/6/07, Installed surface completion and bollards on 09/10/07	Proximal to wells BW-1-1 and BW-1-2; keep as supplemental well for basewide, if needed.	None	N/A	0	N/A
MW-11L	Y	6/25/1990	**-0.15**	8	**3926.093**	PVC	2	85	80	10	70-80	8/12 Frac Sand	No redevelopment or repairs made	Water level measurements	None	N/A	1	7/14/1990
MW-11U	Y	6/26/1990	**2.86**	8	**3929.105**	PVC	2	20	15	10	5-15	8/12 Frac Sand	Well redeveloped on 9/5/07, Installed surface completion and bollards on 09/11/07. No contaminants detected from RI sampling. Well is upgradient of Site 1.	Monitor water level and temperature	Pressure transducer, micropurge pump	N/A	7	9/30/2008
MW-14	Y	3/5/1991	**-0.25**	8	**3928.328**	PVC	2	25	15	10	5-15	8/20 Frac Sand	Well redeveloped on 9/26/07. Well is located east and near leading edge of plume.	Basewide water level measurement	Micropurge pump	N/A	12	3/28/2009
MW-15L	Y	3/6/1991	**-0.06**	8	**3927.158**	PVC	2	25	19	5	14-19	8/20 Frac Sand	Well redeveloped on 2/22/07.	Basewide water level measurement	Micropurge pump	N/A	16	3/29/2009
MW-16L	Y	3/6/1991	**0.05**	8	**3927.372**	PVC	2	30	25	5	20-25	8/20 Frac Sand	Well redeveloped on 9/22/07.	Basewide water level measurement	Micropurge pump	N/A	10	3/29/2009
MW-16U	Y	3/6/1991	**-0.01**	8	**3927.368**	PVC	2	15	15	5	10-15	8/20 Frac Sand	Well redeveloped on 9/22/07.	Monitor contaminants in the upper shallow aquifer for RI and basewide	Micropurge pump	VOCs, PAHs, TDS	26	10/17/2010
MW-17	Y	3/7/1991	**-0.30**	8	**3925.016**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Well redeveloped on 9/22/07.	Basewide water level measurement	None	N/A	11	12/2/2007
MW-50L	Y	11/18/1991	**2.93**	8	**3928.264**	PVC	2	23	21.8	10	11.8-21.8	#2 Frac Sand	Well redeveloped on 9/5/07, installed surface completion and pad on 09/11/07.	Basewide water level measurement	None	N/A	8	11/2/1999
MW-50U	Y	11/19/1991	**2.87**	8	**3928.122**	PVC	2	16	15	10	5-15	#2 Frac Sand	Well redeveloped on 9/5/07, Installed surface completion and pad on 09/11/07.	Basewide water level measurement	None	N/A	4	12/3/2007
MW-51L	Y	11/19/1991	**-0.01**	8	**3928.318**	PVC	2	26	26	10	16-26	#2 Frac Sand	Well redeveloped on 9/26/07.	Basewide water level measurement	Micropurge pump	N/A	8	10/1/2008
MW-51U	Y	11/19/1991	**0.07**	8	**3928.301**	PVC	2	16	15	10	6-16	#2 Frac Sand	Well contained product on 9/26/2007. Did not develop.	Continue to measure water level and product thickness.	None	N/A	12	10/22/2003
MW-68	Y	3/15/1996	**2.97**	12	**3927.064**	PVC	2	17	17	10	4-14	#20 Sand	Well developed 9/5/2007. Repairs made on 9/11/07. Removed concrete pad. PVC riser installed. Installed new concrete pad.	Monitor contaminants in the shallow aquifer for RI; do not plan to use initially (supplemental well) for basewide.	None	N/A	5	12/2/2007
MW-69	Y	3/15/1996	**3.08**	12	**3929.75**	PVC	2	22	22	15	5-20	#20 Sand	Well developed 9/5/2007. Repairs made on 9/11/07. PVC riser set and Protective casing set. Set 4 crash posts around the well pad.	Monitor contaminants in the shallow aquifer for RI; keep as supplemental well for basewide	None	N/A	7	12/2/2007
MW-70	Y	3/15/1996	**2.59**	12	**3927.63**	PVC	2	22	22	15	5-20	#20 Sand	Well developed 9/22/2007 and converted to an above ground surface completion on 6/03/2008.	Monitor water level and temperature	Pressure transducer, micropurge pump	N/A	9	3/26/2009
MW-71	Y	3/19/1996	**-0.44**	12	**3927.00**	PVC	2	22	22	15	5-20	#20 Sand	Well developed on 9/23/2007. Left as flush mount as it is in parking lot. Marker added??	Basewide water level measurement	Micropurge pump	N/A	9	3/27/2009

TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Site 1																		
TT01-MW01	Y	11/10/2007	**2.26**		**3926.65**	PVC	2	22	18	15	3-18	2/16 Frac Sand	Developed on 11/12/2007; replacement well for MW-72 installed 11/10/07 by pulling out casing and overdrilling.	Keep as a supplemental well for basewide, if needed.	None	N/A	2	10/2/2008
PZ-1-6	Y	12/5/1991	FM	5	3925.94	PVC	1.5	18	15	10	5-15	8/20 Frac Sand	Provides an additional observation point northwest (upgradient) of Site 1	Supplemental well for water level monitoring purposes	None	N/A	0	N/A
PZ-1-8	Y	12/5/1991	FM	4	3925.03	PVC	1	18	15	10	5-15	8/20 Frac Sand	Supplemental well for free product monitoring/remediation	Supplemental well for water level monitoring purposes	None	N/A	0	N/A
PZ-1-9	Y	12/5/1991	FM	4	3925.37	PVC	1	18	15	10	5-15	8/20 Frac Sand	Supplemental well for free product monitoring/remediation	Supplemental well for water level monitoring purposes	None	N/A	0	N/A

Notes:

Monitoring wells that will be sampled for water quality analyses semiannually.
Observation wells used for seminannual water level monitoring, but not water quality sampling.
Observation well where floating fuel product has been measured in the well and product thickness and water levels will be measured semiannually.
Supplemental well to monitoring well network but not planned for water quality sampling at present.
Supplemental well to monitoring well network that may be used for water level/product measurements to monitor future remediation strategies.

TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
UST-R SITE 1 (BUILDING 395 AREA)																		
395B	Y	12/8/1994	FM	12	3937.30	SS	4	18.5	17.5	10	5-15	#2/12 Sand	Condition of the well was noted in the Monitoring Well Inventory Report, "Cap is taped over the top and needs to be replaced. Well log indicates a depth of 18.5 ft, however video log and water level show a depth of 17.5 ft. The bottom of well can be seen and only about 1 inch of silt is present. Well log screen drawn as 6-16 ft."	Supplemental well for free product monitoring/remediation.	None	N/A	2	9/1/1996
395C	Y	12/7/1994	-0.761	12	**3934.85**	SS	4	18	17	10	5-15	#2/12 Sand	Well log indicates a depth of 17.5ft, however video log and water level show a depth of 17.0ft. The bottom of well can be seen and only about 2 inches of silt are present.	Observation well for water level and free product monitoring	None	N/A	2	9/1/1996
395F	Y	3/22/1996	**1.12**	8	**3936.046**	PVC	2	22	22	15	5-20	#20 Sand	Developed on 9/11/2007. 0.92 ft of product measured in well. Added PVC riser, protective casing and new concrete pad on 9/13/2007.	Continue to measure water level and product thickness.	None	N/A	6	10/18/2002
395G	Y	3/26/1996	**3.08**	8	**3937.761**	PVC	2	22.5	22	15	5-20	#20 Sand	Developed on 9/11/2007. Added PVC Riser, protective casing and new concrete pad on 9/13/2007.	Monitor contaminants in the shallow aquifer for RI; keep as supplemental well for basewide. Monitoring 2 wells at this site should be sufficient, given the proximity of Site 2 (upgradient) and Site 3 (downgradient).	Micropurge pump	N/A	6	10/2/2008
395H	Y	10/1/1997	**-0.061**	12	**3935.692**	PVC	2	16.5	16	10	5-15	#30 Mesh sand	Developed on 9/25/2007.	Monitor water level and temperature	Pressure transducer, micropurge pump	N/A	8	3/31/2009
TT395-MW01	Y	10/17/2007	**-0.41**		**3934.85**	PVC	2	18	18	15	3-18	Silica Sand	Developed 11/12/2007.	Monitor plume boundary adjacent to area of high SCAPS LIF response; keep as supplemental well for basewide.	Micropurge pump	N/A	2	10/2/2008
TT395-MW02	Y	10/12/2007	**-0.26**		**3935.41**	PVC	2	18.5	18.5	15	3-18	Silica Sand	Developed 11/15/2007.	Basewide water level measurement	Micropurge pump	N/A	4	3/31/2009
TT395-MW03	Y	10/12/2007	**-0.27**		**3934.49**	PVC	2	18.5	18.5	15	3-18	Silica Sand	Developed 11/14/2007.	Replacement well for 395E; keep as supplemental well for basewide.	Micropurge pump	N/A	1	11/30/2007
TT395-MW04	Y	10/12/2007	**-0.35**		**3935.01**	PVC	2	18.5	18.5	15	3-18	Silica Sand	Developed 11/15/2007.	Replacement well for 395D; keep as supplemental well for basewide.	Micropurge pump	N/A	2	10/28/2008

Notes:

- Monitoring wells that will be sampled for water quality analyses semiannually.
- Observation wells used for seminannual water level monitoring, but not water quality sampling.
- Observation well where floating fuel product has been measured in the well and product thickness and water levels will be measured semiannually.
- Supplemental well to monitoring well network but not planned for water quality sampling at present.
- Supplemental well to monitoring well network that may be used for water level/product measurements to monitor future remediation strategies.

TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
UST-R SITE 2 (BUILDING 806 AREA)																		
TT806-MW01	Y	10/15/2007	2.29		3928.52	PVC	2	18	18	15	3-18	Silica Sand	Developed 11/10/2007.	Basewide water level measurement	Micropurge pump	N/A	2	10/28/2008
TT806-MW02	Y	10/14/2007	2.44		3927.47	PVC	2	18	18	15	3-18	Silica Sand	Developed 11/17/2007.	Monitor water level and temperature	Pressure transducer, Micropurge pump	N/A	3	3/30/2009
TT806-MW03	Y	10/14/2007	2.54		3927.47	PVC	2	20	20	15	4-19	Silica Sand	Developed 11/16/2007.	Basewide water level measurement	Micropurge pump	N/A	2	10/2/2008
TT806-MW04	Y	10/17/2008	2.79		3928.05	PVC	2	18	18	15	3-18	Silica Sand		Basewide water level measurement	Micropurge pump	N/A	2	3/30/2009

Notes:

Monitoring wells that will be sampled for water quality analyses semiannually.
Observation wells used for seminannual water level monitoring, but not water quality sampling.
Observation well where floating fuel product has been measured in the well and product thickness and water levels will be measured semiannually.
Supplemental well to monitoring well network but not planned for water quality sampling at present.
Supplemental well to monitoring well network that may be used for water level/product measurements to monitor future remediation strategies.

TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Sites 2 and 4																		
AVGAS	Y	1/1/1991	AGC	6 x 6	3940.40	PVC	4	18.7	18.7	10	6-16	*Unknown*	One of the main free product collection wells at Site 2	Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
EW-15	Y	4/25/1988	**-0.46**	6	**3935.138**	PVC	2	15	15	10	5-15	#3 Sand	Well contained product on 9/23/2007. Did not develop.	Continue to measure water level and product thickness.	None	N/A	0	N/A
EW-16	Y	4/26/1988	**-0.49**	6	**3935.365**	PVC	2	15	15	10	5-15	#3 Sand	Developed on 9/24/2007. Noted during well development that EW-16 needs a new ground cover plate/lid. The current cover is broken and allows sand to collect in well cap.	Basewide water level measurement	Micropurge pump	N/A	2	10/1/2008
EW-20	Y	4/27/1988	**3.09**	6	**3939.708**	PVC	2	15	15	10	5-15	#3 Sand	Development was attempted 10/9/2007. Well contained product, did not develop and will not sample.	Continue to measure water levels and product thicknesses semiannually.	None	N/A	0	N/A
EW-22	UNK	4/28/1988	**3.29**	6	**3939.21**	PVC	2	15	14	10	4-14	*Unknown*	Development was attempted 10/9/2007. Well contained product, did not develop and will not sample.	Continue to measure water levels and product thicknesses semiannually.	None	N/A	0	N/A
GTI-1	Y	5/23/1995	AGC	8.5	3940.80	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	3	11/8/1999
GTI-10	Y	5/23/1995	FM	8	3941.57	PVC	4	18	18	10	7-17	#2/12 Sand	No ID, in roadway, aluminum cap with tubing, asphalt pad	Supplemental well for free product monitoring/remediation	None	N/A	1	9/1/1996
GTI-11	Y	5/24/1995	AGC	8.5	3940.62	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-12	Y	5/24/1995	AGC	8.5	3940.11	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-13	Y	5/24/1995	AGC	8.5	3939.41	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-14	Y	5/18/1995	FM	8	3936.97	PVC	4	15	15	10	3-13	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	1	9/1/1996
GTI-15	Y	5/18/1995	FM	8	3936.97	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-17	Y	5/18/1995	AGC	8	3937.75	PVC	4	15	15	10	4-14	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-18	Y	5/24/1995	FM	8	3936.37	PVC	4	16	16	10	5-15	N/A		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-19	Y	5/17/1995	FM	8	3936.86	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-2	Y	5/19/1995	AGC	8.5	3940.73	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-20	Y	5/17/1995	FM	8	3936.72	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-21	Y	5/25/1995	AGC	8	3939.98	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-22	Y	5/25/1995	AGC	8	3939.65	PVC	4	16	15	9	6-15	#1C Sand	TOC to ground surface measured as 2.50 ft. The video log indicates the bottom of the well is capped and is visible with only a small amount of sand. There is about a 1 ft sump below the screen.	Supplemental well for free product monitoring/remediation	None	N/A	3	11/8/1999
GTI-23	Y	5/17/1995	FM	8	3936.93	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-24	Y	5/17/1995	FM	8	3936.82	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-25	Y	5/17/1995	FM	8	3937.00	PVC	4	18	18	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	4	10/21/2002
GTI-26	Y	5/25/1995	FM	12	3935.14	PVC	4	21	21	10	5-20	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	4	11/30/1999
GTI-28	Y	5/26/1995	FM	8	3934.93	PVC	4	22.5	22.5	10	5-20	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-29	Y	5/25/1995	FM	8	3935.24	PVC	4	21	21	10	5-20	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	1	7/20/1995

TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Sites 2 and 4																		
GTI-3	Y	5/19/1995	AGC	8.5	3940.17	PVC	4	15	14	10	5-15	#1C Sand	TOC to ground surface measured as 2.25 feet. The video log shows the screen beginning at about 5 feet and extending to about 10 feet, where the camera cannot get past a pump in the well. The screen appears to continue, but its end and the total depth of the well cannot be determined. The well log indicates a screen interval of 10 feet, assume screen is from 5 - 15 ft.	Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-30	Y	5/25/1995	FM	8	3935.16	PVC	4	20.5	20.5	10	5-20	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	1	7/20/1995
GTI-31	Y	5/26/1995	-0.51	6	3935.033	PVC	4	16	16	10	5-15	#1C Sand	Well redeveloped on 9/25/2007.	Basewide water level measurement	None	N/A	5	11/29/2007
GTI-33	Y	6/1/1995	AGC	8	3938.13	PVC	4	15	14	9	5-14	#1C Sand	TOC to ground surface measured as 2.50 ft. The video log shows the screen at about 5 ft to at least 13.5 ft where it disappears into silt. The bottom 0.5- to 1-ft of the well contains silts. Assume capped well at 14 ft with 0.5 ft of silt and a screen to 14 ft based on other video and other GTI well construction.	Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-34	Y	6/1/1995	AGC	8	3937.96	PVC	4	15	15	10	4-14	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-35	Y	6/1/1995	AGC	8	3937.82	PVC	4	15	15	10	4-14	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-36	Y	6/1/1995	AGC	8	3939.21	PVC	4	15	15	10	5.5-15.5	#1C Sand	TOC to ground surface measured as 2.42 ft. The video log shows the screen beginning about 5.5 ft and ending about 15.5 ft. The total depth measured with the water level was 18.30 ft below TOC (15.88 ft bgs), and a soft silty bottom of a couple inches thick.	Supplemental well for free product monitoring/remediation	None	N/A	1	3/24/1997
GTI-37	Y	6/2/1995	AGC	8	3938.59	PVC	4	13	13	10	3-13	Pea Gravel		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-4	Y	5/23/1995	AGC	8.5	3940.86	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-5	Y	5/19/1995	FM	12	3937.28	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	1	9/1/1996
GTI-6	Y	5/19/1995	AGC	8.5	3940.09	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-7	Y	5/23/1995	FM	12	3937.79	PVC	4	16	16	10	5-15	#1C Sand	Monitoring Well Inventory noted pad damage and casing damage with the uppermost ring of steel outer casing broken	Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-8	Y	5/23/1995	FM	12	3937.63	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
GTI-9	Y	5/18/1995	FM	12	3938.15	PVC	4	16	16	10	5-15	#1C Sand		Supplemental well for free product monitoring/remediation	None	N/A	0	N/A
KMW	UNK	*Unknown*	FM	8	*Unknown*	PVC	2	*Unknown*	*Unknown*	5	6-11	*Unknown*	bounds eastern portion of free product at Site 2; information on this well was obtained in the field with the video survey, water level, personnel observations. Well log is not available to determine construction on which to base NAC requirement criteria	Supplemental well for free product monitoring/remediation	None	N/A	0	N/A

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Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Sites 2 and 4																		
MW-13	Y	7/20/1990	FM	8	3937.91	PVC	2	16	15	10	5-15	8/12 Frac Sand	Pad is damaged	Supplemental well for free product monitoring/remediation; bounds northern portion of free product at Site 2	None	N/A	6	10/17/2002
MW-1	Y	6/16/1990	**-0.18**	8	**3935.71**	PVC	2	20	15	10	5-15	8/12 Frac Sand	Developed on 9/25.2007. Repairs consisted of changing marker from PW-1 to MW-1.	Basewide water level measurement	Micropurge pump	N/A	15	10/1/2008
MW-10	Y	6/24/1990	**-0.15**	8	**3935.32**	PVC	2	30	15	10	5-15	8/12 Frac Sand	Developed on 9/21/2007.	Monitor contaminants in the shallow aquifer for RI; keep as a supplemental well for the basewide.	None	N/A	10	11/28/2007
MW-2	Y	6/17/1990	**-0.24**	8	**3934.29**	PVC	2	20	15	10	5-15	8/12 Frac Sand	Developed on 9/24/2007.	Basewide water level measurement	Micropurge pump	N/A	11	10/2/2008
MW-4	Y	6/18/1990	**-0.23**	8	**3934.39**	PVC	4	25	14	10	4-14	8/12 Frac Sand	Developed on 9/21/2007. No repairs made.	Monitor contaminants in the shallow aquifer for RI; keep as supplemental well for basewide. Well coverage provided by other nearby monitoring wells is believed sufficient for the current objectives of the basewide investigation. If concentrations notably increase in monitoring wells MW-60 or TT04-MW02, consider this well for future sampling.	Micropurge pump	N/A	8	10/1/2008
MW-59	Y	11/23/1991	FM	8	3933.83	PVC	2	24.5	15	10	5-15	#2 Frac Sand		Supplemental well for free product monitoring/remediation; bounds eastern portion of free product at Site 2	None	N/A	9	4/22/2002
MW-5U	Y	6/19/1990	FM	8	3834.41	PVC	2	19	16.75	10	6.5-16.5	8/12 Frac Sand	Attempted to develop on 9/21/08, however, extremely poor recharge - could not be developed.	Keep as supplemental well for free product monitoring/remediation. Use MW-5L as an alternate water quality monitoring well.	None	N/A	8	10/26/2005
MW-5L	Y	6/19/1990	**-0.05**	8	**3934.91**	PVC	2	25	21	5	16-21	8/12 Frac Sand	Developed on 10/9/2007.	Monitor contaminants in the shallow aquifer for RI; keep as supplemental well for basewide.	Micropurge pump	N/A	7	10/1/2008
MW-60	Y	11/23/1991	**-0.68**	8	**3934.10**	PVC	2	23	15	10	5-15	#2 Frac Sand	Developed on 9/24/2007.	Basewide water level measurement	Micropurge pump	N/A	13	3/30/2009
MW-61	Y	11/23/1991	**0.02**	8	**3935.65**	PVC	2	18	15	10	5-15	#2 Frac Sand	Developed on 9/24/2007.	Monitor contaminants in the shallow aquifer for RI; keep as supplemental well for basewide.	None	N/A	9	11/29/2007
MW-62	Y	11/24/1991	**-0.35**	8	**3936.07**	PVC	2	24.5	14	10	4-14	#2 Frac Sand	Found 1.5 inch of product in well on 9/21/2007. Did not develop.	Measure product thicknesses and water levels semiannually.	None	N/A	1	12/6/1991
MW-6U	Y	6/22/1990	**-0.10**	8	**3936.281**	PVC	2	20	15	10	5-15	8/12 Frac Sand	Developed on 9/24/07. Well is upgradient of Site 2.	Basewide water level measurement	Micropurge pump	N/A	5	10/2/2008
MW-7	Y	6/22/1990	**3.56**	8	**3939.33**	PVC	2	25	15.5	10	5.5-15.5	8/12 Frac Sand	Developed on 9/21/07 and converted to above ground surface completion on 6/04/2008.	Basewide water level measurement	Pressure transducer	N/A	13	10/3/2008
MW-9	Y	6/23/1990	**3.72**	8	**3940.17**	PVC	2	25	15	10	5-15	8/12 Frac Sand	Developed on 9/25/2007 and converted to surface completion on 6/04/2008.	Monitor groundwater upgradient of Site 2 for RI; measure water quality and water levels for basewide.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	10	10/15/2010
OBS-1	Y	6/3/1993	AGC	8	~ 3934.00	PVC	2	20	20	15	5-20	Sand	Pad is cracked	Current Site 2 free product recovery well	None	N/A	0	N/A
OBS-2	Y	6/2/1993	FM	6	~ 3937.00	PVC	2	20.5	20	15	5-20	Sand		Current Site 2 free product recovery well	None	N/A	0	N/A

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Sites 2 and 4																		
VT-1	Y	6/2/1990	AGC	6	~3934.00	PVC	2	10.5	9	5	4-9	#10-20 Sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
VT-2	Y	6/2/1993	AGC	6	~3934.00	PVC	2	10.5	9	5	4-9	#10-20 Sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
VT-3	Y	6/3/1993	AGC	6	~3936.00	PVC	2	11	9	5	4-9	#10-20 Sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
VT-4	Y	6/3/1993	AGC	6	~3936.00	PVC	2	11	10	5	5-10	#10-20 Sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
TT02-MW01	Y	11/1/2007	**1.95**		**3938.59**	PVC	2	18.5	18.5	15	3-18	2/16 Frac Sand	Developed on 11/14/2007.	Monitor water level and temperature	Pressure transducer, micropurge pump	N/A	3	3/31/2009
TT02-MW02	Y	11/9/2007	**2.32**		**3938.04**	PVC	2	18	18	15	3-18	2/16 Frac Sand	Replacement well for GTI-32 installed 11/09/07 by pulling out casing and overdrilling; developed on 11/13/2007.	Basewide water level measurement	Micropurge pump	N/A	3	3/30/2009
TT02-MW03	Y	11/9/2007	**1.57**		**3938.70**	PVC	2	19	19	15	4-19	2/16 Frac Sand	Replacement well for EW-27 installed 11/09/07 by pulling out casing and overdrilling; developed on 11/13/2007.	Basewide water level measurement	Micropurge pump	N/A	3	3/31/2009
TT02-MW04	Y	3/14/2008	**2.57**		**3940.72**	PVC	2	20	19	15	4-19	2/16 Frac Sand	Replacement well for MW-8U.	Monitor water level and temperature	Pressure transducer, micropurge pump	N/A	3	3/31/2009
TT04-MW01	Y	10/31/2007	**2.07**		**3937.79**	PVC	2	19	19	15	3.5-18.5	2/16 Frac Sand	Developed on 11/11/2007.	Basewide water level measurement	Micropurge pump	N/A	3	3/31/2009
TT04-MW02	Y	11/11/2007	**2.21**		**3936.31**	PVC	2	18	18	15	3-18	2/16 Frac Sand	Replacement well for MW-3U; developed on 11/12/2007.	Basewide water level measurement	Micropurge pump	N/A	3	3/31/2009

Notes:

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	Observation wells used for seminannual water level monitoring, but not water quality sampling.
	Observation well where floating fuel product has been measured in the well and product thickness and water levels will be measured semiannually.
	Supplemental well to monitoring well network but not planned for water quality sampling at present.
	Supplemental well to monitoring well network that may be used for water level/product measurements to monitor future remediation strategies.

TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Site 3																		
MW-39L	Y	3/14/1991	FM	8	3933.23	PVC	2	25	19.5	5	15-20	8/20 Frac Sand	Flush mount cover reported to be no longer connected to well casing	Supplemental well for water levels and/or water quality, if needed.	None	N/A	3	10/25/2005
MW-39U	Y	3/14/1991	**-0.25**	8	**3933.878**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Developed 9/12/2007. Manhole repaired and removed sand.	Downgradient from northern disposal area for RI; keep as supplemental well for basewide.	Micropurge pump	N/A	10	10/1/2008
MW-41L	Y	3/14/1991	**-0.62**	8	**3932.17**	PVC	2	26.5	25.5	5	20.5-25.5	8/20 Frac Sand	Developed 10/9/2007.	Monitor contaminants in the lower portion of shallow aquifer for RI; keep as supplemental well for basewide.	Micropurge pump	N/A	8	10/2/2008
MW-42L	Y	3/15/1991	**-0.24**	8	**3935.191**	PVC	2	30	25.5	5	20.5-25.5	8/20 Frac Sand	Developed 9/18/07.	Basewide water level measurement	Micropurge pump	VOCs, PAHs, TDS	4	10/2/2008
MW-43L	Y	3/16/1991	**-0.33**	8	**3935.711**	PVC	2	30	28	5	23-28	8/20 Frac Sand	Well developed on 9/18/2007.	Basewide water level measurement	Micropurge pump	N/A	8	3/30/2009
MW-43U	Y	3/16/1991	**-0.24**	8	**3935.788**	PVC	2	20	17	10	7-17	8/20 Frac Sand	Well developed 9/18/2007. Sloped surface around well to minimize drainage.	Basewide water level measurement	Micropurge pump	N/A	18	3/30/2009
MW-44L	Y	3/16/1991	FM	8	3932.37	PVC	2	30	26.5	5	21.5-26.5	8/20 Frac Sand	Well redeveloped on 09/18/07	Supplemental well for water levels and/or water quality, if needed.	None	N/A	1	4/15/1991
MW-44U	Y	3/17/1991	**-0.56**	8	**3932.999**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Developed on 9/18/2007.	Monitor contaminants in the shallow aquifer for RI; keep as supplemental well for basewide	None	N/A	4	12/3/2007
TT03-MW01	Y	10/11/2007	**2.30**		**3937.11**	PVC	2	20.3	20	15	5-20	#1 C Sand	Developed 10/13/2007.	Replacement well for MW-40 which was destroyed, basewide water level measurement.	Micropurge pump	N/A	2	10/2/2008
TT03-MW02	Y	10/11/2007	**-0.20**		**3937.14**	PVC	2	20.3	20	15	5-20	#1 C Sand	Developed 10/12/2007.	Replacement well for BAT-3-D, basewide water level measurement.	Micropurge pump	VOCs, PAHs, TDS	3	3/31/2009
TT03-MW03	Y	10/9/2007	**2.36**		**3936.30**	PVC	2	16.3	16	10	6-16	#1 C Sand	Developed 10/12/2007.	Replacement well for MW-38, monitor water level and temperature.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	3	3/30/2009
TT03-MW04	Y	10/10/2007	**-0.49**		**3936.84**	PVC	2	20.3	20	15	5-20	#1 C Sand	Developed 10/12/2007	Monitor downgradient plume stability for RI; keep as supplemental well for basewide.	Micropurge pump	N/A	2	10/3/2008
TT03-MW05	Y	10/10/2007	**-0.23**		**3936.66**	PVC	2	20.3	20	15	5-20	#1 C Sand	Developed 10/12/2007.	Basewide water level measurement.	Micropurge pump	N/A	3	3/31/2009
TT03-MW06	Y	10/12/2007	**-0.27**		**3935.82**	PVC	2	20.3	20	15	5-20	#1 C Sand	Developed 10/12/2007.	Basewide water level measurement.	Micropurge pump	VOCs, PAHs, TDS	3	3/30/2009
TT03-MW07	Y	3/10/2009	**-0.35**		**3934.69**	PVC	2	20	19	15	4-19	2/16 Frac Sand	Supplemental well for future monitoring, if needed	Investigate AFFF, oil, and soil staining under concrete apron; keep as supplemental well	None	N/A	1	3/13/2009
TT03-MW08	Y	3/10/2009	**-0.17**		**3934.77**	PVC	2	20	20	15	5-20	2/16 Frac Sand	Supplemental well for future monitoring, if needed	Investigate AFFF, oil, and soil staining under concrete apron; keep as supplemental well	None	N/A	1	3/12/2009
TT03-MW09	Y	3/10/2009	**-0.32**		**3933.99**	PVC	2	20	20	15	4-19	2/16 Frac Sand	Supplemental well for future monitoring, if needed	Investigate AFFF, oil, and soil staining under concrete apron; keep as supplemental well	None	N/A	1	3/12/2009

Notes:

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Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Site 6																		
BAT-6-H	Y	9/26/1997	AGC	2	3928.077	PVC	2	13	13	5	8-13	Silica Sand		Supplemental well for free product monitoring/remediation	None	N/A	3	10/21/2003
MW-45	Y	3/17/1991	-0.55	8	3931.967	PVC	2	20	15	10	5-15	8/20 Frac Sand	Developed on 9/20/2007.	Basewide water level measurement.	Micropurge pump	N/A	12	4/15/2010
MW-48	Y	3/18/1991	-0.07	8	3923.69	PVC	2	15	14	10	4.5-14.5	8/20 Frac Sand	Developed 9/9/2007. Slow recharge but no repairs.	Basewide water level measurement.	None	N/A	13	12/15/2007
MW-49	Y	3/18/1991	0.01	8	3926.86	PVC	2	16	16	10	6-16	8/20 Frac Sand	Developed 9/20/2007.	Basewide water level measurement.	None	N/A	13	12/14/2007
MW-56	Y	11/22/1991	-0.06	8	3925.54	PVC	2	18	9	5	5-10	#2 Frac Sand	Developed 9/19/2007.	Monitor groundwater quality near base boundary for RI; keep as supplemental well for basewide.	Micropurge pump	N/A	9	10/6/2008
MW-58	Y	11/22/1991	3.52	8	3930.47	PVC	2	13	9	5	5-10	#2 Frac Sand	Developed 9/19/2007 and converted to above ground surface completion on 6/03/2008.	Basewide water level measurement.	Micropurge pump	N/A	16	10/6/2008
TT06-MW01	Y	11/7/2007	2.19		3928.05	PVC	2	20	18	15	3-18	2/16 Frac Sand	Developed 12/4/2007.	Monitor water level and temperature	Pressure transducer, micropurge pump	N/A	2	10/6/2008
TT06-MW02	Y	11/7/2007	2.04		3929.09	PVC	2	20	18	15	3-18	2/16 Frac Sand	Developed 11/13/2007.	Monitor groundwater quality near base boundary for RI and basewide.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/15/2010
TT06-MW03	Y	11/7/2007	2.61		3927.89	PVC	2	20	18	15	3-18	2/16 Frac Sand	Developed 11/13/2007.	Monitor water level and temperature	Pressure transducer, micropurge pump	N/A	2	10/3/2008
TT06-MW04	Y	11/8/2007	2.41		3926.07	PVC	2	20	18	15	3-18	2/16 Frac Sand	Developed 11/13/2007.	Monitor water level and temperature	Pressure transducer, micropurge pump	N/A	2	10/3/2008
TT06-MW05	Y	11/8/2007	2.03		3929.15	PVC	2	20	18	15	3-18	2/16 Frac Sand	Replacement well for MW-57; developed 12/4/2007.	Basewide water level measurement.	Micropurge pump	N/A	3	3/31/2009

Notes:

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Site 14																		
BAT-14-F	Y	9/23/1997	FM	9	3926.136	PVC	0.75	24.93	14.75	6	8.75-14.75	Formation Collapse		Supplemental well for water level/product measurements	None	N/A	1	10/22/2002
CW-14-1-1	Y	10/18/2004	FM	12	3925.754	PVC	4	13.55	13.55	10	3.55-13.55	20/30 Sand Pack	Installed Oct. 2004 by Robinson Engineering, information provided in SATO report. The well log and information in the report tables are not consistent in terms of well depth, which effects the reported screen interval.	Supplemental well for water level/product measurements	None	N/A	0	N/A
CW-14-1-2	Y	10/19/2004	FM	12	3925.377	PVC	2	13.8	13.8	10	3.8-13.8	20/30 Sand Pack	Installed in Oct. 2004 by Robinson Engineering, information provided in SATO report. The well log and information in the report tables are not consistent in terms of well depth, which effects the reported screen interval.	Supplemental well for water level/product measurements	None	N/A	0	N/A
CW-14-1-3	Y	10/20/2004	**-0.26**	12	**3926.041**	PVC	2	14	14	10	4-14	20/30 Sand Pack	Attempted development on 10/10/2007. Well contained product. Could not develop.	Well contained product, did not develop and will not sample. Continue to collect product thickness measurements and water levels semiannually.	None	N/A	0	N/A
CW-14-1-4	Y	10/21/2004	FM	12	3925.763	PVC	2	14	14	10	4-14	20/30 Sand Pack	Installed in Oct. 2004 by Robinson Engineering, information provided in SATO report.	Supplemental well for water level/product measurements	None	N/A	0	N/A
CW-14-1-5	Y	10/20/2004	FM	12	3925.145	PVC	2	13.9	13.9	10	3.9-13.9	20/30 Sand Pack	Installed in Oct. 2004 by Robinson Engineering, information provided in SATO report. The well log and information in the report tables are not consistent in terms of well depth, which effects the reported screen interval.	Supplemental well for water level/product measurements	None	N/A	0	N/A
GTI-14-2	Y	5/31/1995	FM	12	3926.23	PVC	4	16	15	10	5-15	#1C Sand		Supplemental well for water level/product measurements	None	N/A	6	9/1/1999
MW-18L	Y	3/7/1991	**-0.04**	8	**3926.828**	PVC	2	25	21	5	16-21	8/20 Frac Sand	Developed on 9/23/2007.	Delineate the extent of contaminant concentrations and determine plume stability or potential migration.	Micropurge pump	VOCs, PAHs, TDS	13	10/17/2010
MW-18U	Y	3/7/1991	FM	8	3926.23	PVC	2	20	15	10	5-15	8/20 Frac Sand		Supplemental well for water level/product measurements	None	N/A	7	11/3/1999
MW-19	Y	3/7/1991	**-0.31**	8	**3926.422**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Developed 9/23/2007.	Sample in 2011 to determine plume stability, potential contaminant migration, and degradation of contaminants.	Micropurge pump	VOCs, PAHs, TDS	19	3/26/2009
MW-22	Y	3/8/1991	**-0.26**	10	**3926.075**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Developed 9/23/2007.	Basewide water level measurement.	Micropurge pump	N/A	19	3/29/2009
MW-23	Y	3/8/1991	**0.03**	8	**3926.741**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Developed 9/7/2007.	Monitor contaminants in the shallow aquifer for RI and basewide.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	18	10/19/2010
MW-24	Y	3/8/1991	**-0.30**	10	**3925.399**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Developed 9/6/2007; repaired on 9/12/07 with new 12-inch PVC well completion box and new concrete pad with well monument.	Determine whether one or two potential source areas exist and further delineate the nature and extent of contamination.	None	VOCs, PAHs, TDS	9	10/19/2010
MW-27	Y	3/9/1991	**3.04**	**8**	**3926.025**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Developed on 9/11/2007.	Monitor the leading edge of contaminant plume migration; determine plume stability or potential migration.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	19	10/17/2010

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Site 14																		
MW-53	Y	11/20/1991	**-0.19**	12	**3926.17**	PVC	2	21	15	10	5-15	#2 Frac Sand	Steel flush mount well cover 12-inch diameter; located in fenced parking lot. Redeveloped on 9/23/07.	Supplemental well for water level/product measurements	None	N/A	13	12/2/2007
MW-54	Y	11/21/1991	**-0.66**	10	**3925.53**	PVC	2	23	15	10	5-15	#2 Frac Sand	Developed on 9/26/2007.	Sample in 2011 to determine plume stability, potential contaminant migration, and degradation of contaminants.	Micropurge pump	VOCs, PAHs, TDS	19	3/26/2009
MW-55	Y	11/21/1991	**-0.09**	10	**3926.85**	PVC	2	23	15	10	5-15	#2 Frac Sand	Developed on 9/7/2007; repaired on 9/12/2007 with new concrete pad, 12-inch PVC well box with steel cap, and well monument.	Monitor nature and extent of groundwater contamination for RI; inactive (supplemental well) for basewide. Well coverage is believed sufficient for the current objectives of the basewide investigation. If concentrations notably increase in monitoring wells MW-23 or MW-73, consider this well for future sampling.	None	N/A	9	12/2/2007
MW-73	Y	3/19/1996	**-0.51**	12	**3925.32**	PVC	2	22	22	15	5-20	#20 Sand	Developed on 10/10/2007.	Determine plume stability, potential contaminant migration, and degradation of contaminants.	Micropurge pump	VOCs, PAHs, TDS	16	10/18/2010
MW-75	Y	3/13/1996	**-0.04**	12	**3925.31**	PVC	2	22	22	15	5-20	#20 Sand	Developed on 9/9/2007; repaired on 9/13/2007 with new flush-mount well box and concrete pad.	Determine plume stability, potential contaminant migration, and degradation of contaminants.	Micropurge pump	VOCs, PAHs, TDS	15	10/19/2010
P3-MW-01	Y	5/16/2002	AGC	1	3927.52	PVC	1	20	19	10	9-19	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-02	Y	5/17/2002	AGC	1	3927.68	PVC	1	20	19	10	9-19	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-03	Y	5/17/2002	AGC	1	3927.68	PVC	1	20	17.5	10	7.5-17.5	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-04	Y	5/16/2002	AGC	1	3927.52	PVC	1	20	17	10	7-17	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-05	Y	5/17/2002	AGC	1	3927.56	PVC	1	20	17	10	7-17	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-06	Y	5/16/2002	AGC	1	3927.52	PVC	1	20	19	10	9-19	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-07	Y	5/16/2002	AGC	1	3927.18	PVC	1	20	17	10	7-17	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-08	Y	5/16/2002	AGC	1	3927.77	PVC	1	20	17	10	7-17	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-09	Y	5/17/2002	AGC	1	3927.56	PVC	1	20	17	10	7-17	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-10	Y	5/17/2002	AGC	1	3927.76	PVC	1	20	17	10	7-17	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-11	Y	6/6/2002	AGC	1	3927.58	PVC	1	20	19.5	10.5	9-19.5	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-12	Y	6/6/2002	AGC	1	3927.58	PVC	1	20	19.5	10.5	9-19.5	Pre-pack silica sand	6-in coupler from 9.5-10 ft in screen area	Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-13	Y	6/6/2002	AGC	1	3927.52	PVC	1	20	19.5	10.5	9-19.5	Pre-pack silica sand	6-in coupler in screen area	Supplemental well for water level/product measurements	None	N/A	0	N/A
P3-MW-14	Y	6/6/2002	AGC	1	3927.7	PVC	1	20	18.5	10.5	8-18.5	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-BS-01	Y	11/2002	AGC	2	3927.962	PVC	2	15	15	10	5-15	Sand Filter Pack	The well is located outside the Plot 4 fence at Site 14.	Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-BS-02	Y	11/2002	AGC	2	3928.150	PVC	2	15	15	10	5-15	Sand Filter Pack	The well is located inside the Plot 4 fence at Site 14.	Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-BS-03	Y	11/2002	AGC	2	3928.241	PVC	2	15	15	10	5-15	Sand Filter Pack	The well monument is incorrectly stamped as P4-BS-05 and is located inside the Plot 4 fence at Site 14.	Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-BS-04	Y	11/2002	AGC	2	3928.601	PVC	2	15	15	10	5-15	Sand Filter Pack	The well is located inside the Plot 4 fence at Site 14.	Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-BS-05	Y	11/2002	AGC	2	3928.652	PVC	2	15	15	10	5-15	Sand Filter Pack	The well is located outside the Plot 4 fence at Site 14.	Supplemental well for water level/product measurements	None	N/A	0	N/A

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Site 14																		
P4-BS-06	Y	11/2002	AGC	2	3928.304	PVC	2	15	15	10	5-15	Sand Filter Pack	The well is located outside the Plot 4 fence at Site 14.	Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-BS-07	Y	11/2002	AGC	2	3927.979	PVC	2	15	15	10	5-15	Sand Filter Pack	The well is located outside the Plot 4 fence at Site 14.	Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-BS-08	Y	11/2002	AGC	2	3927.738	PVC	2	15	15	10	5-15	Sand Filter Pack	The well is located outside the Plot 4 fence at Site 14.	Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-BS-09	Y	11/2002	AGC	2	3927.645	PVC	2	15	15	10	5-15	Sand Filter Pack	The well is located inside the Plot 4 fence at Site 14.	Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-BS-10	Y	11/2002	AGC	2	3927.575	PVC	2	15	15	10	5-15	Sand Filter Pack	The well is located outside the Plot 4 fence at Site 14.	Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-MW-01	Y	6/5/2002	AGC	1	3927.76	PVC	1	20	19	10	9-19	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-MW-02	Y	5/20/2002	AGC	1	3927.46	PVC	1	22.5	22	15	7-22	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-MW-03	Y	5/21/2002	AGC	1	3927.86	PVC	1	22	21	15.5	5.5-21	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-MW-04	Y	6/4/2002	AGC	1	3927.62	PVC	1	20	20	10	10-20	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-MW-05	Y	5/21/2002	AGC	1	3927.89	PVC	1	20	20	15.5	4.5-20	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-MW-06	Y	5/20/2002	AGC	1	3927.54	PVC	1	22	22	15.5	6.5-22	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-MW-07	Y	5/21/2002	AGC	2	3927.58	PVC	2	20	20	15	5-20	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-MW-08	Y	5/21/2002	AGC	2	3927.51	PVC	2	20	19.6	15	4.6-19.6	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
P4-MW-09	Y	5/21/2002	AGC	2	3927.68	PVC	2	20	20	15	5-20	Pre-pack silica sand		Supplemental well for water level/product measurements	None	N/A	0	N/A
TT14-MW01	Y	11/11/2007	**2.27**		**3930.43**	PVC	2	18	18	15	3-18	2/16 Frac Sand	Developed 11/11/2007.	Basewide water level measurement.	Micropurge pump	N/A	2	10/3/2008
TT14-MW02	Y	12/3/2007	**2.49**		**3925.83**	PVC	2	18	18	15	3-18	2/16 Frac Sand	Developed 12/3/2007.	Monitor water level and temperature	Pressure transducer, micropurge pump	N/A	2	9/30/2008
TT14-MW03	Y	11/12/2007	**2.21**		**3928.76**	PVC	2	18	18	15	3-18	2/16 Frac Sand	Developed 11/12/2007.	Replacement well for GTI-14-3A; since there was previously a sheen noted, well installed at a location that is slightly downgradient (southeast of the existing well location for GTI-14-3A). Well coverage provided by other nearby monitoring wells sufficient for the basewide investigation. Supplemental well location for additional targeted monitoring, if needed.	Micropurge pump	N/A	2	10/3/2008

Notes:

- Monitoring wells that will be sampled for water quality analyses semiannually.
- Observation wells used for seminannual water level monitoring, but not water quality sampling.
- Observation well where floating fuel product has been measured in the well and product thickness and water levels will be measured semiannually.
- Supplemental well to monitoring well network but not planned for water quality sampling at present.
- Supplemental well to monitoring well network that may be used for water level/product measurements to monitor future remediation strategies.

TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Site 16																		
DPZ-1	N	Apr-04	**5.76**	1.5	**3922.763**	Steel	1.5	*Unknown*	5	3	2-5	*Unknown*	Deep piezometer in E4X Drain.	Monitor water level.	Pressure transducer	N/A	0	N/A
DPZ-2	N	Apr-04	**4.02**	1.5	**3922.019**	Steel	1.5	*Unknown*	5	3	2-5	*Unknown*	Deep piezometer in E4X Drain.	Monitor water level, temperature, and specific conductance.	Pressure transducer w/ conductivity meter	N/A	0	N/A
DPZ-3	N	Apr-04	**5.71**	1.5	**3922.71**	Steel	1.5	*Unknown*	5	3	2-5	*Unknown*	Deep piezometer in E4X Drain.	Monitor water level, temperature, and specific conductance.	Pressure transducer w/ conductivity meter	N/A	0	N/A
BAT-16-Q	Y	9/23/1997	AGC	2	3925.11	PVC	0.75	25.1	12.5	5	7.5-12.5	Formation Collapse		Supplemental well for water level/product measurements	None	N/A	0	N/A
MW-16-2	Y	4/8/2004	**3.54**	10	**3927.90**	PVC	2	20	19	10	5-15	2/12 Sand	Developed on 10/11/2007 and converted to above ground surface completion on 6/03/2008.	Monitor water level, temperature, and specific conductance.	Pressure transducer w/ conductivity meter	N/A	2	3/29/2009
MW-16-3	Y	4/8/2004	**3.13**	10	**3926.56**	PVC	2	20	19	10	5-15	2/12 Sand	Developed on 9/07/07; well not screened across water table (DTW=4.83; screen depth=5-15).	Sample in 2011 to determine chlorinated solvent plume extent and stability, potential contaminant migration, and degradation of contaminants.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	4	3/29/2009
MW-16-4	Y	4/8/2004	**3.13**	10	**3927.15**	PVC	2	21	20	10	5.5-15	2/12 Sand	Developed on 9/07/07; noted that well had sand during development.	Monitor water levels for basewide.	None	N/A	1	12/3/2007
MW-25L	Y	3/9/1991	**-0.19**	8	**3925.06**	PVC	2	20	18	5	13-18	8/20 Frac Sand	Not developed.	Measure water level and product thickness semiannually.	None	N/A	9	11/4/1999
MW-25U	Y	3/8/1991	**1.43**	8	**3926.60**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Attempted to develop well on 10/11/07; well contained product and could not be developed.	Measure water level and product thickness semiannually.	None	N/A	14	11/30/1999
MW-26	Y	3/9/1991	**3.15**	8	**3927.99**	PVC	2	25	15	10	5-15	8/20 Frac Sand	Well developed 9/09/2007; repaired on 9/12/07 by converting to an above ground completion. Concrete pad set with new well monument. Filled interior of protective casing with sand and installed 2 crash posts.	Supplemental well in basewide monitoring well network; not currently used for groundwater monitoring, due to proximity to MW-27.	None	N/A	16	10/22/2002
MW-28	Y	3/10/1991	**3.81**	8	**3928.57**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Well developed on 9/26/07 and repaired on 6/02/2008 by converting to above ground completion.	Monitor groundwater adjacent to E4X drain. Monitor water quality, water level, and specific conductance for basewide.	Pressure transducer w/ conductivity meter, micropurge pump	VOCs, PAHs, TDS	19	10/18/2010
MW-29L	Y	3/10/1991	**3.437**	8	**3927.54**		2	25	19.5	5	14.5-19.5	8/20 Frac Sand	Well developed on 9/11/07; well not screened across water table (DTW=6.94; screen depth=14.5-19.5). Well repairs made on 9/12/07 to convert to surface completion. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument	Basewide water level measurement.	None	N/A	1	4/11/1991
MW-29U	Y	3/10/1991	**3.277**	8	**3927.52**		2	15	15	10	5-15	8/20 Frac Sand	Developed on 9/11/07; repaired on 9/12/07 to convert to surface completion. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand.	Basewide water level measurement.	None	N/A	15	12/4/2007
MW-30	Y	3/10/1991	**2.91**	8	**3927.84**	PVC	2	20	15	10	5-15	8/20 Frac Sand	Well developed and repaired on 9/12/07; converted to surface completion by adding PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand. 2 crash posts installed.	Monitor groundwater adjacent to E4X drain for RI. Keep as supplemental well for potential future monitoring, if needed.	Micropurge pump	N/A	7	10/6/2008

TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Site 16																		
MW-63	Y	11/24/1991	-0.36	8	3924.60	PVC	2	23	23	20	3-23	#2 Frac Sand	Well developed on 9/9/2007.	Sample in 2011 to determine plume stability, potential contaminant migration, and degradation of contaminants.	Micropurge pump	VOCs, PAHs, TDS	17	3/29/2009
MW-65	Y	11/25/1991	-0.41	8	3923.67	PVC	2	19.5	8	5	3-8	#2 Frac Sand	MW-65 often has product, MW-65A (5 feet away) installed as replacement well in terms of sampling. MW-65 is still a functional well.	Supplemental well for water level/product measurements	None	N/A	18	10/25/2003
MW-65A	Y	4/8/2004	0.08	8	3923.95	PVC	2	23	20	15	5-20	2/12 Frac Sand	Well MW-65A also has floating product	Supplemental well for water level/product measurements	None	N/A	0	N/A
MW-74	Y	3/19/1996	3.37	8	3926.77	PVC	2	22	22	15	5-20	#20 Sand	Well developed on 09/9/2007 and repaired on 9/13/2007 by adding PVC riser, protective casing, new concrete pad.	Monitor water level and temperature	Pressure transducer, micropurge pump	N/A	8	10/5/2008
MW-77	Y	3/13/1996	3.21	8	3926.55	PVC	2	17	17	10	5-15	#20 Sand	Well developed on 09/10/2007 and repaired on 9/13/2007 by adding PVC riser, protective casing, new concrete pad.	Monitor potential contaminant migration toward the E4X Drain, plume stability, and degradation of contaminants.	Micropurge pump	VOCs, PAHs, TDS	14	10/16/2010
MW-78	Y	3/14/1996	3.03	8	3926.44	PVC	2	22	22	15	5-20	#20 Sand	Well developed on 09/9/2007 and repaired on 9/12/2007 by adding PVC riser, protective casing, new concrete pad.	Basewide water level measurement.	Micropurge pump	N/A	9	10/7/2008
MW-79	Y	3/14/1996	-0.07	8	3923.59	PVC	2	22	22	15	5-20	#20 Sand	Well developed on 09/9/2007 and repaired on 9/12/2007 by installing a 12-inch manhole cover and contouring the concrete pad to alleviate surface water drainage into well.	Monitor groundwater adjacent to E4X drain. Monitor water quality, water level, and specific conductance for basewide.	Pressure transducer w/ conductivity meter, micropurge pump	VOCs, PAHs, TDS	11	10/18/2010
PZ-16-11	N	12/7/1991	AGC	4	3923.47	PVC	1.5	12	8.5	5	3.5-8.5	8/20 Frac Sand	No bentonite seal, cement surface seal thickness not on log - doesn't meet NAC regs. Only 1 ft screen.	Supplemental well for water level/product measurements	None	N/A	0	N/A
RW-16-1	Y	4/8/2004	FM	10	3925.64	PVC	4	22	20.5	15	5.5-20.5	2/12 Sand	This well was installed in 4/2004 as part of the hydraulic containment system. "R" is for recovery well.	Supplemental well for water level/product measurements	None	N/A	0	N/A
TT16-MW01	Y	8/13/2007	2.69		3927.34	PVC	2	20	20	15	4.5-19.5		Developed 8/17/2007.	Downgradient from solvent detections from well MW-16-3, adjacent to E4X drain; monitor water quality and water levels.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/18/2010
TT16-MW02	Y	8/13/2007	3.04		3926.51	PVC	2	20	20	15	4.5-19.5		Developed 8/17/2007.	Monitor groundwater adjacent to E4X drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/18/2010
TT16-MW03	Y	8/14/2007	3.05		3926.16	PVC	2	20	20	15	5-20		Developed 8/17/2007.	Monitor groundwater adjacent to E4X drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/16/2010
TT16-MW04	Y	8/15/2007	2.90		3927.55	PVC	2	19.5	19.5	15	4-19		Developed 8/17/2007.	Monitor groundwater adjacent to E4X drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/17/2010
TT16-MW05	Y	8/14/2007	3.05		3926.60	PVC	2	19.5	19.5	15	4-19		Developed 8/17/2007.	Basewide water level measurement.	Micropurge pump	N/A	2	10/7/2008
TT16-MW06	Y	10/12/2007	2.56		3925.82	PVC	2	20	20	15	5-20	2/16 Frac Sand	Developed 11/9/2007.	Monitor groundwater adjacent to E4X drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/16/2010

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Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Site 16																		
TT16-MW07	Y	10/13/2007	**2.49**		**3926.20**	PVC	2	18	18	15	3-18	2/16 Frac Sand	Developed 11/9/2007.	Monitor groundwater adjacent to E4X drain.	Micropurge pump	VOCs, PAHs, TDS	6	10/16/2010
TT16-MW08	Y	10/13/2007	**2.41**		**3924.84**	PVC	2	18	18	15	3-18	2/16 Frac Sand	Developed 11/9/2007.	Monitor groundwater adjacent to E4X drain (paired with TT16-MW06 on west side of E4X drain).	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/16/2010
TT16-MW09	Y	10/28/2007	**1.91**		**3925.87**	PVC	2	19	19	15	3-18	2/16 Frac Sand	Developed 11/9/2007.	Monitor groundwater adjacent to E4X drain (paired with TT16-MW06 on west side of E4X drain).	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/16/2010
TT16-MW10	Y	11/8/2007	**2.53**		**3926.51**	PVC	2	14	14	10	3-13	2/16 Frac Sand	Developed 11/15/2007.	Downgradient from solvent detections (from well MW-16-3), adjacent to E4X Drain. Supplemental well for future sampling, if needed.	Micropurge pump	N/A	2	10/5/2008
TT16-MW11	Y	11/9/2007	**2.26**		**3925.77**	PVC	2	18	20	15	3-18	2/16 Frac Sand	Developed 11/15/2007.	Downgradient from solvent detections from well MW-16-3 adjacent to E4X Drain. Well coverage is believed sufficient for the current objectives of the basewide investigation. Supplemental well location for additional targeted monitoring, if needed.	Micropurge pump	N/A	2	10/5/2008
TT16-MW12	Y	10/28/2007	**2.22**		**3927.08**	PVC	2	18.5	18.5	15	3-18	2/16 Frac Sand	Developed 11/10/2007.	Basewide water level measurement.	Micropurge pump	N/A	2	10/6/2008
TT16-MW13	Y	10/13/2007	**2.50**		**3925.77**	PVC	2	15	15	12	3-15	2/16 Frac Sand	Developed 11/10/2007.	Basewide water level measurement.	Micropurge pump	N/A	2	10/5/2008
TT16-MW14	Y	10/28/2007	**-0.41**		**3924.15**	PVC	2	20	20	15	3-18	2/16 Frac Sand	Developed 11/14/2007.	Basewide water level measurement.	Micropurge pump	N/A	3	3/29/2009
TT16-MW15	Y	10/27/2007	**2.04**		**3925.39**	PVC	2	15	15	10	3-13	2/16 Frac Sand	Replacement well for GTI-16; developed 11/10/2007.	Sample in 2011 to determine plume stability, potential contaminant migration, and degradation of contaminants.	Micropurge pump	VOCs, PAHs, TDS	3	3/27/2009
TT16-MW16	Y	11/13/2007	**2.47**		**3928.04**	PVC	2	18.5	18.5	15	3-18	2/16 Frac Sand	Developed 11/16/2007.	Replacement well for MW-66; measure water levels for basewide.	Micropurge pump	N/A	3	3/29/2009
TT16-MW17	Y	3/16/2008	**-0.12**		**3926.78**	PVC	2	20	19.5	15	4.5-19.5	2/16 Frac Sand		Determine extent of contamination south of E4X drain	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	7	10/19/2010
TT16-MW18	Y	10/18/2008	**2.40**		**3926.14**	PVC	2	20	18	15	3-18	2/16 Frac Sand		Determine extent of contamination south of E4X drain	Micropurge pump	VOCs, PAHs, TDS	5	10/16/2010
TT16-MW19	Y	10/18/2008	**2.77**		**3929.22**	PVC	2	21	18	15	3-18	2/16 Frac Sand		Determine extent of contamination south of E4X drain	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/16/2010

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Site 16																		
SPZ-1	N	4/1/2004	6.12	2	3923.12	Steel	2	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	Shallow piezometer in E4X Drain.	Monitor water level and temperature	Pressure transducer	N/A	0	N/A
SPZ-2	N	4/1/2004	4.51	2	3922.51	Steel	2	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	Shallow piezometer in E4X Drain.	Monitor water level, temperature, and specific conductance.	Pressure transducer w/ conductivity meter	N/A	0	N/A
SPZ-3	N	4/1/2004	5.13	2	3922.13	Steel	2	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	Shallow piezometer in E4X Drain.	Monitor water level, temperature, and specific conductance.	Pressure transducer w/ conductivity meter	N/A	0	N/A
TT16-STW01	N	10/19/2009	3.12	2	3921.28	PVC	2	*Not Applicable*	*Stilling well; elbow joint on bottom of drain*	*No Screen*	*No Screen*	*None*	Stilling well in E4X Drain	Monitor water level and temperature.	None	N/A	0	N/A
TT16-TW01	N	10/9/2010	2.40	2	3922.18	PVC	2	*7.6*	*7.6*	5	*2.6-7.6*	*None*	Shallow piezometer in E4X Drain installed prior to SVE and AS tests in October 09.	Monitor water level and temperature.	Pressure transducer	N/A	1	10/22/2009

Notes:

Monitoring wells that will be sampled for water quality analyses semiannually.
Observation wells used for seminannual water level monitoring, but not water quality sampling.
Observation well where floating fuel product has been measured in the well and product thickness and water levels will be measured semiannually.
Supplemental well to monitoring well network but not planned for water quality sampling at present.
Supplemental well to monitoring well network that may be used for water level/product measurements to monitor future remediation strategies.

TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

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Site 18																		
MW-32	Y	3/9/1991	**4.24**	8	**3926.85**	PVC	2	15	15	10	5-15	8/20 Frac Sand	Well developed on 9/26/2007 and repaired on 6/2/2008. Converted to surface completion with PVC riser, protective steel casing, and marker placed on well pad.	Monitor groundwater quality downgradient from Site 18 and upgradient of the Lower Diagonal drain for basewide.	Pressure transducer and micropurge pump	VOCs, PAHs, TDS, aldrin, and dieldrin (aldrin and dieldrin added to analytical suite in October 2010)	8	10/19/2010

Notes:

Monitoring wells that will be sampled for water quality analyses semiannually.
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Site 20																		
MW-33L	Y	3/11/1991	2.38	8	3929.10	PVC	2	30	27	5	22-27	8/20 Frac Sand	Developed on 10/10/2007 And converted to a surface completion on 6/03/2008.	Monitor groundwater quality downgradient in the lower portion of the shallow alluvial aquifer near Site 20 for compliance and water levels for basewide.	Micropurge pump	N/A	5	4/17/2010
MW-33U	Y	3/12/1991	2.95	8	3929.46	PVC	2	20	15	10	5-15	8/20 Frac Sand	Developed on 10/10/2007 And converted to a surface completion on 6/03/2008.	Sampled as part of the landfill monitoring program. Water level and temperature measurements collected for basewide hydrologic investigation.	Pressure transducer and micropurge pump	N/A	9	10/17/2010
MW-36	Y	3/12/1991	-0.26	8	3928.67	PVC	2	25	15	10	5-15	8/20 Frac Sand	Developed 9/10/2007.	Monitor groundwater quality at Site 20 for compliance; water levels only for basewide.	Micropurge pump	N/A	6	4/17/2010
BA20-MW01	Y	1/30/2007	3.49		3933.16		4	16	15	10	5-15	#1/20 Sand	Developed 2/1/07	Monitor groundwater quality at Site 20 near checkerboard landfill near southwestern base boundary; measure water levels for basewide.	Micropurge pump	N/A	3	4/18/2010
BA20-MW02	Y	1/31/2007	3.32		3933.51		4	16	15	10	5-15	#1/20 Sand	Developed 2/13/07	Sampled as part of the landfill monitoring program. Water level and temperature measurements collected for basewide hydrologic investigation.	Pressure transducer and micropurge pump	N/A	5	4/16/2010
BA20-MW03	Y	1/29/2007	2.96		3930.99			15.5	15	10	5-15	#1/20 Sand	Developed 2/12/07	Monitor groundwater quality at Site 20 near checkerboard landfill near southwestern base boundary; measure water levels for basewide.	Micropurge pump	N/A	3	4/18/2010
BA20-MW04	Y	1/30/2007	3.40		3933.47		4	15.5	15	10	5-15	#1/20 Sand	Developed 2/14/07	Monitor groundwater quality at Site 20 near checkerboard landfill near southwestern base boundary; compliance and basewide monitoring.	Micropurge pump	N/A	5	4/16/2010
BA20-MW05	Y	1/31/2007	3.50		3931.52		4	16	15	10	5-15	#1/20 Sand	Developed 2/13/07	Monitor groundwater quality at Site 20 near checkerboard landfill near southwestern base boundary; compliance and basewide monitoring.	Micropurge pump	N/A	5	4/17/2010
TT20-MW02	Y		1.99		3928.60		2	18.5	18	15	3-18	2/16 Sand	Replacement well for MW-37	Monitor groundwater quality at Site 20 near checkerboard landfill near southwestern base boundary; compliance and basewide monitoring.	Pressure transducer and micropurge pump	N/A	5	4/17/2010

Notes:

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Site 21																		
MW-12L	Y	7/11/1990	-0.21	8	3930.70	NA	2	85	84	10	74-84	8/12 Frac Sand	Developed 9/22/2007	Monitor groundwater quality at Site 21 and water levels near the Lower Diagonal drain for basewide.	Micropurge pump	N/A	5	4/21/2010
MW-94	Y	3/28/1996	-0.01	8	3928.81	PVC	2	22.5	22	15	4-19	#20 Sand	Developed on 9/19/2007.	Monitor groundwater quality at Site 21 and water level for basewide.	None	N/A	7	4/15/2010
BA21-MW01	Y	2/6/2007	3.32		3934.12		4	16	15	10	5-15	#1/20 Sand	Developed on 2/14/07	Monitor groundwater quality in the vicinity of Site 21; measure water levels for basewide.	Micropurge pump	N/A	3	4/21/2010
BA21-MW02	Y	2/6/2007	3.28		3931.64		4	16	15	10	5-15	#1/20 Sand	Developed on 2/16/07	Monitor groundwater in the vicinity of Site 21; compliance monitoring and basewide water levels.	Micropurge pump	N/A	5	4/15/2010
BA21-MW03	Y	2/6/2007	2.97		3931.07		4	16	15	10	5-15	#1/20 Sand	Developed on 2/16/07	Monitor groundwater quality in the vicinity of Site 21; measure water levels for basewide.	Micropurge pump	N/A	4	4/15/2010
BA21-MW04	Y	2/1/2007	3.89		3933.89		4	16	15	10	5-15	#1/20 Sand	Developed on 2/14/07	Monitor groundwater quality in the vicinity of Site 21; measure water levels for basewide.	Micropurge pump	N/A	3	4/20/2010
BA21-MW05	Y	2/5/2007	3.36		3931.86		4	16	15	10	5-15	#1/20 Sand	Developed on 2/15/07	Monitor groundwater quality in the vicinity of Site 21; measure water levels for basewide.	Micropurge pump	N/A	3	4/14/2010

Notes:

Monitoring wells that will be sampled for water quality analyses semiannually.
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TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Site 22																		
TT22-MW01	Y	3/14/2008	**2.64**		**3926.52**	PVC	2	18.5	18	15	3-18	# 2/16 Sand	Replacement well for 2200; developed on 5/13/08	Monitor groundwater in the vicinity of the northeast runway landfill for compliance purposes; supplemental well for basewide.	Micropurge pump	N/A	0	N/A
TT22-MW02	Y	3/13/2008	**2.14**		**3928.04**	PVC	2	19	18	15	3-18	# 2/16 Sand	Replacement well for PW03; developed on 3/26/08	Monitor groundwater in the vicinity of the northeast runway landfill for compliance purposes; supplemental well for basewide.	Micropurge pump	N/A	0	N/A
BA22-MW01	Y	2/5/2007	**3.08**		**3927.32**		4	15	14	10	4-14	#1/20 Sand	Developed on 2/15/07	Monitor groundwater in the vicinity of the northeast runway landfill for compliance purposes; measure water levels for basewide.	Micropurge pump	N/A	3	4/14/2010
BA22-MW02	Y	2/1/2007	**2.99**		**3931.69**		4	16	15	10	5-15	#1/20 Sand	Developed on 2/15/07	Monitor groundwater in the vicinity of the northeast runway landfill for compliance purposes; measure water levels for basewide.	Micropurge pump	N/A	3	4/20/2010
BA22-MW03	Y	2/1/2007	**3.35**		**3932.35**		4	16	15	10	5-15	#1/20 Sand	Developed on 2/15/07	Monitor groundwater in the vicinity of the northeast runway landfill for compliance purposes; measure water levels for basewide.	Micropurge pump	N/A	3	4/21/2010
BA22-MW04	Y	2/5/2007	**3.24**		**3933.09**		4	16	15	10	5-15	#1/20 Sand	Developed on 2/14/07	Monitor groundwater in the vicinity of the northeast runway landfill for compliance purposes; measure water levels for basewide.	Micropurge pump	N/A	3	4/20/2010

Notes:

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Hot Pit Wells																		
BA-HP3-MW1	Y		**-0.19**		**3933.47**	PVC	4	16	15	10	5-15	#1/20 Sand	Developed on 1/31/07	Evaluate extent of groundwater contamination near Hot Pit #3, due to leak in a nearby pipeline carrying JP-8 jet fuel.	Micropurge pump	N/A	0	N/A
BA-HP3-MW2	Y		**-0.20**		**3933.73**	PVC	4	16	15	10	5-15	#1/20 Sand	Developed on 2/26/07	Evaluate extent of groundwater contamination near Hot Pit #3, due to leak in a nearby pipeline carrying JP-8 jet fuel.	Micropurge pump	N/A	0	N/A
BA-HP3-MW3	Y		**-0.27**		**3933.49**		4	16	15	10	5-15	#1/20 Sand	Developed on 2/26/07	Evaluate extent of groundwater contamination near Hot Pit #3, due to leak in a nearby pipeline carrying JP-8 jet fuel; measure water levels for basewide.	Micropurge pump	N/A	0	N/A

Notes:

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TABLE 2-1: BASEWIDE GROUNDWATER MONITORING WELL NETWORK

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Basewide (Sentinel) Wells																		
MW-81	Y	3/20/1996	FM	8	3938.29	PVC	2	22	22	15	5-20	#20 Sand	Referenced as Site 2 in NAS Fallon Well Locations xls file dated 12.8.02; reference near Site 2 in NASF MWL remarks. Well has not been redeveloped.	Supplemental well for water level and water quality measurements; well should be redeveloped prior to collecting any water quality samples.	None	N/A	2	9/16/1997
MW-82	Y	3/21/1996	**2.84**	8	**3939.70**	PVC	2	22	22	15	5-20	#20 Sand	Developed 9/11/07 and repaired 9/13/07, converting to above ground surface completion. Added PVC riser and protective casing, installed new concrete pad with monument. Filled annular space.	Monitor water levels near west-central base boundary and the Lower Diagonal No. 1 drain, upgradient of Site 2 for basewide.	Micropurge pump	N/A	4	3/29/2009
MW-83	Y	3/22/1996	**3.23**	8	**3940.28**	PVC	2	22	22	15	6-21	#20 Sand	Developed 9/11/07 and repaired 9/13/07, converting to above ground surface completion. Added PVC riser and protective casing, installed new concrete pad with monument. Filled annular space.	Well was used to monitor groundwater quality near west-central base boundary and the Lower Diagonal No. 1 Drain, upgradient of Site 2 for basewide through 2010. Only groundwater level and temperature will be monitored in 2011.	Pressure transducer, micropurge pump	N/A	8	10/18/2010
MW-84	Y	3/21/1996	FM	8	3924.06	PVC	2	22	22	15	5-20	#20 Sand	Referenced as Site 16 in NAS Fallon Well Locations xls file dated 12.8.02; referenced near Site 9 in NASF MWL remarks. Well has not been redeveloped.	Supplemental well for water level and water quality measurements; well should be redeveloped prior to collecting any water quality samples	None	N/A	1	9/1/1996
MW-85	Y	3/19/1996	**3.06**	12	**3926.02**	PVC	2	22	22	15	5-20	#20 Sand	Developed 9/10/07 and repaired 9/13/07, converting to an above ground surface completion. Added PVC riser and protective casing, installed new concrete pad with monument and filled annular space.	Monitor groundwater quality south of the Lower Diagonal drain for basewide.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	7	10/15/2010
MW-86	Y	3/21/1996	FM	8	3923.86	PVC	2	22	22	15	5-20	#20 Sand	Referenced as Site 16 in NAS Fallon Well Locations xls file dated 12.8.02; referenced near Site 9 in NASF MWL remarks. Well has not been redeveloped.	Supplemental well for water level and water quality measurements; well should be redeveloped prior to collecting any water quality samples	None	N/A	1	9/1/1996
TTBW-MW01	Y	3/12/2008	**2.31**		**3944.33**	PVC	2	19	18	15	3-18	# 2/16 Sand	New basewide well.	Location was used to monitor groundwater quality near the L-Line Canal from 2008 through 2010. Only water level and temperature will be monitored in 2011.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/15/2010
TTBW-MW02	Y	3/17/2008	**2.10**		**3935.03**	PVC	2	19	18	15	3-18	# 2/16 Sand	New basewide well.	Monitor groundwater quality near the L-Line Canal	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/17/2010
TTBW-MW03	Y	3/14/2008	**2.39**		**3937.85**	PVC	2	18.5	18	15	3-18	# 2/16 Sand	New basewide well.	Monitor groundwater quality near west central base boundary and the Lower diagonal #1 drain	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/15/2010
TTBW-MW04	Y	3/20/2008	**2.46**		**3934.70**	PVC	2	20	19.5	15	4.5-19.5	# 2/16 Sand	New basewide well.	Monitor groundwater quality near the lower diagonal No. 1 drain west of Site 21	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/17/2010
TTBW-MW05	Y	3/24/2008	**2.13**		**3937.99**	PVC	2	24	23	15	8-23	# 2/16 Sand	New basewide well.	Monitor groundwater quality near the lower diagonal No. 1 drain north of Site 21	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/15/2010
TTBW-MW05 (east)	Y	3/24/2008	2.82	NA	**3935.723**	PVC	2	24	23	15	8-23	2/16 Frac Sand	Well was installed approximately 1,500 feet east of its intended location; has not been developed but could be used as a supplemental well for water level and water quality monitoring, if needed	Supplemental well for water level and water quality measurements; well should be developed prior to collecting any water quality samples	None	N/A	0	N/A
TTBW-MW06	Y	3/17/2008	**2.02**		**3931.10**	PVC	2	18	17.3	15	2.3-17.3	# 2/16 Sand	New basewide well.	Monitor groundwater quality near the Lower Diagonal No. 1 drain northeast of Site 21	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/17/2010

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Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Final Comments	Well Use/ Rationale	Dedicated Equipment	2011 Analytical Parameters	Number of Times Well was Sampled Between 1988 - 2010	Date Last Sampled
Basewide Wells																		
TTBW-MW07	Y	3/15/2008	**2.39**		**3927.07**	PVC	2	18.5	18	15	3-18	# 2/16 Sand	New basewide well.	Monitor groundwater quality near the southwest base boundary and Lower Diagonal drain.	Pressure transducer, micropurge pump	N/A	6	10/15/2010
TTBW-MW08	Y	3/13/2008	**2.30**		**3927.26**	PVC	2	20	18	15	3-18	# 2/16 Sand	New basewide well.	Monitor groundwater quality downgradient of site 1and adjacent to the Lower Diagonal drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/15/2010
TTBW-MW09	Y	3/13/2008	**2.11**		**3925.63**	PVC	2	19	18	15	3-18	# 2/16 Sand	New basewide well.	Monitor groundwater quality downgradient of sites 14 and 16 adjacent to the Lower Diagonal drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/15/2010
TTBW-MW10	Y	3/16/2008	**2.20**		**3924.67**	PVC	2	19	18	15	3-18	# 2/16 Sand	New basewide well.	Monitor groundwater quality east of the L4X drain on the north side of the Lower Diagonal drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/16/2010
TTBW-MW11	Y	3/17/2008	**2.34**		**3929.94**	PVC	2	20	19.5	15	4.5-19.5	# 2/16 Sand	New basewide well.	Replacement well for MW-80 (which had very poor recharge and could not be redeveloped) to monitor groundwater quality on the south side of the Lower Diagonal drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/17/2010
TTBW-MW12	Y	3/16/2008	**2.13**		**3924.89**	PVC	2	18.5	18	15	3-18	# 2/16 Sand	New basewide well.	Monitor groundwater quality south (crossgradient) of Site 18 and the Lower Diagonal drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS, aldrin, and dieldrin (aldrin and dieldrin added to analytical suite in October 2010)	6	10/19/2010
TTBW-MW13	Y	3/24/2008	**1.98**	NA	**3923.85**	PVC	2	20	18	15	3-18	# 2/16 Sand	New basewide well.	Monitor groundwater quality near the Lower Diagonal drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/18/2010
TTBW-MW14	Y	3/26/2008	**-0.41**	NA	**3919.61**	PVC	2	19	18	15	3-18	# 2/16 Sand	New basewide well.	Monitor groundwater quality near the Lower Diagonal drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/19/2010
TTBW-MW15	Y	3/20/2008	**2.48**	NA	**3924.19**	PVC	2	20	18	15	3-18	# 2/16 Sand	New basewide well.	Monitor groundwater quality near the Lower Diagonal drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/18/2010
TTBW-MW16	Y	3/20/2008	**1.72**	NA	**3923.22**	PVC	2	20	19.5	15	3.5-18.5	# 2/16 Sand	New basewide well.	Monitor groundwater quality near the Lower Diagonal drain.	Pressure transducer, micropurge pump	VOCs, PAHs, TDS	6	10/18/2010
TTBW-MW17	Y	11/18/2008	**2.28**	NA	**3937.41**	PVC	2	16	13	10	3-13	# 2/16 Sand	New basewide well.	Well was used to monitor groundwater quality near the L-Line Canal in 2008 through 2010. Only groundwater level and temperature will be monitored in 2011.	Pressure transducer, micropurge pump	N/A	5	10/16/2010

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- Supplemental well to monitoring well network that may be used for water level/product measurements to monitor future remediation strategies.

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 1															
BAT-1-B	Y	9/18/1997	AGC	2	3927.04	PVC	0.75	12.5	12.5	5	7.5-12.5	Silica Sand	1	10/22/2002	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-1-D	Y	9/18/1997	AGC	2	3927.69	PVC	0.75	13	13	5	8-13	Silica Sand	0	NA	Well diameter is less than 1-inch; adequate coverage by other wells. Does not appear to be in solvent plume.
BAT-1-E/14C	Y	9/18/1997	FM	9	3927.77	PVC	0.75	24.77	14.25	5	9.25-14.25	Silica Sand	1	10/21/2002	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-1-F	Y	9/18/1997	FM	8	3925.50	PVC	0.75	25.1	13	6	7-13	Silica Sand	6	2/21/2001	Well diameter is less than 1-inch; adequate coverage by other wells such as MW-70
BAT-1-G-L	Y	9/24/1997	AGC	4	3927.89	PVC	0.75	15.5	15.5	2.5	13-15.5	Silica Sand	0	NA	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-1-G-M	Y	9/24/1997	AGC	4	3927.66	PVC	0.75	12.5	12.5	2.5	10-12.5	Silica Sand	0	NA	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-1-G-U	Y	9/24/1997	AGC	4	3927.68	PVC	0.75	9.75	9.75	2.5	7.25-9.75	Silica Sand	3	9/1/1999	Well diameter is less than 1-inch; adequate coverage by other wells; appears to be screened too deep to be a free product monitoring well
BAT-1-J	NA	9/23/1997	AGC	2	3927.98	PVC	0.75	16	16	7.5	8.5-16	Silica Sand	0	NA	Pad and stickup completely severed from casing, cannot locate a well in the ground in this vicinity. Pad and stickup appear intact, but they are not connected to anything.
BAT-1-K	Y	9/23/1997	AGC	2	3927.37	PVC	0.75	24.61	12.5	5	7.5-12.5	Silica Sand	4	9/1/1999	Well diameter is less than 1-inch; adequate coverage by other wells
MW-15U	Y	3/6/1991	FM	8	3926.79	PVC	2	15	15	5	6-11	8/20 Frac Sand	12	10/28/2005	Attempted to develop well on 9/22/07; extremely poor recharge and could not be developed. Sample MW-15L instead.
MW-72	Y	3/13/1996	FM	12	3923.68	PVC	2	22	22	15	5-20	#20 Sand	4	11/3/1999	When an attempt was made to redevelop this well for future use, the surge block would not go past about 5 ft bgs as a result of bent casing. Well was replaced with TT01-MW01 (by pulling out casing and overdrilling).
P1-MW-01	N	5/14/2002	AGC	1	3926.60	PVC	1	20	17.5	10	7.5-17.5	Pre-pack silica sand	0	NA	Well diameter is 1-inch; adequate coverage by other wells
P1-MW-02	N	5/14/2002	AGC	1	3927.73	PVC	1	20	18	10	8-18	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P1-MW-03	N	5/14/2002	AGC	1	3928.04	PVC	1	20	19	10	9-19	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P1-MW-04	N	5/14/2002	AGC	1	3927.95	PVC	1	20	17.5	10	7.5-17.5	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P1-MW-05	N	5/14/2002	AGC	1	3928.45	PVC	1	20	19	10	9-19	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P1-MW-06	N	5/13/2002	AGC	1	3928.27	PVC	1	20	19	10	9-19	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P1-MW-07	N	5/13/2002	AGC	1	3928.64	PVC	1	21.5	20	10	10-20	Pre-pack silica sand	14	10/3/2008	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P1-MW-08	N	5/13/2002	AGC	1	3928.53	PVC	1	23	19	10	9-19	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.

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Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 1															
P2-MW-01	N	5/15/2002	AGC	1	3928.33	PVC	1	20	20	14.5	5.5-20	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack
P2-MW-02	N	5/15/2002	AGC	1	3928.23	PVC	1	20	19	10	9-19	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P2-MW-03	NA	5/15/2002	AGC	1	3928.28	PVC	1	20	20	15.5	4.5-20	Pre-pack silica sand	0	NA	Damage: upper casing broken in half, 4-in sticking out of ground. GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2 ft total - well has only 1 ft); Final GW Pilot Studies Rpt A.2 9/2004 contains the well log.
P2-MW-04	N	5/15/2002	AGC	2	3928.22	PVC	2	20	20	15.5	4.5-20	Pre-pack silica sand	0	NA	This well was run over and the casing broken, has been recut and surveyed. Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total - well has only 1 ft); Final GW Pilot Studies Rpt A.2 9/2004 contains the well log.
P2-MW-05	N	5/14/2002	AGC	1	3928.21	PVC	1	20	19	15.5	3.5-19	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P2-MW-06	N	5/14/2002	AGC	1	3928.18	PVC	1	20	19	10	9-19	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P2-MW-07	N	5/15/2002	AGC	2	3927.7	PVC	2	20	19	15	4-19	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P2-MW-08	N	5/16/2002	AGC	2	3927.6	PVC	2	20	19	15	4-19	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
P2-MW-09	N	5/15/2002	AGC	2	3927.65	PVC	2	20	19.6	15	4.6-19.6	Pre-pack silica sand	0	NA	Groundwater not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1 ft of filter pack above top of screen (2 ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9/2004 contains the well log.
PW-02	NA	11/21/1991	FM	12	3925.25	PVC	5	18	17	12	5-17	#2 Frac Sand	3	9/16/1997	Well is dry & severely silted in
PZ-1-1	N	*Unknown*	FM	3	3927.43	PVC	1	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	0	NA	No well log to base criteria
PZ-1-10	Y	12/8/1991	FM	4	3924.62	PVC	1.75	20	20	5	15-20	8/20 Frac Sand	8	10/21/2002	Assumes well log drawing of bentonite seal is correct (not stated on well log)
PZ-1-2	N	*Unknown*	AGC	1	3929.50	PVC	1	*Unknown*	*Unknown*	1	14 - 15	*Unknown*	0	NA	No well log to base criteria
PZ-1-3	Y	12/4/1991	FM	5	3924.29	PVC	1.5	18	15	10	5-15	8/20 Frac Sand	0	NA	Assumes well log drawing of bentonite seal is correct (not stated on well log)
PZ-1-4	Y	12/5/1991	FM	5	3925.51	PVC	1.5	18	15	10	5-15	8/20 Frac Sand	0	NA	Assumes well log drawing of bentonite seal is correct (not stated on well log)
PZ-1-5	Y	12/5/1991	FM	5	3925.94	PVC	1.5	18	15	10	5-15	8/20 Frac Sand	0	NA	Assumes well log drawing of bentonite seal is correct (not stated on well log)
PZ-1-7	N	12/5/1991	FM	4	3925.00	PVC	1	18	15	10	5-15	8/20 Frac Sand	0	NA	The well is dry and silted in. Also, the video log shows what appears to be a 0.75" PVC step-down within the 1.0" casing at 2.94'. It is difficult to tell if the casing is broken at this point, or if an extension was added on. Native sand 1-18 feet not to code.

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
UST-R Site 1 (Building 395 Area)															
395A	Y	12/8/1994	FM	12	3937.21	SS	4	18	18	10	5.5-15.5	#2/12 Sand	3	9/15/1997	When an attempt was made to redevelop this well for future use, a very poor recharge/recovery rate was noted and the well could not be developed. Replaced with TT395-MW02.
395D	Y	12/7/1994	FM	12	3937.08	SS	4	20	18	10	5-15	#2/12 Sand	7	10/24/2003	When an attempt was made to redevelop this well for future use, extreme siltation was noted during development, indicative of incorrect screen/slot size. Replaced with TT395-MW04
395E	Y	3/26/1996	FM	12	3933.77	PVC	2	22.5	22	15	3-18	#20 Sand	3	9/15/1997	When an attempt was made to redevelop this well for future use, it was bailed dry & didn't recharge. Replaced with TT395-MW03

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Sites 2 and 4															
EW-17	Y	4/26/1988	AGC	4	3939.08	PVC	2	15	15	10	5-15	#3 Sand	3	10/31/1990	Attempted to redevelop well on 09/21/07; casing bent and surge block would not go past about 5 ft bgs
EW-24	UNK	4/28/1988	AGC	4	3940.27	PVC	2	15	15	5	10-15	*Unknown*	1	4/29/1988	Damaged well
EW-27	UNK	4/29/1988	AGC	6	3938.65	PVC	2	15	15	10	5-15	*Unknown*	0	NA	Above ground casing bent and surge block couldn't fit in well during an attempt to redevelop the well; TT02-MW03 was installed by pulling the casing and overdrilling
EW-28	UNK	4/29/1988	AGC	6	3938.64	PVC	2	20	15	10	8-18	*Unknown*	0	NA	TOC to ground surface measured as 2.75 ft. Well log doesn't mention well construction on which to base NAC requirement criteria; May 1995 water level data indicates TOC at 3938.54. Well is upgradient of source area and plumes; adequate well coverage from nearby wells TTBW-MW03, MW-82, MW-6U, and TT02-MW04
GTI-32	Y	5/30/1995	AGC	6	3938.80	PVC	4	15	14	9	5.5-14.5	#1C Sand	0	NA	GTI-32 could not be redeveloped as a result of very poor recharge/recovery rate; well TT02-MW02 was installed as a replacement well by pulling out the casing and overdrilling
MW-3L	Y	6/18/1990	FM	8	3933.13	PVC	2	30	21.5	5	16.5-21.5	8/12 Frac Sand	2	11/4/1990	Adequate coverage by other wells; well TT04-MW02 (screened from 3 to 18 ft) used as single replacement well for MW-3L and MW-3U
MW-3U	Y	6/18/1990	FM	8	3933.13	PVC	2	30	11.2	5	6.2-11.2	8/12 Frac Sand	9	10/25/2005	Adequate coverage by other wells; well TT04-MW02 (screened from 3 to 18 ft) used as single replacement well for MW-3L and MW-3U
MW-6L	Y	6/20/1990	FM	8	3935.45	NA	NA	87	84	10	74-84	8/12 Frac Sand	2	11/4/1990	Adequate coverage by other wells
MW-8L	Y	6/23/1990	FM	8	3937.68	PVC	2	25	25	10	20-25	8/12 Frac Sand	2	11/1/1990	Adequate coverage by other wells
MW-8U	Y	6/23/1990	FM	8	3937.74	PVC	2	25	13	5	4-9	8/12 Frac Sand	0	NA	Upon an attempt to redevelop the well, very poor recharge/recovery rate were noted and the well could not be developed; well TT02-MW04 was installed as a replacement well
PW-01	Y	6/23/1990	FM	6	3933.77	PVC	2	25	19	10	9-19	8/12 Frac Sand	0	NA	Adequate coverage by other wells
PZ-2-4	N	9/25/1989	AGC	1	3940.11	PVC	1	15	15	0	No screen	Native sand	0	NA	No screen in well; does not meet NAC criteria
PZ-2-5	N	9/25/1989	AGC	1	3938.51	PVC	1	15	15	0	No screen	Native sand	0	NA	No screen in well; does not meet NAC criteria
PZ-2-6	N	9/25/1989	AGC	1	3940.80	PVC	1	15	15	0	No screen	Native sand	0	NA	No screen in well; does not meet NAC criteria
PZ-2-7	N	9/25/1989	AGC	1	3939.91	PVC	1	15	15	0	No screen	Native sand	0	NA	No screen in well; does not meet NAC criteria
RW-1	N	7/15/1993	AGC	10	~3934.00	PVC	5	23	22	16	4-20	#2/12 Sand	2	11/8/1999	5" well is too big to meet regs, cracked pad; mention of an outer casing screen 4-20ft and an inner casing screen 6-20ft on well log.
RW-2	N	7/14/1993	AGC	10	~3934.00	PVC	6	16	14	10	4-14	#2/16 Sand	0	NA	6" well is too big to meet regs, Inside locked porta-potty; could not survey well inside porta-potty.
RW-3	N	6/8/1993	AGC	10	~3936.00	PVC	6	16	14.5	10	4.5-14.5	Sand	0	NA	6" well is too big to meet regs; April 1995 water level information indicates TOC at 3939.39
RW-5A	UNK	11/9/1993	AGC	8	3937	*Unknown*	*Unknown*	15	14	5	9-14	*Unknown*	1	9/28/1998	Inside locked porta-potty. Well log is not available to determine construction on which to base NAC requirement criteria.

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 3															
BAT-3-A-L	Y	9/24/1997	FM	6	3933.333	PVC	0.75	22	22	10	12-22	Formation Collapse	0	NA	Well diameter is less than 1-inch; well pair is beyond extent (cross-gradient) from dissolved hydrocarbon plumes
BAT-3-A-U	Y	9/24/1997	FM	6	3933.408	PVC	0.75	10.5	10.5	5	5.5-10.5	Silica Sand	0	NA	Well diameter is less than 1-inch; well pair is beyond extent (cross-gradient) from dissolved hydrocarbon plumes
BAT-3-B-L	Y	9/25/1997	AGC	2	3933.957	PVC	0.75	31.5	25	4	21-25	Formation Collapse	5	11/10/1999	Well diameter is less than 1-inch; adequate coverage by other nearby monitoring wells
BAT-3-B-U	Y	9/25/1997	AGC	2	3935.137	PVC	0.75	16	16	10	6-16	Silica Sand	5	11/10/1999	Well diameter is less than 1-inch; adequate coverage by other nearby monitoring wells
BAT-3-C-L	Y	9/25/1997	FM	6	3936.217	PVC	0.75	23.5	23.5	7	16.5-23.5	Formation Collapse	5	11/10/1999	Well diameter is less than 1-inch; adequate coverage by other nearby monitoring wells
BAT-3-C-U	Y	9/25/1997	FM	6	3936.238	PVC	0.75	15.5	15.5	5	10.5-15.5	Silica Sand	0	NA	Well diameter is less than 1-inch; adequate coverage by other nearby monitoring wells
BAT-3-D	Y	4/11/1999	FM	5	3937.17	PVC	0.75	20	20	5	15-20	Pre-packed	6	10/23/2003	Well diameter is less than 1-inch; well TT03-MW02 was installed as a replacement
MW-38	Y	3/13/1991	FM	8	3933.10	PVC	2	25	15	10	5-15	8/20 Frac Sand	6	3/26/1997	Well was found to be silted in and well TT03-MW03 was installed as a replacement well
MW-41U	Y	3/15/1991		8		PVC	2	20	15	10	5-15	8/20 Frac Sand	15	10/25/2005	Extremely poor recharge, parameters didn't stabilize, silty water were all noted during an effort to develop the well; as a result MW-41L was used instead to monitor water levels and water quality.
MW-42U	Y	3/15/1991	FM	8	3934.66	PVC	2	20	17	10	7-17	8/20 Frac Sand	8	11/10/1999	Well is dry and silted in.
MW-95	UNK	3/28/1996	FM	6	3933.64	PVC	2	22	Unknown	15	5-15	#20 sand	0	NA	This well is located west of site 3, in the general vicinity of behind Building 64. Not enough information is available to determine if the well meets NAC requirements. Well is cross-gradient of source area.

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 6															
BAT-6-B	Y	9/25/1997	AGC	2	3926.377	PVC	0.75	25.1	10.5	6	4.5-10.5	Silica Sand	1	3/12/2003	Well diameter is less than 1-inch; BA20-MW01 installed as a replacement well
BAT-6-C	Y	9/25/1997	AGC	2	3928.037	PVC	0.75	11	11	5	6-11	Natural Sand	7	10/21/2003	Well diameter is less than 1-inch; adequate coverage provided by other monitoring wells
BAT-6-D	Y	9/25/1997	AGC	2	3927.517	PVC	2	14	14	10	4-14	Formation Collapse	0	NA	Well is dry and apparently silted in
BAT-6-E	Y	9/25/1997	AGC	2	3922.837	PVC	2	20	13	10	3-13	Silica Sand	0	NA	Adequate coverage provided by other monitoring wells
BAT-6-F	Y	9/25/1997	AGC	2	3927.867	PVC	2	25.1	15	10	5-15	Formation Collapse	0	NA	Well is dry and apparently silted in
BAT-6-G	Y	9/25/1997	AGC	2	3929.097	PVC	2	25	11	6	5-11	Silica Sand	4	11/9/1999	Well location is adjacent to and includes the same screen interval range as TT06-MW05
BAT-6-I	Y	9/25/1997	AGC	0.75	3928.297	PVC	0.75	14.5	14.5	7	7.5-14.5	Silica Sand	1	11/9/1999	Well diameter is less than 1-inch; adequate coverage by other nearby monitoring wells
GTI-6-1A	Y	5/31/1995	AGC	8	3930.27	PVC	4	15	14	10	4-14	#1C Sand	6	11/9/1999	Attempted to develop well on 09/20/07, however, well could not be developed due to extremely poor recharge; no product noted during attempt to develop well
MW-46	NA	3/17/1991	FM	8	3926.85	PVC	2	20	15	10	5-15	8/20 Frac Sand	8	11/9/1999	Well is dry and silted in; adequate coverage provided by other monitoring wells
MW-47	Y	3/17/1991	FM	8	3925.72	PVC	2	16	15	10	5-15	8/20 Frac Sand	13	10/21/2003	Pad damage - large cracks radiate out from casing. Water could potentially rundown outside of well casing to screened area and infiltrate well. Adequate coverage provided by other monitoring wells
MW-57	Y	11/22/1991	FM	8	3927.94	PVC	2	13	7	5	2-7	#2 Frac Sand	11	10/17/2002	Well was plugged on 11/08/07 and well TT06-MW05 was installed as a replacement well
PW-03	N	11/22/1991	FM	12	3926.85	PVC	5	18	14	12	2-14	#2 Frac Sand	9	3/13/2007	Well diameter is greater than 4" - does not meet NAC regs; well was replaced with well TT22-MW02; well PW-03 still needs to be plugged
PZ-6-1	N	4/3/1991	AGC	2	3926.64	PVC	1.5	12	8	1	7-8	8/20 Frac Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs
PZ-6-10	N	12/6/1991	FM	6	3928.81	PVC	1.5	15	12.5	10	2.5-12.5	Flush Mount	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs. Well cover cannot be opened to access well. Well log drawing and stated features do not match - screen stated as 2.5-12.5, but drawn as 3-12.5.
PZ-6-2	N	4/3/1991	AGC	2	3926.46	PVC	1.5	12	7.5	1	6.5-7.5	8/20 Frac Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs
PZ-6-3	N	4/3/1991	AGC	2	3926.46	PVC	1.5	9	8	1	7-8	8/20 Frac Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs. Well log drawing and stated features do not match - screen stated as 7-8, but no screen drawn.
PZ-6-4	N	12/6/1991	FM	6	3926.86	PVC	1.5	18	13	10	3-13	Native Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs. Well cover cannot be opened to access well
PZ-6-5	N	12/6/1991	FM	6	3927.06	PVC	1.5	18	13	10	3-13	Native Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs. Well cover cannot be opened to access well
PZ-6-6	N	12/6/1991	FM	6	3926.84	PVC	1.5	18	13	10	3-13	Native Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs. Well cover cannot be opened to access well
PZ-6-7	N	12/6/1991	FM	6	3927.12	PVC	1.5	18	13	10	3-13	Native Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs. Well cover cannot be opened to access well, the elevation reading was taken from the top of the flush mount lid - NOT from the TOC.
PZ-6-8	UNK	*Unknown*	FM	6	*Unknown*	PVC	1.5	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	0	NA	No well log to base criteria. However, well logs for PZ-6-1 through PZ-6-7 & PZ-6-10 all show construction that does not meet NAC regs, it is likely this well was constructed similarly and does not meet NAC regs.
PZ-6-9	UNK	*Unknown*	FM	6	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	0	NA	No well log to base criteria. No well log to base criteria. However, well logs for PZ-6-1 through PZ-6-7 & PZ-6-10 all show construction that does not meet NAC regs, it is likely this well was constructed similarly and does not meet NAC regs. Well cover cannot be opened to access well, survey point was taken from top of cover (not TOC)

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 14															
BAT-14-A-L	Y	9/22/1997	AGC	2	3927.147	PVC	0.75	21.50	21.5	5	16.5-21.5	Natural Sand	0	NA	Location is north of plumes; adequate coverage of hydrocarbon plumes from other wells
BAT-14-A-U	Y	9/22/1997	AGC	2	3927.387	PVC	0.75	37.57	12	5	7-12	Natural Sand	3	9/1/1999	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-14-B	Y	9/23/1997	FM	11	3928.326	PVC	0.75	25.10	16.5	7	9.5-16.5	Formation Collapse	1	10/21/2002	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-14-C6	Y	4/1/1998	FM	4	3924.19	PVC	0.75	14	14	5	9-14	Pre-packed	4	2/22/2001	Well diameter is less than 1-inch; adequate coverage by other wells, such as MW-27
BAT-14-D	Y	9/23/1997	FM	12	3927.059	PVC	0.75	25.10	16.5	7.5	9-16.5	Silica Sand	2	10/21/2002	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-14-D2	Y	4/1/1998	AGC	4	3924.02	PVC	0.75	25	17	5	12-17	Pre-packed	3	4/9/2002	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-14-D4	Y	4/1/1998	AGC	2	3923.99	PVC	0.75	17	17	5	12-17	Pre-packed	3	2/22/2001	Well diameter is less than 1-inch and outer protective casing is broken; adequate coverage by other wells
BAT-14-D5	Y	4/1/1998	FM	4	3923.6	PVC	0.75	15	15	5	10-15	Pre-packed	5	2/22/2001	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-14-E	Y	9/22/1997	AGC	2	3928.145	PVC	0.75	24.77	14.5	5	9.5-14.5	Silica Sand	0	NA	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-14-E5	NA	4/1/1998	AGC	2	3924.38	PVC	0.75	19	19	5	14-19	Pre-packed	5	11/8/1999	Well is silted in, based on field measurements and observations
BAT-14-G-L	NA	9/27/1997	AGC	2	3927.457	PVC	0.75	17	17	5	12-17	Formation Collapse	0	NA	Well diameter is less than 1-inch and broken well and outer casing; adequate coverage by other wells
BAT-14-G-U	Y	9/27/1997	AGC	2	3927.217	PVC	0.75	10	10	5	5-10	Silica Sand	0	NA	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-14-H	Y	4/12/1999	AGC	0.75	3925.06	PVC	0.75	15	15	5	10-15	Pre-packed	6	10/24/2003	Well diameter is less than 1-inch; adequate coverage by other wells
GTI-14-3A	Y	5/31/1995	FM	12	3926.30	PVC	4	16	15	10	5-15	#1C Sand	3	10/24/2003	During an attempt to redevelop the well, it was pumped dry and a sheen of hydrocarbons was noted; TT14-MW03 was installed as a replacement well. Well GTI-14-3A was plugged.
MW-21	Y	3/8/1991	**-0.20**	10	**3925.54**	PVC	2	20	15	10	5-15	8/20 Frac Sand	9	12/3/2007	Could not locate well in field in March 2009; most likely destroyed or covered during building demolition
MW-52	NA	11/19/1991	FM	8	3925.98	PVC	2	21.5	15	10	5-15	#2 Frac Sand	1	12/4/1991	No cap, well is silted in and dry
MW-76	Y	3/13/1996	FM	12	**3928.91**	PVC	2	22	22	15	5-20	#20 Sand	6	12/1/2007	Developed on 9/23/2007 and converted to surface completion on 6/2/2008. Attempt made to change to surface completion resulted in break in well casing in October 2008. Plug well.
PZ-14-2	N	4/7/1991	AGC	3	3927.36	PVC	1.5	12	10	1	9-10	8/20 Frac Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs
PZ-14-3	N	4/7/1991	AGC	3	3928.12	PVC	1.5	12	10	1	9-10	8/20 Frac Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs
PZ-14-4	N	4/7/1991	AGC	3	3927.16	PVC	1.5	12	10	1	9-10	8/20 Frac Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs
PZ-14-5	N	12/4/1991	FM	5	3927.24	PVC	1.5	18	15	10	5-15	Native Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs
PZ-14-6	N	12/4/1991	FM	5	3925.96	PVC	1.5	18	15	10	5-15	8/20 Frac Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs
PZ-14-7	N	12/4/1991	FM	5	3926.37	PVC	1.5	18	12	10	2-12	8/20 Frac Sand	0	NA	No bentonite seal and insufficient or no surface seal - does not meet NAC regs

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Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 16															
BAT-16-A	Y	9/22/1997	AGC	2	3927.817	PVC	0.75	25.1	13.5	5	8.5-13.5	Natural Sand	3	9/1/1999	Location is north of plumes and well diameter is less than 1-inch; adequate coverage by other wells
BAT-16-B	Y	9/19/1997	FM	4	3925.178	PVC	0.75	24.93	12	5	7-12	Formation Collapse	0	NA	Location is north of plumes and well diameter is less than 1-inch; adequate coverage by other wells
BAT-16-C	Y	9/20/1997	**-0.27**	8	**3925.27**	PVC	0.75	13	13	5	8-13	Silica Sand	0	NA	Location is north of plumes and well diameter is less than 1-inch; adequate coverage by other wells
BAT-16-D	NA	9/19/1997	AGC	2	3926.597	PVC	0.75	12	12	5	7-12	Silica Sand	0	NA	Well and pad destroyed. Well full of silt.
BAT-16-F	Y	9/19/1997	AGC	2	3925.847	PVC	0.75	15	15	5	10-15	Silica Sand	0	NA	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-16-I	Y	9/20/1997	AGC	2	3926.267	PVC	0.75	18	18	7	11-18	Formation Collapse	1	10/27/2003	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-16-J	Y	9/21/1997	AGC	2	3925.397	PVC	0.75	25.1	17	7	10-17	Formation Collapse	0	NA	Well diameter is less than 1-inch; adequate coverage by other wells
BAT-16-K	Y	9/21/1997	AGC	2	3925.117	PVC	0.75	25.1	14.5	6	8.5-14.5	Silica Sand	6	10/24/2003	Well diameter is less than 1-inch; 2-inch outer PVC casing 2-feet exposed above ground surface; adequate coverage by other wells
BAT-16-L	Y	9/20/1997	FM	8	3924.48	PVC	0.75	25.1	13.5	5	8.5-13.5	Silica Sand	0	NA	Well diameter is less than 1-inch; pad is chipped and slightly damaged; adequate coverage by other wells
BAT-16-M-L	Y	9/19/1997	**1.44**	2	**3925.79**	PVC	0.75	16	16	3	13-16	Silica Sand	0	NA	Well diameter is less than 1-inch; 2-inch outer PVC casing 2-feet exposed above ground surface; adequate coverage by other wells
BAT-16-M-U	Y	9/19/1997	**1.29**	2	**3925.53**	PVC	0.75	12	12	5	7-12	Silica Sand	3	4/13/1999	Well diameter is less than 1-inch; 2-inch outer PVC casing 2-feet exposed above ground surface; adequate coverage by other wells
BAT-16-N	Y	9/20/1997	AGC	2	3925.62	PVC	0.75	25.1	16.5	6	10.5-16.5	Silica Sand	4	10/27/2003	Well diameter is less than 1-inch; 2-inch outer PVC casing 2-feet exposed above ground surface; adequate coverage by other wells along E4X drain
BAT-16-O	Y	9/21/1997	**2.09**	2	**3926.00**	PVC	0.75	24.93	12.5	4	8.5-12.5	Silica Sand	1	10/25/2003	Well diameter is less than 1-inch; adequate coverage by other wells along E4X drain
BAT-16-P	Y	9/23/1997	AGC	2	3924.74	PVC	0.75	25.1	12.5	7.5	5-12.5	Silica Sand	1	11/30/1999	Well diameter is less than 1-inch; adequate coverage by other wells along E4X drain
GTI-16-1	Y	5/31/1995	FM	8	3922.54	PVC	4	14	13	10	3-13	#1C Sand	10	10/25/2003	Plug due to poor recharge during development; TT16-MW15 installed as a replacement well
MW-16-1	Y	4/8/2004	**-0.08**	10	**3923.79**	PVC	2	21	20	10	5-15	2/12 Sand	1	10/28/2005	Attempted to develop well on 10/11/2007, but could not be developed due to bent casing; adequate coverage by other wells along E4X drain, such as TT16-MW04
MW-66	Y	11/25/1991	FM	8	3923.04	PVC	2	22	13	10	3-13	#2 Frac Sand	17	10/24/2003	Well is located in dog kennel. Plug due to access issues. Well TT16-MW16 installed as a replacement well.
PZ-16-01	N	4/8/1991	AGC	4	3925.10	PVC	1.5	12	12	1	9-10	8/20 Frac Sand/ Native sand	0	NA	Only 1 ft screen, no bentonite seal, cement surface seal thickness not on log - doesn't meet NAC regs; adequate coverage by other wells along E4X drain
PZ-16-04	N	4/6/1991	AGC	4	3926.34	PVC	1.5	12	10	1	9-10	8/20 Frac Sand/ Native sand	0	NA	Only 1-foot screen, needs pad and new external casing, no bentonite seal, cement surface seal thickness not on log - doesn't meet NAC regs. .
PZ-16-2	N	4/8/1991	AGC	4	3925.63	PVC	1.5	12	10	1	9-10	8/20 Frac Sand	0	NA	Only 1-foot screen, needs pad and new external casing, no bentonite seal, cement surface seal thickness not on log - doesn't meet NAC regs. .
PZ-16-3	N	4/5/1991	AGC	4	3924.47	PVC	1.5	12	10	1	9-10	8/20 Frac Sand	0	NA	Only 1-foot screen, needs pad and new external casing, no bentonite seal, cement surface seal thickness not on log - doesn't meet NAC regs. .
PZ-16-5	N	4/6/1991	AGC	4	3925.84	PVC	1.5	12	10	1	9-10	8/20 Frac Sand	0	NA	Only 1-foot screen, needs pad and new external casing, no bentonite seal, cement surface seal thickness not on log - doesn't meet NAC regs. .
PZ-16-6	N	4/6/1991	AGC	3	3923.75	PVC	1.5	12	9	1	8-9	8/20 Frac Sand	0	NA	Only 1-foot screen, needs pad and new external casing, no bentonite seal, cement surface seal thickness not on log - doesn't meet NAC regs. .
PZ-16-7	N	4/6/1991	AGC	4	3926.43	PVC	1.5	12	8	1	7-8	8/20 Frac Sand	0	NA	Only 1-foot screen, needs pad and new external casing, no bentonite seal, cement surface seal thickness not on log - doesn't meet NAC regs. .
PZ-16-8	N	4/8/1991	AGC	3	3924.41	PVC	1.5	12	9	1	8-9	8/20 Frac Sand	0	NA	Only 1-foot screen, needs pad and new external casing, no bentonite seal, cement surface seal thickness not on log - doesn't meet NAC regs. .

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 16															
PZ-16-9	N	12/13/1991	FM	4	3924.30	PVC	1.5	12	10	1	9-10	*Unknown*	0	NA	Only 1-foot screen, pad is damaged (chipped and worn away), does not meet NAC regs - pad damage, no filter packing listed on well log, no bentonite seals. Also, well log conflicts with field verification regarding flush mount (actual) vs. AGC (drawn on log).

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 18															
MW-31	NA	3/10/1991	FM	8	3924.13	PVC	2	20	15	10	5-15	8/20 Frac Sand	2	8/10/1991	Well is dry and silted in

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 20															
MW-37	Y	3/13/1991	FM	8	3925.86	PVC	2	20	15	10	5-15	8/20 Frac Sand	3	3/5/2007	Attempted to develop on 9/10/2007, however, extremely poor recharge - could not be developed. Plug well and use TT20-MW02 as an alternate.
TT20-MW01	Y	11/13/2007	**1.94**	NA	**3928.67**	PVC	2	18.5	18	15	3-18	2/16 Frac Sand	0	NA	TT20-MW01 was initially installed as a replacement well for MW-37 on 11/13/07 by overdrilling; however, it did not develop properly and TT20-MW02 was installed slightly downgradient of the MW-37/TT20-MW01 location. TT20-MW01 needs to be plugged.

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 21															
MW-12U	Y	6/26/1990	FM	8	3930.25	PVC	2	20	15	10	5-15	8/12 Frac Sand	2	4/16/1991	Well is dry and silted in, adequate coverage provided by other monitoring wells, including BA21-MW01 which as installed as a replacement well
PZ-1	UNK	*Unknown*	AGC	2	*Unknown*	PVC	1	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	0	NA	No well log to base criteria, diameter too small to video well, well diameter is 1" at surface and 0.75" further down (~3ft). Assume similar seal between different sized PVC casings as seen in PZ-3 and PZ-4, and that seal does not meet NAC code. Well has poor recharge and is generally dry or nearly dry. Recommend plugging.
PZ-2	UNK	*Unknown*	AGC	2	*Unknown*	PVC	1	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	0	NA	No well log to base criteria, diameter too small to video well, well diameter is 1" at surface and 0.75" further down (~3ft). Assume similar seal between different sized PVC casings as seen in PZ-3 and PZ-4, and that seal does not meet NAC code. Well has poor recharge and is generally dry or nearly dry. Recommend plugging.
PZ-3	UNK	*Unknown*	AGC	2	*Unknown*	PVC	1	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	0	NA	No well log to base criteria, diameter too small to video well, well diameter is 1" at surface and 0.75" further down (~3ft). Assume seal between different sized PVC casing does not meet NAC code - video taken to that point shows potential compromised seal and metal pins fixing casing together. Well has poor recharge and is generally dry or nearly dry. Recommend plugging.
PZ-4	UNK	*Unknown*	AGC	2	*Unknown*	PVC	1	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	0	NA	No well log to base criteria, diameter too small to video well, well diameter is 1" at surface and 0.75" further down (~3ft). Assume seal between different sized PVC casing does not meet NAC code - video taken to that point shows potential compromised seal and metal pins fixing casing together. Well has poor recharge and is generally dry or nearly dry. Recommend plugging.
PZ-5	UNK	*Unknown*	AGC	2	*Unknown*	PVC	1	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	0	NA	No well log to base criteria, diameter too small to video well, well diameter is 1" at surface and 0.75" further down (~3ft). Assume similar seal between different sized PVC casings as seen in PZ-3 and PZ-4, and that seal does not meet NAC code. Well has poor recharge and is generally dry or nearly dry. Recommend plugging.

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 22															
22004	UNK	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	*Unknown*	1	3/14/2007	Plug well 22004 due to insufficient recharge; TT22-MW01 installed as a replacement well

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Site 348															
348A	N	3/27/1996	FM	8	3935.33	PVC	6	22.5	22	15	5-20	#20 Sand	0	NA	According "NASF Master Well List," well closed in Aug 2002, however, field crew was able to open well and it does not appear plugged. NASF MWL lists 348A as being MW-90. Also have a well log MW-87 marked out and 348A handwritten in (no initials or signature) - this is incorrect.
348C	NA	3/27/1996	FM	8	3934.74	PVC	*Unknown*	22	22	15	5-20	#20 Sand	0	NA	According "NASF Master Well List," well closed in Aug 2002; unable to open, appears abandoned based on cover. Well has external ID that says "MW-87." The correct well log for 348C is MW-87, the log has been corrected to reflect this. 2-foot sump at 20-22 feet.

TABLE 2-2: WELLS AND PIEZOMETERS RECOMMENDED FOR PLUGGING

Well ID	Meets NAC Criteria	Installation Date	Surface Completion	Surface Casing Size (in)	TOC Elev (ft amsl)	Well Type	Well Diam. (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Number of Samples Collected Between 1988 - 2007	Date Last Sampled	Final Comments
Basewide (Sentinel) Wells															
MW-80	Y	3/14/1996	FM	12	3927.46	PVC	2	22	22	15	5-20	#20 Sand	1	9/1/1996	MW-80 replaced with TTBW-MW11 due to poor recharge during well redevelopment

Notes:

AGC	above ground completion
amsl	above mean sea level
AR	Administrative Record
bgs	below ground surface
D	damage
diam	diameter
Draft Groundwater Pilot Study.	Battelle. 2003
"Fallon NAS Wells" document	A folder labeled "Fallon NAS Wells" was obtained from the Navy and it contains loose leaf information without reference to reports or specific field efforts.
Final Groundwater Pilot Study.	Battelle. 2004
ft	feet
Frac	fraction
GW	groundwater
ID	identification
in	inches
KMW	Kinder Morgan Well
M. Place	Phone conversation with Matt Place of Battelle who was on-site and
MW	monitoring well
MWL	Master Well List
N	no
NA	not applicable
NAC	Nevada Administrative Code
NAD 83	North American Datum of 1983
NASF	Naval Air Station Fallon
None	The information was not contained in the Master Well List
O	Other - this notation is used for well logs. In the instance where "O" is indicated there is not a dedicated well log, but there is a generic well log and a table containing well construction information. Specifically, this reference is to the "BAT" wells.
ORNL	Oak Ridge National Laboratory
PVC	polyvinylchloride
PZ	peizometer
regs	regulations
RR	remediation or recovery
SATO Report	"Soil and Groundwater Sampling at 4th and C Street," and "Soil and Groundwater Sampling of 3 Monitoring Wells Placed North of the Base Housing Area." January and February 2005, respectively. Sato Environmental Consultants, Inc.
SS	stainless steel
TBP	to be provided
TOC	top of casing
Trend analysis	"Trend Analysis and Updated Plume Assessment for Naval Air Station Fallon, Nevada," Battelle October 31, 2003.
UTM	universal transverse Mercator, designated as North (N) and East (E)
xls	Excel
Y	yes

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site 1														
P1-EW-01	7/11/2002	AGC	6	3927.88	PVC	6	19	17	10	7.5-17.5	sand	RR	Found, documented	Doesn't meet NAC regs - diameter too large. Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-01	5/23/2002	AGC	2	3927.23	PVC	2	18	18	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-02	5/23/2002	AGC	2	3927.59	PVC	2	17	17	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-03	5/22/2002	AGC	2	3927.65	PVC	2	20	17.5	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-04	5/22/2002	AGC	2	3928	PVC	2	20	18	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-05	5/22/2002	AGC	2	3927.63	PVC	2	20	18	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-06	5/22/2002	AGC	2	3927.94	PVC	2	20	18	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-07	5/22/2002	AGC	2	3928.29	PVC	2	20	17	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-08	5/22/2002	AGC	2	3928.46	PVC	2	18	17	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site 1														
P1-IW-09	5/22/2002	AGC	2	3927.81	PVC	2	18.5	17.5	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-10	5/22/2002	AGC	2	3928.16	PVC	2	18	17.5	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-11	5/21/2002	AGC	2	3928.4	PVC	2	18	17	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P1-IW-12	5/21/2002	AGC	2	3928.66	PVC	2	18	18	10	7.5-17.5	sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P2-SP-01	5/30/2002	AGC	6	3928.42	PVC	1	19.5	19.5	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	Final GW Pilot Studies Rpt A.1 9.2004
P2-SP-02	5/30/2002	AGC	6	3928.41	PVC	1	22	20	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	Final GW Pilot Studies Rpt A.1 9.2004
P2-SP-03	5/30/2002	AGC	6	3928.17	PVC	1	19	19	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft); Final GW Pilot Studies Rpt A.1 9.2004
P2-SP-04	5/30/2002	AGC	6	3928.42	PVC	1	20	20	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	Final GW Pilot Studies Rpt A.1 9.2004
P2-SP-05	5/30/2002	AGC	6	3928.57	PVC	1	20	20	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	Final GW Pilot Studies Rpt A.1 9.2004
P2-VE-01	5/23/2002	AGC	2	3928.15	PVC	2	11	6.5	3	7.5-17.5	pre-pack silica sand	RR	Found, documented	There is no filter pack above the screen, therefore well doesn't meet NAC regs. Final GW Pilot Studies Rpt A.1 9.2004
P2-VE-02	5/23/2002	AGC	2	3927.94	PVC	2	11	7	3	7.5-17.5	pre-pack silica sand	RR	Found, documented	There is no filter pack above the screen, therefore well doesn't meet NAC regs. Final GW Pilot Studies Rpt A.1 9.2004
P2-VE-03	5/23/2002	AGC	2	3928.23	PVC	2	11	7	3	7.5-17.5	pre-pack silica sand	RR	Found, documented	There is no filter pack above the screen, therefore well doesn't meet NAC regs. Final GW Pilot Studies Rpt A.1 9.2004

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site 14														
P3-EW-01A	7/13/2002	FM	12	3926.84	PVC	6	18	17.5	10	7.5-17.5	sand	RR	Found, documented	doesn't meet NAC regs - diameter too large. Well log *Final GW Pilot Studies Rpt A3* 9.2003
P3-IW-01	6/4/2002	AGC	6	3927.47	PVC	1	19	18.5	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P3-IW-02	6/4/2002	AGC	6	3927.59	PVC	1	19	18.5	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P3-IW-03	6/4/2002	AGC	6	3927.43	PVC	1	19	18.5	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P3-IW-04	6/4/2002	AGC	6	3927.31	PVC	1	19	18.5	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P3-IW-05	6/3/2002	AGC	6	3927.55	PVC	1	19	18.5	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P3-IW-06	6/3/2002	AGC	6	3927.49	PVC	1	19	18.5	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P3-IW-07	6/3/2002	AGC	6	3927.46	PVC	1	20	19.5	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P3-IW-08	6/3/2002	AGC	6	3927.22	PVC	1	19	18.5	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site 14														
P3-IW-09	6/3/2002	AGC	6	3927.65	PVC	1	19	18.5	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P3-IW-10	6/3/2002	AGC	6	3927.47	PVC	1	19	19	2	17.0 - 19.0	Silica Sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P3-IW-11	5/31/2002	AGC	6	3927.48	PVC	1	18	18	2	16.0 - 18.0	Silica Sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P3-IW-12	5/31/2002	AGC	6	3927.41	PVC	1	20	20	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log *Final GW Pilot Studies Rpt A3* 9.2004
P4-SP-01	6/6/2002	AGC	6	3927.77	PVC	1	18	17	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log Final GW Pilot Studies Rpt A3 9.2004
P4-SP-02	6/5/2002	AGC	6	3928.14	PVC	1	20	20	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log Final GW Pilot Studies Rpt A3 9.2004
P4-SP-03	6/6/2002	AGC	6	3927.88	PVC	1	22	22	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 0.5 ft of filter pack above top of screen (2ft total required - well has only 1.5 ft). Well log Final GW Pilot Studies Rpt A3 9.2004
P4-SP-04	6/5/2002	AGC	6	3927.64	PVC	1	20	19	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	Well log *Final GW Pilot Studies Rpt A4* 9.2004
P4-SP-05	6/5/2002	AGC	6	3927.97	PVC	1	20	20	2	7.5-17.5	pre-pack silica sand	RR	Found, documented	GW not encountered within 5 ft of ground surface during installation, therefore filter pack doesn't meet NAC regs, need an additional 1ft of filter pack above top of screen (2ft total required - well has only 1 ft). Well log Final GW Pilot Studies Rpt A3 9.2004

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site 14														
P4-VE-01	6/5/2002	AGC	2	3927.22	PVC	2	12	7	3	7.5-17.5	sand	RR	Found, documented	There is no filter pack above the screen, therefore well doesn't meet NAC regs. Well log *Final GW Pilot Studies Rpt A4* 9.2004
P4-VE-02	6/6/2002	AGC	2	3927.58	PVC	2	12	7	3	7.5-17.5	sand	RR	Found, documented	There is no filter pack above the screen, therefore well doesn't meet NAC regs. Well log *Final GW Pilot Studies Rpt A4* 9.2004
P4-VE-03	6/5/2002	AGC	2	3927.36	PVC	2	12	7	3	7.5-17.5	sand	RR	Found, documented	There is no filter pack above the screen, therefore well doesn't meet NAC regs. Well log *Final GW Pilot Studies Rpt A4* 9.2004
P4-VE-04	*Unknown*	AGC	2	*Unknown*	PVC	2	9.25	8.58	4	4.08-8.08	#30 silica sand	RR	Found, documented	There is no filter pack above the screen, therefore well doesn't meet NAC regs. Well log *Final GW Pilot Studies Rpt A4* 9.2004
Site Unknown														
MW-I		AGC	2		PVC	2						MW	New well found	
MW-L		AGC	2		PVC	2						MW	New well found	
BS-1		AGC	2		PVC	2						RR	New well found	Upper casing destroyed, locking cap is damaged
BS-2		AGC	2		PVC	2						RR	New well found	Upper casing destroyed, locking cap is damaged
BS-3		AGC	2		PVC	2						RR	New well found	
BS-4		AGC	2		PVC	2						RR	New well found	
BS-5		AGC	2		PVC	2						RR	New well found	
BS-6		AGC	2		PVC	2						RR	New well found	
BS-7		AGC	2		PVC	2						RR	New well found	
BS-8		AGC	2		PVC	2						RR	New well found	
BS-9		AGC	2		PVC	2						RR	New well found	
BS-10		AGC	2		PVC	2						RR	New well found	
BS-11		AGC	2		PVC	2						RR	New well found	
BS-12		AGC	2		PVC	2						RR	New well found	
BS-13		AGC	2		PVC	2						RR	New well found	
BS-14		AGC	2		PVC	2						UN	New well found	
BS-15		AGC	2		PVC	2						UN	New well found	
BS-16		AGC	2		PVC	2						UN	New well found	
BS-17		AGC	2		PVC	2						UN	New well found	
BS-18		AGC	2		PVC	2						UN	New well found	
BS-19		AGC	2		PVC	2						UN	New well found	
BS-20		AGC	2		PVC	2						UN	New well found	
BS-21		AGC	2		PVC	2						UN	New well found	
BS-22		AGC	2		PVC	2						UN	New well found	
BS-23		AGC	2		PVC	2						UN	New well found	Upper casing destroyed, locking cap is damaged
BS-25		AGC	2		PVC	2						UN	New well found	
BS-26		AGC	2		PVC	2						UN	New well found	
BS-27		AGC	2		PVC	2						UN	New well found	
BS-28		AGC	2		PVC	2						UN	New well found	
BS-29		AGC	2		PVC	2						UN	New well found	
BS-30		AGC	2		PVC	2						UN	New well found	
A-1-10		AGC	2		PVC	2						UN	New well found	
A-2-?		AGC	2		PVC	2						UN	New well found	ID is unclear
A-3-10		AGC	2		PVC	2						UN	New well found	
A-4-10		AGC	2		PVC	2						UN	New well found	
AFC-3		AGC	6 X12		PVC	0.5						UN	New well found	3 inner casings
B-1-10		AGC	2		PVC	2						UN	New well found	

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site Unknown														
B-2-10		AGC	2		PVC	2						UN	New well found	
B-2-12		AGC	2		PVC	2						UN	New well found	
B-3-10		AGC	2		PVC	2						UN	New well found	
B-3-12		AGC	2		PVC	2						UN	New well found	
B-4-?		AGC	2		PVC	2						UN	New well found	ID is unclear
B-4-10		AGC	2		PVC	2						UN	New well found	
B-5-10		AGC	2		PVC	2						UN	New well found	
B-5-12		AGC	2		PVC	2						UN	New well found	
C-1-10		AGC	2		PVC	2						UN	New well found	
C-2-10		AGC	2		PVC	2						UN	New well found	
C-2-12		AGC	2		PVC	2						UN	New well found	
C-3-10		AGC	2		PVC	2						UN	New well found	
C-4-12		AGC	2		PVC	2						UN	New well found	
C-5-?		AGC	2		PVC	2						UN	New well found	ID is unclear
D-1-10		AGC	2		PVC	2						UN	New well found	
D-2-10		AGC	2		PVC	2						UN	New well found	
D-2-12		AGC	2		PVC	2						UN	New well found	
D-3-12		AGC	2		PVC	2						UN	New well found	
D-4-10		AGC	2		PVC	2						UN	New well found	
D-5-10		AGC	2		PVC	2						UN	New well found	
D-5-12		AGC	2		PVC	2						UN	New well found	
E1		FM	4		NA	--						UN	New well found	
E2		FM	4		NA	--						UN	New well found	
E2.5-D		FM	6 X12		NA	--						UN	New well found	
E3-A		FM	4		NA	--						UN	New well found	
E3-B		FM	4		NA	--						UN	New well found	
E3-C		FM	4		NA	--						UN	New well found	
E3-D		FM	4		NA	--						UN	New well found	
E3-E		FM	12 X12		NA	--						UN	New well found	
E4-A		FM	4		NA	--						UN	New well found	
E4-B		FM	4		NA	--						UN	New well found	
E4-C		FM	4		NA	--						UN	New well found	
E4-D		FM	4		NA	--						UN	New well found	
E4-E		FM	4		NA	--						UN	New well found	
E5-A		FM	4		NA	--						UN	New well found	
E5-B		FM	4		NA	--						UN	New well found	
E5-C		FM	4		NA	--						UN	New well found	
E5-D		FM	4		NA	--						UN	New well found	
E5-E		FM	4		NA	--						UN	New well found	
EO-5		FM	12 X12		NA	--						UN	New well found	
S-1-?		AGC	2		PVC	2						UN	New well found	ID is unclear
S-2-10		AGC	2		PVC	2						UN	New well found	
S-3-10		AGC	2		PVC	2						UN	New well found	
S-4-10		AGC	2		PVC	2						UN	New well found	
UNK		AGC	2		PVC	2						UN	New well found	
UNK-10		AGC	6		PVC	6						UN	New well found	
UNK-11		AGC	2		PVC	2						UN	New well found	
UNK-12		AGC	2		PVC	2						UN	New well found	
UNK-13		AGC	0.5		PVC	0.5						UN	New well found	
UNK-14		FM	6 X12		PVC	2						UN	New well found	Pad is damaged
UNK-15		FM	6 X12		NA	--						UN	New well found	

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site Unknown														
UNK-16		AGC	2		PVC	2						UN	New well found	
UNK-17		FM	4		NA	--						UN	New well found	
UNK-18		FM	12 X12		NA	--						UN	New well found	
UNK-19		AGC	8 X12		PVC	8						UN	New well found	
UNK-20		AGC	1.5		PVC	1.5						UN	New well found	Needs new well box and cap
UNK-21		AGC	0.75		PVC	0.75						UN	New well found	Needs new well box and cap
UNK-22		AGC	2		PVC	2						UN	New well found	
UNK-23		AGC	2		PVC	2						UN	New well found	
UNK-24		AGC	2		PVC	2						UN	New well found	
UNK-25		AGC	2		PVC	2						UN	New well found	
UNK-26		AGC	2		PVC	2						UN	New well found	
UNK-27		AGC	2		PVC	2						UN	New well found	
UNK-28		AGC	1.5		PVC	1.5						UN	New well found	
UNK-5		FM	4		PVC	2						UN	New well found	
UNK-6		AGC	2		PVC	2						UN	New well found	
UNK-7		AGC	6 X12		PVC	0.5						UN	New well found	Pad and PVC cracked; 3 inner casings
UNK-8		AGC	6 X12		PVC	0.5						UN	New well found	3 inner casings
UNK-9		AGC	2		PVC	2						UN	New well found	
B		AGC	2		PVC	2						UN	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-1		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-10		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-11		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-12		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-13		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-14		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site Unknown														
BS-15		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-16		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-17		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-18		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-19		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-2		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-20		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-21		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-22		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-23		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-24		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-25		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site Unknown														
BS-26		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-27		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-28		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-29		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-3		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-30		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-31		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-32		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-33		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-34		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-35		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-36		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site Unknown														
BS-37		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-38		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-39		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-4		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-40		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-41		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-42		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-43		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-44		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-45		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-46		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-47		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site Unknown														
BS-48		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-5		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-6		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-7		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-8		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
BS-9		AGC	2		PVC	2						BS	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
C		AGC	2		PVC	2						UN	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
E		AGC	2		PVC	2						UN	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
EW-3		AGC	8		PVC							MW	New well found	Per NASF 5/12/04 part of product recovery trench
F		AGC	2		PVC	2						UN	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
I2-EW-1		AGC	8		PVC	8						RR	New well found	Per NASF 5/12/04 part of product recovery trench
T1EW-2		AGC	8		PVC	8						UN	New well found	Per NASF 5/12/04 part of product recovery trench
T2-EW-2		AGC	8		PVC	8						UN	New well found	Per NASF 5/12/04 part of product recovery trench
T3-EW-1		AGC	8		PVC	8						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-29		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site Unknown														
UNK-30		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-31		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-32		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-33		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-34		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-35		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-36		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-37		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-38		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-39		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-40		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-41		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-42		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-43		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-44		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-45		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-46		AGC	4		PVC	4						UN	New well found	Per NASF 5/12/04 part of product recovery trench
"T" OR "I" 3E		AGC	8		PVC							UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-47		FM	8		PVC	2						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-48		FM	8		PVC	2						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-49		FM	8		PVC	2						UN	New well found	Per NASF 5/12/04 part of product recovery trench
UNK-50		FM	8		PVC	2						UN	New well found	Per NASF 5/12/04 part of product recovery trench

TABLE 2-3: WELLS, PIEZOMETERS, AND REMEDIAL SYSTEMS TO CONSIDER FOR FUTURE EVALUATION AND PLUGGING

Well ID	Installation Date	Surface Completion	Surface Casing Size (in)	Elevation at TOC (ft amsl)	Well Type	Well Diam (in)	Boring Depth (ft bgs)	Well Depth (ft bgs)	Screen Interval (ft)	Screened Depth (ft bgs)	Filter Packing	Category	Phase I Field Status	Notes and comments
Site Unknown														
UNK-1		AGC	2		PVC	2						UN	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
UNK-2		AGC	2		PVC	2						UN	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
UNK-3		AGC	2		PVC	2						UN	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)
UNK-4		AGC	2		PVC	2						UN	New well found	Part of the bioslurper system at Site 2. Immediately south of the Kinder Morgan Pipeline system (a fenced in area along Carson Road to the west)

Notes:

AGC	above ground completion
amsl	above mean sea level
bgs	below ground surface
FM	flush mount
ft	feet
GW	groundwater
ID	identification
in	inches
KMW	Kinder Morgan Well
MW	monitoring well
MWL	Master Well List
N	no
NAC	Nevada Administrative Code
NASF	Naval Air Station Fallon
PVC	polyvinylchloride
regs	regulations
RR	remediation or recovery

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
1	MW-11U	5-15	15	14.8	6.94	6.97	Flush	2	9/5/2007	Well developed properly, but sand was removed from bottom of the well - may be indicative of screen damage	9/11/2007	N/A	No
	MW-14	5-15	15	14.57	9.17	9.57	Flush	2	9/26/2007	Well developed properly	N/A		No
	MW-15U	6-11	15	16.24	---	---	Flush	2	9/22/2007	Extremely poor recharge - could not be developed	N/A	Do not repair/Add to wells to be plugged	No; monitor well MW-15L instead
	MW-15L	14-19	19	19.65	8.11	8.29	Flush	2	2/22/2007	Well developed properly	N/A	N/A	No
	MW-16U	10-15	15	10.37	8.41	8.55	Flush	2	9/22/2007	Well developed properly	N/A	N/A	No
	MW-16L	20-25	25	24.16	8.44	8.65	Flush	2	9/22/2007	Well developed properly	N/A	N/A	No
	MW-17	5-15	15	14.29	6.14	6.55	Flush	2	9/22/2007	Well developed properly	N/A	N/A	No
	MW-50U	5-15	15	14.85	6.25	6.30	Flush	2	9/5/2007	Well developed properly	9/11/2007	N/A	No
	MW-50L	11.8-21.8	21.8	21.03	6.27	6.33	Flush	2	9/5/2007	Well developed properly, but turbidity did not stabilize to within 10%	9/11/2007	N/A	No
	MW-51U	6-16	15	15.98	---	---	Flush	2	9/26/2007	Well contained product. Did not develop.	N/A	N/A	No
	MW-51L	16-26	15	15.98	9.38	9.43	Flush	2	9/26/2007	Well developed properly	N/A	N/A	No
	MW-70	5-20	22	21.85	6.21	6.26	Flush	2	9/22/2007	Well developed properly	N/A	N/A	No
	BW-1-1	3.4-14.4	13.4	13.22	8.96	8.96	Flush	2	9/6/2007	Well developed properly	9/10/2007	N/A	No
	BW-1-2	4.2-14.12	14.2	14.08	7.49	7.49	Flush	2	9/6/2007	Well developed properly	9/10/2007	N/A	No
	BW-1-3	4.0-14	14	13.87	6.44	6.47	Flush	2	9/6/2007	Well developed properly	9/10/2007	N/A	No
	MW-53	5.0-15	15	14.32	7.52	7.55	Flush	2	9/23/2007	Well developed properly	N/A	N/A	No
	MW-68	4.0-14	17	16.11	4.94	4.97	Flush	2	9/5/2007	Well developed properly	9/11/2007	N/A	No
	MW-69	5.0-20	22	22.3	7.57	7.61	Flush	2	9/5/2007	Well developed properly	9/11/2007	N/A	No
	MW-72	5.0-20	22	21.45	---	---	Flush	2	9/23/2007	Casing bent; surge block would not go past about 5 ft bgs	N/A	Do not repair/Add to wells to be plugged	Yes, added well TT01-MW01
	MW-71	5-20	22	22.11	8.26	8.41	Flush	2	9/23/2007	Well developed properly	N/A	N/A	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
2/4	EW-15	5-15	15		---	---	Flush	2	10/9/2007	Well contained product. Did not develop.	N/A	N/A	No
	EW-16	5-15	15		7.60	7.89	Flush	2	9/24/2007	Well developed properly	N/A	N/A	No
	EW-17	5-15	15	14.29	---	---	AGC	2	9/21/2007	Casing bent; surge block would not go past about 5 ft bgs	N/A	Do not repair/Add to wells to be plugged	No
	EW-20	5-15	15	18	---	---	3.8	2	10/9/2007	Well contained product. Did not develop.	N/A	N/A	No
	EW-22	4-14	14		---	---	3.18	2	10/9/2007	Well contained product. Did not develop.	N/A	N/A	No
	EW-27	5-15	15		---	---	AGC	2	9/11/2007	Above ground casing bent; surge block couldn't fit in well	9/14/2007	Inspected well - well casing severely bent about 3-4 ft bgs. Recommend replacing well, rather than repairing. Add to wells to be plugged	Yes, added well TT02-MW03
	GTI-31	5-15	16	15.07	7.29	7.36	AGC	4	9/25/2007	Well developed properly	N/A	N/A	No
	GTI-32	5.5-14.5	14	17.66	9.68	---	3.7	4	9/25/2007	Very poor recharge/recovery rate-could not be developed	N/A	Do not repair/Add to wells to be plugged	Yes, added well TT02-MW02
	MW-1	5-15	15	14.17	8.21	8.25	Flush	2	9/25/2007	Well developed properly	N/A	N/A	No
	MW-2	5-15	15	15.1	6.94	7.19	Flush	2	9/24/2007	Well developed properly	N/A	N/A	No
	MW-3U	6.2-11.2	11.2	10.98	---	---	Flush	2	9/24/2007	Very poor recharge/recovery rate-could not be developed	N/A	Do not repair/Add to wells to be plugged	Yes - since MW-3L also could not be developed, added well TT04-MW02
	MW-3L	16.5-21.5	21.5		---	---	Flush	2	10/9/2007	Extremely poor recharge - could not be developed	N/A	Do not repair/Add to wells to be plugged	No
	MW-4	4-14	14	13.91	7.51	7.54	Flush	4	9/21/2007	Well developed properly	N/A	N/A	No
	MW-5U	6.5-16.5	16.75	16.73	---	---	Flush	2	9/21/2007	Extremely poor recharge - could not be developed	N/A	Do not repair/Add to wells to be plugged	No - Developed well 5L
	MW-5L	16-21	21		7.83	7.97	Flush	2	10/9/2007	Well developed properly	N/A	N/A	No
	MW-6U	5-15	15	15.11	6.42	6.48	Flush	2	9/21/2007	Well developed properly	N/A	N/A	No

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
2/4	MW-8U	4-9	15	15.19			Flush	2	9/24/2007	Well was bailed dry on several attempts to develop it. Bent casing noted.	N/A	Do not repair/Add to wells to be plugged	Yes, added well TT02-MW04
	MW-7	5.5-15.5	15.5	15	7.86	7.89	Flush	2	9/24/2007	Well developed properly	N/A	N/A	No
	MW-9	5-15	15	15.19	9.05	9.12	Flush	2	9/25/2007	Well developed properly	N/A	N/A	No
	MW-10	5-15	15	14.54	8.17	8.25	Flush	2	9/21/2007	Well developed properly	N/A	N/A	No
	MW-60	5-15	15	15.14	6.75	7.25	Flush	2	9/24/2007	Well developed properly	N/A	N/A	No
	MW-61	5-15	15	15.14	7.86	7.89	Flush	2	9/24/2007	Well developed properly	N/A	N/A	No
	MW-62	4-14	14	14	---	---	Flush	2	9/21/2007	Found 1.5 inch of product in well. Did not develop.	N/A	N/A	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
3	MW-39U	5-15	15	14.88	7.59	7.88	Flush	2	9/12/2007	Well developed properly	N/A	Well is located in taxiway-flush mount repairs needed	No
	MW-39L	15-20	19.5	20.8	7.42	7.79	Flush	2	9/12/2007	Well developed properly	N/A	N/A	No
	MW-41U	5-15	15	14.7	6.63	N/A	Flush	2	9/12/2007	Extremely poor recharge, parameters didn't stabilize, silty water	N/A	Do not repair/Add to wells to be plugged	No - Developed 41L
	MW-41L	20.5-25.5	25.5	25.13	6.60	7.06	Flush	2	10/9/2007	Well developed properly	N/A	N/A	No
	MW-42L	20.5-25.5	25.5	25.08	9.78	9.78	Flush	2	9/18/2007	Well developed properly	N/A	N/A	No
	MW-43U	7-17	17	16.6	10.47	10.78	Flush	2	9/18/2007	Well developed properly	N/A	N/A	No
	MW-43L	23-28	28	27.31	10.59	10.58	Flush	2	9/18/2007	Well developed properly	N/A	N/A	No
	MW-44U	5-15	15	15.24	7.24	7.32	Flush	2	9/18/2007	Well developed properly	N/A	N/A	No
	MW-44L	21.5	26.5	26.29	7.08	7.38	Flush	2	9/18/2007	Well developed properly	N/A	N/A	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
6	GTI-6-1A	4-14	17.73	17.3	10.11	---	2.18	4	9/20/2007	Extremely poor recharge - could not be developed	N/A	Do not repair/Add to wells to be plugged	No
	MW-45	5-15	15.3	15.05	11.75	11.96	Flush	2	9/19/2007	Well developed properly	N/A	N/A	No
	MW-47	5-15	15.3	15.04	6.20	6.31	Flush		9/19/2007	Well developed properly	N/A	N/A	No
	MW-48	4.5-14.5	14.51	14.41	4.55	4.61	Flush	2	9/9/2007	Turbidity did not stabilize within 10%; took 2 hrs to recharge to within 0.5 ft of static wl	N/A	N/A	Sample for RI; not for basewide
	MW-49	6-16	16.38		7.86	7.86	Flush	2	9/20/2007	Well developed properly	N/A	N/A	No
	MW-56	5-10	9.98	7.02	6.73	6.92	Flush	2	9/19/2007	Well developed properly	N/A	N/A	No
	MW-57	2-7	7.11		6.92 (mud)	---	Flush	2	9/19/2007	Well is dry	N/A	Well was plugged on 11/08/07.	Yes, added well TT06-MW05
	MW-58	5-10	10.08	9.83	7.35	7.40	Flush	2	9/19/2007	Well developed properly	N/A	N/A	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
14	CW-14-1-3	4-14	14	14		---	Flush	2	10/10/2007	Well contained product and could not be developed	N/A	N/A	No
	GTI-14-2	5-15	15	---	---	---	Flush	2	9/8/2007	Well had 0.12 ft of product	N/A	N/A	No
	GTI-14-3A	5-15	15.5	15.2	7.44	7.47	Flush	4	9/7/2007	Well was pumped dry; sheen and petroleum smell noted	N/A	Well was plugged on 11/11/07	Yes, added replacement well TT14-MW03 at a slightly downgradient location (southeast)
	MW-18L	16-21	21	21.25	7.99	8.04	Flush	2	9/23/2007	Well developed properly	N/A	N/A	No
	MW-19	5-15	15.17	14.88	7.67	7.74	Flush	2	9/23/2007	Well developed properly	N/A	N/A	No
	MW-21	5-15	14.62	14.37	7.81	7.94	Flush	2	9/6/2007	Well developed properly	N/A	N/A	No
	MW-22	5-15	15.14	14.9	7.38	7.51	Flush	2	9/23/2007	Well developed properly	N/A	N/A	No
	MW-23	5-15	15.21	14.95	8.12	8.17	Flush	2	9/7/2007	Well developed properly	9/12/2007	N/A	No
	MW-24	5-15	14.73	14.47	6.78	6.97	Flush	2	9/6/2007	Well developed properly	9/12/2007	N/A	No
	MW-27	5-15	15.17	14.9	4.54	4.56	Flush	2	9/11/2007	Well developed properly	9/12/2007	N/A	No
	MW-54	5-15	15.35		7.06	7.10	Flush	2	9/26/2007	Well developed properly	N/A	N/A	No
	MW-55	5-15	15.3	15.05	8.33	8.37	Flush	2	9/7/2007	Well developed properly	9/12/2007	N/A	No
	MW-73	5-20	22.35		6.30	6.35	Flush	2	10/10/2007	Well developed properly	N/A	N/A	No
	MW-75	5-20	21.66	21.42	6.91	6.95	Flush	2	9/9/2007	Well developed properly	9/13/2007	Replaced flush-mount well box, new concrete pad	No
	MW-76	5-20	21.98	21.82	7.09	7.11	Flush	2	9/23/2007	Well developed properly	N/A	N/A	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
16	GTI-16-1	3-13	14.31	17.3	4.35	4.35	2.18	4	9/10/2007	Poor recharge, parameters did not stabilize, high turbidity	N/A	Do not repair/Add to wells to be plugged	Yes, added well TT16-MW15
	MW-16-1	5-15	16.85	16.07	6.30	6.33	Flush	2	10/11/2007	Bent casing - could not be developed	N/A	Do not repair/Add to wells to be plugged	No. New well is not necessary due to proximity of new well TT16-MW04
	MW-16-2	5-15	18.6	17.69	6.30	6.33	Flush	2	10/11/2007	Well developed properly	N/A	N/A	
	MW-16-3	5-15	19.92	19.45	4.74	4.97	Flush	2	9/7/2007	Well developed properly; well not screened across water table (DTW=4.83; screen depth=5-15)	9/13/2007	Added PVC riser, protective casing, new concrete pad	No
	MW-16-4	5.5-15	19.13	18.62	4.52	4.98	Flush	2	9/7/2007	Well developed properly; however well had sand in it	9/13/2007	Added PVC riser, protective casing, new concrete pad	No
	MW-25-U	5-15	15.15	16.1	8.12	---	1.5	2	10/11/2007	Well contained product and could not be developed	N/A	N/A	No
	MW-26	5-15	15.16	14.9	6.34	6.37	Flush	2	9/9/2007	Well developed properly	9/12/2007	N/A	No
	MW-28	5-15	15.15		7.00	7.49	Flush	2	9/26/2007	Well developed properly	N/A	N/A	No
	MW-29U	5-15	15.16		6.45	6.47	Flush	2	9/11/2007	Well developed properly	9/12/2007	Added PVC riser, protective casing, new concrete pad	No
	MW-29L	14.5-19.5	19.44	19.23	6.55	6.67	Flush	2	9/11/2007	Well developed properly; well not screened across water table (DTW=6.94; screen depth=14.5-19.5)	9/12/2007	Added PVC riser, protective casing, new concrete pad	No
	MW-30	5-15	13.75	12.8	5.98	6.46	Flush	2	9/12/2007	Well developed properly	9/12/2007	Added PVC riser, protective casing, new concrete pad	No
	MW-63	4-19	22.69	22.67	5.94	6.02	Flush	2	9/9/2007	Well developed properly	N/A	N/A	No
	MW-66	3-13	16.75		---	---	AGC	2	10/11/2007	Access issue with dog kennel-well has not been developed yet	N/A	Do not repair/Add to wells to be plugged	Yes, added well TT16-MW16 to avoid access issues during sampling
	MW-74	5-20	21.83	21.7	4.46	4.51	Flush	2	9/9/2007	Well developed properly	9/13/2007	Added PVC riser, protective casing, new concrete pad	No
	MW-77	5-15	16.96	16	5.11	5.12	Flush	4	9/10/2007	Well developed properly	9/13/2007	Added PVC riser, protective casing, new concrete pad	No
	MW-78	5-20	21.69		5.41	5.71	Flush	2	9/9/2007	Well developed properly	9/12/2007	Added PVC riser, protective casing, new concrete pad	No
	MW-79	5-20	22.45	22.24	6.15	6.34	Flush	2	9/9/2007	Well developed properly	9/12/2007	N/A	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
UST-R Site 1 (Building 395 Area)	395A	5.5-15.5	18	17.4	7.15	---	Flush	3.5	9/25/2007	Very poor recharge/recovery rate-could not be developed	N/A	Do not repair/Add to wells to be plugged	Yes, added well TT395-MW02
	395D	5-15	18	16.7		---	Flush	3.75		Extreme siltation during development; indicative of incorrect screen/slot size - could not be developed	N/A	N/A	Yes, added well TT395-MW04
	395E	3-18	22	16.3		---	Flush	2	9/12/2007	Bailed dry & didn't recharge	N/A	Do not repair/Add to wells to be plugged	Yes, added well TT395-MW03
	395F	5-20	22	21.85		---	Flush	2	9/11/2007	0.92 ft of product measured; no product in 395G (~25 ft north)	9/13/2007	Added PVC riser, protective casing, new concrete pad	No
	395G	5-20	21	21.52	6.88	6.92	Flush	2	9/11/2007	Well developed properly	9/13/2007	Added PVC riser, protective casing, new concrete pad	No
	395H	5-15	16	16	8.34	8.35	Flush	2	9/25/2007	Well developed properly	N/A	N/A	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
18	MW-32	5-15	15	14.17	6.17	6.27	Flush	2	9/26/2007	Well developed properly	N/A	N/A	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
20	MW-37	5-15	15	14.98	5.60	5.85	Flush	2	9/10/2007	Poor recharge, parameters did not stabilize, high turbidity	N/A	Do not repair/Add to wells to be plugged	Yes, added well TT20-MW02
	MW-33U	5-15	15	14.56	5.90	6.12	Flush	2	10/10/2007	Well developed properly	N/A	N/A	No
	MW-33L	22-27	27	27.1	5.86	6.58	Flush	2	10/10/2007	Well developed properly	N/A	N/A	No
	MW-36	5-15	15	15.14	7.85	7.94	Flush	2	9/10/2007	Well developed properly	N/A	N/A	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
21	MW-12L	74-84	~83.5	84	3.05	3.43	Flush	2	9/20/2007	Well developed properly	N/A	N/A	No
	MW-94	4-19	21.2	22	7.91	8.85	Flush	2	9/19/2007	Well developed properly	N/A	N/A	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-4: RESULTS OF WELL DEVELOPMENT

Site	Monitoring Well	Screen Interval	TD (installed)	TD (recorded)	Depth to Water Before Development	Depth to Water After Development	Surface Completion	Casing (in)	Well Development Date	Well Development Notes	Repair Date	Repair Notes	Replacement Well Needed?
Basewide (Sentinel) Wells	MW-80	5-20	22.5	22.31	10.74	---	Flush	2	10/11/2007	Very poor recharge-could not be developed	N/A	N/A	Yes, added well TTBW-MW11
	MW-82	5-20	21.75	21.49	5.42	5.47	Flush	2	9/11/2007	Well developed properly	9/13/2007	Added PVC riser, protective casing, new concrete pad	No
	MW-85	5-20	22.46	21.4	6.55	6.60	Flush	2	9/10/2007	Well developed properly	9/13/2007	Added PVC riser, protective casing, new concrete pad	No
	MW-83	6-21	22.64	22.41	5.31	5.31	Flush	2	9/11/2007	Well developed properly	9/13/2007	Added PVC riser, protective casing, new concrete pad	No

Notes:

N/A Not applicable

Wells with product in them

Wells that have been replaced

TABLE 2-5: WELL REPAIRS

Well	Description of Work	Surface completion	Surface casing size (in)	Well type	Well diam (in)	Boring depth (ft bgs)	Well depth (ft bgs)	Total depth measured in field (ft below TOC)	Screen interval (ft)	Screened depth (ft bgs)	Filter packing	Well Inventory Notes and Comments	Notes and Comments Following Well Development
Site 1													
MW-68	Add Riser and Above Ground Protective Casing/Crash Posts	FM	12	PVC	2	17	17	NA	10	4-14	#20 Sand	—	Repairs made on 9/11/07. Removed concrete pad. PVC riser set about 2.5 ft ags. Installed new concrete pad.
MW-69	Add Riser and Above Ground Protective Casing/Crash Posts	FM	12	PVC	2	22	22	22.61	15	5-20	#20 Sand	—	Repairs made on 9/11/07. PVC riser set about 2.5 ft ags. Protective casing set about 3 ft ags. Set 4 crash posts around the well pad.
BW-1-3	Add Riser and Above Ground Protective Casing/Crash Posts	FM	12	PVC	2	14	14	NA	10	4-14	20/30 Sand Pack	These wells were installed in Oct. 2004 by Robinson Engineering, information provided in SATO report.	Repairs made on 9/10/07. Removed 12-inch outer casing. PVC riser set about 2.75 ft ags. Protective casing set about 3 ft ags
BW-1-1	Add Riser and Above Ground Protective Casing/Crash Posts	FM	12	PVC	2	13.4	13.4	NA	10	3.4-13.4	20/30 Sand Pack	These wells were installed in Oct. 2004 by Robinson Engineering, information provided in SATO report.	Repairs made on 9/10/07. No crash posts were installed due to remote location. Removed 12-inch outer casing. PVC riser set about 3 ft ags. Protective casing set about 3.5 ft ags. Set 4 crash posts around the well pad.
MW-11U	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	20	15	15.07	10	5-15	8/12 Frac Sand	—	Repairs made on 9/11/07. PVC riser set about 2.5 ft ags. Protective casing set about 3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand. 2 crash posts set facing taxiway.
MW-50L	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	23	21.8	21.54	10	11.8-21.8	#2 Frac Sand	Not screened across water table (DTW = 6.08; Screened depth = 11.8-21.8).	Repairs made on 9/11/07. PVC riser set about 2.5 ft ags. Protective casing set about 3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand.
MW-50U	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	16	15	15.20	10	5-15	#2 Frac Sand	—	Repairs made on 9/11/07. PVC riser set about 2.5 ft ags. Protective casing set about 3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand.
BW-1-2	Add Riser and Above Ground Protective Casing/Crash Posts	FM	12	PVC	2	14.2	14.2	NA	10	4.2-14.2	20/30 Sand Pack	These wells were installed in Oct. 2004 by Robinson Engineering, information provided in SATO report. The well log and information in the report tables are not consistent in terms of well depth (differ by 0.2 ft), screen interval stated in text is used.	Repairs made on 9/10/07

TABLE 2-5: WELL REPAIRS

Well	Description of Work	Surface completion	Surface casing size (in)	Well type	Well diam (in)	Boring depth (ft bgs)	Well depth (ft bgs)	Total depth measured in field (ft below TOC)	Screen interval (ft)	Screened depth (ft bgs)	Filter packing	Well Inventory Notes and Comments	Notes and Comments Following Well Development
Site 3													
MW-43L	Add grout to fill several feet of annular space	FM	8	PVC	2	30	28	27.68	5	23-28	8/20 Frac Sand	—	Well successfully developed on 9/18/07
MW-43U	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	20	17	16.60	10	7-17	8/20 Frac Sand	—	Leave as flush mount completion. Increase slope of pad to alleviate drainage as possible.
MW-44L	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	30	26.5	26.29	5	21.5-26.5	8/20 Frac Sand	—	Leave as flush mount completion. Increase slope of pad to alleviate drainage as possible.
MW-44U	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	20	15	15.24	10	5-15	8/20 Frac Sand	—	Leave as flush mount completion. Increase slope of pad to alleviate drainage as possible.
MW-42L	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	30	25.5	25.35	5	20.5-25.5	8/20 Frac Sand	Well log drawing and stated features do not match - screen stated as 20.5-25.5, but drawn as 23-27.	Leave as flush mount completion. Increase slope of pad to alleviate drainage as possible.
MW-39L	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	25	19.5	21.19	5	15-20	8/20 Frac Sand	Remove christy box cover by lifting cover and outer ring out of ground - no longer connected to casing.	Leave as a flush mount completion. Repair chipped casing.
MW-39U	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	20	15	15.15	10	5-15	8/20 Frac Sand	christy box cover replaced, cover had been missing and the christy box full of sand, well is located within taxiway.	Leave as a flush mount completion. Clean out sand. Fill annular space as required. Perform any surface repairs.

TABLE 2-5: WELL REPAIRS

Well	Description of Work	Surface completion	Surface casing size (in)	Well type	Well diam (in)	Boring depth (ft bgs)	Well depth (ft bgs)	Total depth measured in field (ft below TOC)	Screen interval (ft)	Screened depth (ft bgs)	Filter packing	Well Inventory Notes and Comments	Notes and Comments Following Well Development
Site 6													
MW-58	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	13	9	10.08	5	5-10	#2 Frac Sand	—	Done

TABLE 2-5: WELL REPAIRS

Well	Description of Work	Surface completion	Surface casing size (in)	Well type	Well diam (in)	Boring depth (ft bgs)	Well depth (ft bgs)	Total depth measured in field (ft below TOC)	Screen interval (ft)	Screened depth (ft bgs)	Filter packing	Well Inventory Notes and Comments	Notes and Comments Following Well Development
Site 14													
MW-71	Add Riser and Above Ground Protective Casing/Crash Posts	FM	12	PVC	2	22	22	22.44	15	5-20	#20 Sand	Steel flush mount well cover 12" Diam. Located in parking lot.	Leave as a flush mount completion. Pad needs a marker. Done
MW-75	Replace Concrete Surface Pad	FM	12	PVC	2	22	22	21.66	15	5-20	#20 Sand	Slight damage - pad has cracks	Done - Replaced flush mount well box, new surface completion.
MW-23	Replace Concrete Surface Pad	FM	8	PVC	2	20	15	15.21	10	5-15	8/20 Frac Sand	—	Repairs made on 9/12/07. New 12-inch PVC well completion box and new concrete pad with well monument.
MW-24	Replace Concrete Surface Pad	FM	10	PVC	2	20	15	14.73	10	5-15	8/20 Frac Sand	christy box bolts need retapping	Repairs made on 9/12/07. New 12-inch PVC well completion box and new concrete pad with well monument.
MW-55	Replace Damaged Surface Completion Box and Concrete Pad	FM	10	PVC	2	23	15	15.30	10	5-15	#2 Frac Sand	Slight damage - pad has cracks	Repairs made on 9/12/07. New concrete pad with well monument. New 12-inch PVC well box with steel cap.

TABLE 2-5: WELL REPAIRS

Well	Description of Work	Surface completion	Surface casing size (in)	Well type	Well diam (in)	Boring depth (ft bgs)	Well depth (ft bgs)	Total depth measured in field (ft below TOC)	Screen interval (ft)	Screened depth (ft bgs)	Filter packing	Well Inventory Notes and Comments	Notes and Comments Following Well Development
Site 16													
MW-16-4	Add Riser and Above Ground Protective Casing/Crash Posts	FM	10	PVC	2	21	20	19.13	10	5.5-15	2/12 Sand	This well was installed in 4/2004 as part of the hydraulic containment system	Repairs made on 9/13/07. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand and concrete.
MW-77	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	17	17	16.96	10	5-15	#20 Sand	Top of well casing needs squaring, 2 ft. sump	Repairs made on 9/13/07. Added PVC riser ~2.5 ft ags and protective casing ~3.25 ft ags. Concrete pad set. Filled interior of protective casing with sand.
MW-27	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	20	15	15.17	10	5-15	8/20 Frac Sand	—	Repairs made on 9/12/07. Added PVC riser ~2.5 ft ags and protective casing ~3.25 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand.
MW-26	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	25	15	15.16	10	5-15	8/20 Frac Sand	—	Repairs made on 9/12/07. Added PVC riser ~3 ft ags and protective casing ~3.25 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand. 2 crash posts installed.
MW-16-3	Add Riser and Above Ground Protective Casing/Crash Posts	FM	10	PVC	2	20	19	19.92	10	5-15	2/12 Sand	Not screened across water table (DTW = 4.83; screened depth = 5-15).	Repairs made on 9/13/07. Added PVC riser ~2.5 ft ags and protective casing ~3.25 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand and concrete.
MW-30	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	20	15	13.75	10	5-15	8/20 Frac Sand	—	Repairs made on 9/12/07. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand. 2 crash posts installed.
MW-29L	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	25	19.5	19.44	5	14.5-19.5	8/20 Frac Sand	OK - worth repairing. Not screened across water table (DTW = 6.94; screened depth = 14.5-19.5).	Repairs made on 9/12/07. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand. 3 crash posts installed.
MW-29U	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	15	15	15.16	10	5-15	8/20 Frac Sand	Pad seriously damaged - well and casing appear fine	Repairs made on 9/12/07. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand.
MW-78	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	22	22	21.69	15	5-20	#20 Sand	Well log - screen drawn as 5-20 ft, states screen is 5-20 ft, however states screen length as 10ft. Assume screen 5-20 ft. 2 ft sump	Repairs made on 9/12/07. Added PVC riser ~2.75 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand.
MW-74	Replace Damaged Surface Completion Box and Concrete Pad	FM	8	PVC	2	22	22	21.83	15	5-20	#20 Sand	2 ft sump	Repairs made on 9/13/07. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Filled interior of protective casing with concrete and sand.
MW-79	Replace Damaged Surface Completion Box and Concrete Pad	FM	8	PVC	2	22	22	22.45	15	5-20	#20 Sand	2 ft sump	Repairs made on 9/12/07. New surface completion box (PVC) 12-in w/ steel cap and concrete pad.

TABLE 2-5: WELL REPAIRS

Well	Description of Work	Surface completion	Surface casing size (in)	Well type	Well diam (in)	Boring depth (ft bgs)	Well depth (ft bgs)	Total depth measured in field (ft below TOC)	Screen interval (ft)	Screened depth (ft bgs)	Filter packing	Well Inventory Notes and Comments	Notes and Comments Following Well Development
Basewide (Sentinel) Wells													
MW-85	Add Riser and Above Ground Protective Casing/Crash Posts	FM	12	PVC	2	22	22	22.46	15	5-20	#20 Sand	Referenced as Site 16 in NAS Fallon Well Locations xls file dated 12.8.02; referenced near Site 9 in NASF MWL remarks.	Repairs made on 9/13/07. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand and concrete.
MW-83	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	22	22	22.64	15	6-21	#20 Sand	Referenced as Site 2 in NAS Fallon Well Locations xls file dated 12.8.02; reference near Site 2 in NASF MWL remarks	Repairs made on 9/13/07. Removed metal sign from MW-83. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand and concrete.
MW-82	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	22	22	21.73	15	5-20	#20 Sand	Referenced as Site 2 in NAS Fallon Well Locations xls file dated 12.8.02; reference near Site 2 in NASF MWL remarks	Repairs made on 9/13/07. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand and concrete.

TABLE 2-5: WELL REPAIRS

Well	Description of Work	Surface completion	Surface casing size (in)	Well type	Well diam (in)	Boring depth (ft bgs)	Well depth (ft bgs)	Total depth measured in field (ft below TOC)	Screen interval (ft)	Screened depth (ft bgs)	Filter packing	Well Inventory Notes and Comments	Notes and Comments Following Well Development
UST-R Site 1 (Building 395 Area)													
395F	Add Riser and Above Ground Protective Casing/Crash Posts	FM	8	PVC	2	22		22.15	15	5-20	#20 Sand	Broken pad, casing ok	Repairs made on 9/13/07. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand and concrete.
395G	Replace Concrete Surface Pad	FM	12	PVC	2	22.5		21.52	15	5-20	#20 Sand	Broken pad, little bit of siltation in well - about 0.5 ft.	Repairs made on 9/13/07. Added PVC riser ~2.5 ft ags and protective casing ~3 ft ags. Concrete pad set with new well monument. Filled interior of protective casing with sand and concrete.

Notes:

—	No comments noted
AGC	above ground completion
bgs	below ground surface
D	damage
diam	diameter
"Fallon NAS Wells" document	A folder labeled "Fallon NAS Wells" was obtained from the Navy and it contains loose leaf information without reference to reports or specific field efforts.
FM	flush mount
ft	feet
Frac	fraction
GW	groundwater
ID	identification
in	inches
MW	monitoring well
MWL	Master Well List
NAC	Nevada Administrative Code
NASF	Naval Air Station Fallon
PVC	polyvinylchloride
regs	regulations
RR	remediation or recovery
SATO Report	"Soil and Groundwater Sampling at 4th and C Street," and "Soil and Groundwater Sampling of 3 Monitoring Wells Placed North of the Base Housing Area." January and February 2005, respectively. Sato Environmental Consultants, Inc.
TOC	top of casing
xls	Excel

TABLE 2-6: NEW WELL INSTALLATION AND DEVELOPMENT INFORMATION

SITE	WELL ID	INSTALLATION DATE	TOTAL WELL DEPTH (Ft, Bgs)	DIAMETER (Inches)	SURFACE COMPLETION TOC (Ft, Ags)	SCREEN INTERVAL (Ft)	TOP OF SCREEN (Ft, Bgs)	BOTTOM OF SCREEN (Ft, Bgs)	WELL DEVELOPMENT DATE	POST DEVELOP STATIC WATER LEVEL (Ft, Below TOC)
1	TT01-MW01	11/10/2007	18	2	2.26	15	3	18	11/12/2007	8.07
2/4	TT02-MW01	11/1/2007	18.5	2	1.95	15	3	18	11/14/2007	10.15
	TT02-MW02	11/9/2007	18	2	2.32	15	3	18	11/13/2007	9.35
	TT02-MW03	11/9/2007	19	2	1.57	15	4	19	11/13/2007	11.23
	TT02-MW04	3/14/2008	19	2	2.57	15	4	19	3/18/2008	12.58
	TT04-MW01	10/31/2007	19	2	2.07	15	3.5	18.5	11/11/2007	10.43
	TT04-MW02	11/11/2007	18	2	2.21	15	3	18	11/12/2007	9.51
3	TT03-MW01	10/11/2007	20	2	2.30	15	5	20	10/13/2007	11.21
	TT03-MW02	10/11/2007	20	2	-0.20	15	5	20	10/12/2007	12.14
	TT03-MW03	10/9/2007	16	2	2.36	10	6	16	10/12/2007	9.84
	TT03-MW04	10/10/2007	20	2	-0.49	15	5	20	10/12/2007	11.90
	TT03-MW05	10/10/2007	20	2	-0.23	15	5	20	10/12/2007	11.76
	TT03-MW06	10/12/2007	20	2	-0.27	15	5	20	10/12/2007	11.49
	TT03-MW07	3/10/2009	19	2	-0.35	15	4	19	3/11/2009	8.38
	TT03-MW08	3/10/2009	20	2	-0.17	15	5	20	3/11/2009	8.78
	TT03-MW09	3/10/2009	20	2	-0.32	15	4	19	3/11/2009	7.88
6	TT06-MW01	11/7/2007	18	2	2.19	15	3	18	12/4/2007	7.77
	TT06-MW02	11/7/2007	18	2	2.04	15	3	18	11/13/2007	9.73
	TT06-MW03	11/7/2007	18	2	2.61	15	3	18	11/13/2007	8.96
	TT06-MW04	11/8/2007	18	2	2.41	15	3	18	11/13/2007	7.66
	TT06-MW05	11/8/2007	18	2	2.03	15	3	18	12/4/2007	9.27
14	TT14-MW01	11/10/2007	18	2	2.27	15	3	18	11/11/2007	11.56
	TT14-MW02	11/10/2007	18	2	2.49	15	3	18	12/3/2007	8.05
	TT14-MW03	11/11/2007	18	2	2.21	15	3	18	11/12/2007	10.25
16	TT16-MW01	8/13/2007	20	2	2.69	15	4.5	19.5	8/17/2007	9.09
	TT16-MW02	8/13/2007	20	2	3.04	15	4.5	19.5	8/17/2007	8.40
	TT16-MW03	8/14/2007	20	2	3.05	15	5	20	8/17/2007	8.04
	TT16-MW04	8/15/2007	19.5	2	2.90	15	4	19	8/17/2007	9.36
	TT16-MW05	8/14/2007	19.5	2	3.05	15	4	19	8/17/2007	9.20
	TT16-MW06	10/12/2007	20	2	2.56	15	5	20	11/9/2007	8.62
	TT16-MW07	10/13/2007	18	2	2.49	15	3	18	11/9/2007	9.06
	TT16-MW08	10/13/2007	18	2	2.41	15	3	18	11/9/2007	7.68
	TT16-MW09	10/28/2007	19	2	1.91	15	3	18	11/9/2007	6.81
	TT16-MW10	11/8/2007	14	2	2.53	10	3	13	11/15/2007	8.43
	TT16-MW11	11/9/2007	20	2	2.26	15	3	18	11/15/2007	7.65
	TT16-MW12	10/28/2007	18.5	2	2.22	15	3	18	11/10/2007	8.68
	TT16-MW13	10/13/2007	15	2	2.50	12	3	15	11/10/2007	7.39
	TT16-MW14	10/28/2007	20	2	-0.41	15	3	18	11/14/2007	6.02
	TT16-MW15	10/27/2007	15	2	2.04	10	3	13	11/10/2007	7.04
	TT16-MW16	11/13/2007	18.5	2	2.47	15	3	18	11/16/2007	10.20
	TT16-MW17	3/16/2008	19.5	2	-0.12	15	4.5	19.5	3/16/2008	8.33
	TT16-MW18	10/18/2008	19.92	2	2.40	15	3	18	10/21/2008	not measured
	TT16-MW19	10/18/2008	19.92	2	2.77	15	3	18	10/21/2008	not measured
UST-R Site 1 (395)	TT395-MW01	10/17/2007	18	2	-0.41	15	3	18	11/12/2007	7.85
	TT395-MW02	11/12/2007	18.5	2	-0.26	15	3	18	11/15/2007	8.25
	TT395-MW03	11/12/2007	18.5	2	-0.27	15	3	18	11/14/2007	8.33
	TT395-MW04	11/12/2007	18.5	2	-0.35	15	3	18	11/15/2007	8.07
UST-R Site 2 (800 Complex)	TT806-MW01	10/15/2007	18	2	2.29	15	3	18	11/10/2007	9.23
	TT806-MW02	10/14/2007	18	2	2.44	15	3	18	11/17/2007	8.16
	TT806-MW03	10/14/2007	20	2	2.54	15	4	19	11/16/2007	8.26
	TT806-MW04	10/19/2008	18	2	2.79	15	5	20	10/21/2008	not measured

TABLE 2-6: NEW WELL INSTALLATION AND DEVELOPMENT INFORMATION

SITE	WELL ID	INSTALLATION DATE	TOTAL WELL DEPTH (Ft, Bgs)	DIAMETER (Inches)	SURFACE COMPLETION TOC (Ft, Ags)	SCREEN INTERVAL (Ft)	TOP OF SCREEN (Ft, Bgs)	BOTTOM OF SCREEN (Ft, Bgs)	WELL DEVELOPMENT DATE	POST DEVELOP STATIC WATER LEVEL (Ft, Below TOC)
20	TT20-MW01	11/13/2007	18.5	2	NR	15	3	18	11/16/2007	7.85
	TT20-MW02	3/15/2008	18.5	2	1.99	15	3	18	3/18/2008	7.3
22	TT22-MW01	3/14/2008	18	2	2.64	15	3	18	5/13/2008	5.62
	TT22-MW02	3/13/2008	15	2	2.14	15	3	18	3/26/2008	7.2
Basewide (Sentinel) Wells	TTBW-MW01	3/12/2008	18	2	2.31	15	3	18	3/18/2008	9.09
	TTBW-MW02	3/17/2008	18	2	2.10	15	3	18	3/20/2008	8.44
	TTBW-MW03	3/14/2008	18	2	2.39	15	3	18	3/17/2008	8.29
	TTBW-MW04	3/20/2008	19.5	2	2.46	15	4.5	19.5	3/26/2008	10.99
	TTBW-MW05	3/24/2008	23	2	2.13	15	8	23	5/12/2008	14.79
	TTBW-MW06	3/17/2008	17.3	2	2.02	15	2.3	17.3	3/19/2008	8.55
	TTBW-MW07	3/15/2008	18	2	2.39	15	3	18	3/18/2008	7.60
	TTBW-MW08	3/13/2008	18	2	2.30	15	3	18	3/18/2008	7.60
	TTBW-MW09	3/13/2008	18	2	2.11	15	3	18	3/17/2008	8.22
	TTBW-MW10	3/26/2008	18	2	2.20	15	3	18	3/27/2008	7.24
	TTBW-MW11	3/17/2008	19.5	2	2.34	15	4.5	19.5	3/19/2008	12.85
	TTBW-MW12	3/16/2008	18	2	2.13	15	3	18	3/20/2008	8.05
	TTBW-MW13	3/24/2008	18	2	1.98	15	3	18	3/27/2008	8.98
	TTBW-MW14	3/26/2008	18	2	-0.41	15	3	18	3/27/2008	not measured
	TTBW-MW15	3/20/2008	18	2	2.48	15	3	18	3/27/2008	10.57
	TTBW-MW16	3/20/2008	19.5	2	1.72	15	3.5	18.5	3/26/2008	8.25
	TTBW-MW17	10/18/2008	13	2	2.28	8	5	13	10/21/2008	not measured

Notes:

NR	Not recorded
Ft	Feet
Bgs	Below ground surface
Ags	Above ground surface
TOC	Top of casing

Table 2-7 Groundwater Elevation Data, 2008-2010

Monitoring Well	Total Depth (feet bgs)	Screened Interval (feet bgs)	Stickup (feet, ags)	TOWC Elevation (feet msl)	May 2008 Depth to Water (feet TOWC)	May 2008 Water Level Elevation (feet msl)	October 2008 Depth to Water (feet TOWC)	October 2008 Water Level Elevation (feet msl)	March 2009 Depth to Water (feet TOWC)	March 2009 Water Level Elevation (feet msl)	October 2009 Depth to Water (feet TOWC)	October 2009 Water Level Elevation (feet msl)	March 2010 Depth to Water (feet TOWC)	March 2010 Water Level Elevation (feet msl)	October 2010 Depth to Water (feet TOWC)	October 2010 Water Level Elevation (feet msl)
SITE 1																
MW-11U	15	5-15	2.87	3929.11	9.26	3919.85	9.96	3919.15	9.86	3919.25	10.18	3918.93	9.52	3919.59	9.65	3919.46
MW-14	15	5-15	-0.25	3928.33	8.68	3919.65	9.24	3919.09	9.21	3919.12	9.48	3918.85	8.70	3919.63	8.98	3919.35
MW-15L	19	14-19	-0.06	3927.16	7.78	3919.38	8.34	3918.82	8.42	3918.74	8.56	3918.60	7.85	3919.31	7.98	3919.18
MW-16U	15	10-15	-0.01	3927.37	8.04	3919.33	8.58	3918.79	8.77	3918.60	8.86	3918.51	8.09	3919.28	8.34	3919.03
MW-16L	25	20-25	0.05	3927.37	8.07	3919.30	NM	--	8.65	3918.72	8.83	3918.54	8.17	3919.20	8.40	3918.97
MW-17	15	5-15	-0.30	3925.02	5.69	3919.33	NM	--	6.32	3918.70	6.52	3918.50	5.96	3919.06	6.11	3918.91
MW-50U	15	5-15	2.87	3928.12	8.56	3919.56	NM	--	9.22	3918.90	9.52	3918.60	8.74	3919.38	9.06	3919.06
MW-50L	21.8	11.8-21.8	2.93	3928.26	8.79	3919.47	NM	--	9.39	3918.87	9.65	3918.61	8.98	3919.28	9.19	3919.07
MW-51U	16	6-16	0.07	3928.30	NM	--	NM	--	9.22 (9.20P)	3919.065	9.51 (9.47P)	3918.760	8.67	3919.63	9.04	3919.26
MW-51L	15	16-26	-0.01	3928.32	8.76	3919.56	9.36	3918.96	9.38	3918.94	9.65	3918.67	8.84	3919.48	9.16	3919.16
BW-1-1	13.4	3.4-14.4	2.78	3930.85	11.64	3919.21	NM	--	12.30	3918.55	12.47	3918.38	12.05	3918.80	12.18	3918.67
BW-1-2	14.2	4.2-14.12	2.77	3929.12	9.94	3919.18	NM	--	NM	--	NM	--	NM	--	NM	--
BW-1-3	14	4.0-14	2.96	3928.40	9.33	3919.07	NM	--	NM	--	NM	--	NM	--	NM	--
MW-53	15	5.0-15	-0.19	3926.17	7.40	3918.77	NM	--	NM	--	NM	--	NM	--	NM	--
MW-68	17	4.0-14	2.97	3927.06	7.65	3919.41	NM	--	NM	--	NM	--	NM	--	NM	--
MW-69	22	5.0-20	3.08	3929.75	10.60	3919.15	NM	--	NM	--	NM	--	NM	--	NM	--
MW-70	22	5-20	2.59	3927.63	9.96	3917.67	9.17	3918.46	9.30	3918.33	9.32	3918.31	8.92	3918.71	8.87	3918.76
MW-71	22	5-20	-0.44	3927.00	8.04	3918.96	8.45	3918.55	NM	--	8.70	3918.30	8.09	3918.91	8.16	3918.84
TT01-MW01	18	3-18	2.26	3926.65	NM	--	8.43	3918.22	NM	--	NM	--	NM	--	NM	--
SITES 2/4																
EW-15	15	5-15	-0.46	3935.14	NM	--	NM	--	8.01	3927.13	7.99	3927.15	7.39	3927.75	7.41	3927.73
EW-16	15	5-15	-0.49	3935.37	7.26	3928.11	7.91	3927.455	8.00	3927.37	7.91	3927.46	7.22	3928.15	NM	--
EW-20	15	5-15	3.09	3939.708	NM	--	NM	--	12.57	3927.14	12.45	3927.26	11.98	3927.73	11.93	3927.78
EW-22	14	4-14	3.29	3939.21	NM	--	NM	--	11.42 (11.40P)	3927.774	11.53 (11.44P)	3927.610	NM	--	11.01	3928.20
GTI-31	16	5-15	-0.51	3935.03	6.80	3928.23	NM	--	7.37	3927.66	7.48	3927.55	6.72	3928.31	6.96	3928.07
MW-1	15	5-15	-0.18	3935.71	NM	--	8.19	3927.52	NM	--	NM	--	NM	--	7.86	3927.85
MW-2	15	5-15	-0.24	3934.29	6.40	3927.89	6.85	3927.44	6.92	3927.37	7.09	3927.20	6.24	3928.05	6.44	3927.85
MW-4	14	4-14	-0.23	3934.39	7.20	3927.19	7.75	3926.64	7.75	3926.64	NM	--	NM	--	NM	--
MW-5L	21	16-21	-0.05	3934.91	7.66	3927.25	8.15	3926.76	NM	--	NM	--	NM	--	NM	--
MW-6U	15	5-15	-0.10	3936.28	7.11	3929.17	8.98	3927.30	7.63	3928.65	7.01	3929.27	6.90	3929.38	7.05	3929.23
MW-7	15.5	5.5-15.5	3.56	3939.33	11.81	3927.52	12.07	3927.26	12.10	3927.23	11.83	3927.50	11.71	3927.62	11.58	3927.75
MW-9	15	5-15	3.72	3940.17	NM	--	13.27	3926.90	13.11	3927.06	13.14	3927.03	12.55	3927.62	12.81	3927.36
MW-10	15	5-15	-0.15	3935.32	8.03	3927.29	NM	--	NM	--	NM	--	NM	--	NM	--
MW-60	15	5-15	-0.68	3934.10	6.41	3927.69	6.81	3927.29	NM	--	6.98	3927.12	6.23	3927.87	6.44	3927.66
MW-61	15	5-15	0.02	3935.65	7.01	3928.64	NM	--	NM	--	NM	--	NM	--	NM	--
MW-62	14	4-14	-0.35	3936.07	NM	--	8.06	3928.01	7.96 (7.81P)	3927.993	8.00 (7.90P)	3927.992	NM	--	7.67	3928.40
TT02-MW01	18.5	3-18	1.95	3938.59	9.66	3928.93	10.28	3928.31	10.22	3928.37	10.22	3928.37	9.62	3928.97	10.04	3928.55
TT02-MW02	18.5	3-18	2.32	3938.04	9.66	3928.38	9.83	3928.21	NM	--	9.29	3928.75	8.98	3929.06	9.15	3928.89
TT02-MW03	18.5	4-19	1.57	3938.70	9.66	3929.04	10.86	3927.84	10.97	3927.73	10.83	3927.87	11.38	3927.32	9.07	3929.63
TT02-MW04	22.3	4-19	2.57	3940.72	12.61	3928.11	13.04	3927.68	12.92	3927.80	12.51	3928.21	12.47	3928.25	12.44	3928.28
TT04-MW01	19	3.5-18.5	2.07	3937.79	9.81	3927.98	10.23	3927.56	NM	--	10.48	3927.31	9.71	3928.08	9.91	3927.88
TT04-MW02	19	3-18	2.21	3936.31	9.81	3926.50	9.17	3927.14	NM	--	9.31	3927.00	8.53	3927.78	8.72	3927.59
SITE 3																
MW-39U	15	5-15	-0.25	3933.88	7.07	3926.81	7.37	3926.51	NM	--	NM	--	NM	--	NM	--
MW-41L	25.5	20.5-25.5	-0.62	3932.17	6.11	3926.06	6.25	3925.92	NM	--	NM	--	NM	--	NM	--
MW-42L	25.5	20.5-25.5	-0.24	3935.19	9.21	3925.98	9.31	3925.88	NM	--	9.56	3925.63	9.05	3926.14	8.89	3926.30
MW-43U	17	7-17	-0.24	3935.79	10.11	3925.68	10.17	3925.62	NM	--	10.43	3925.36	9.94	3925.85	9.76	3926.03
MW-43L	28	23-28	-0.33	3935.71	9.79	3925.92	9.89	3925.82	NM	--	10.50	3925.21	9.62	3926.09	9.37	3926.34
MW-44U	15	5-15	-0.56	3933.00	6.84	3926.16	NM	--	NM	--	NM	--	NM	--	NM	--
MW-44L	26.5	21.5	-0.63	3932.87	6.55	3926.32	NM	--	NM	--	NM	--	NM	--	NM	--
TT03-MW01	15	5-20	2.30	3937.11	10.16	3926.95	10.50	3926.61	10.53	3926.58	10.67	3926.44	9.79	3927.32	9.97	3927.14
TT03-MW02	15	5-20	-0.26	3937.08	NM	--	11.80	3925.28	NM	--	12.06	3925.02	NM	--	11.50	3925.58
TT03-MW03	10	6-16	2.36	3936.30	9.41	3926.89	9.79	3926.51	9.79	3926.51	9.91	3926.39	9.01	3927.29	9.01	3927.29
TT03-MW04	15	5-20	-0.43	3936.84	11.42	3925.42	11.52	3925.32	NM	--	NM	--	NM	--	NM	--
TT03-MW05	15	5-20	-0.27	3936.63	11.21	3925.42	11.31	3925.32	NM	--	11.54	3925.09	11.08	3925.55	11.01	3925.62
TT03-MW06	15	5-20	-0.29	3935.78	NM	--	10.66	3925.12	NM	--	10.96	3924.82	10.56	3925.22	10.56	3925.22

Table 2-7 Groundwater Elevation Data, 2008-2010

Monitoring Well	Total Depth (feet bgs)	Screened Interval (feet bgs)	Stickup (feet, ags)	TOWC Elevation (feet msl)	May 2008 Depth to Water (feet bgs)	May 2008 Water Level Elevation (feet msl)	October 2008 Depth to Water (feet bgs)	October 2008 Water Level Elevation (feet msl)	March 2009 Depth to Water (feet bgs)	March 2009 Water Level Elevation (feet msl)	October 2009 Depth to Water (feet bgs)	October 2009 Water Level Elevation (feet msl)	March 2010 Depth to Water (feet bgs)	March 2010 Water Level Elevation (feet msl)	October 2010 Depth to Water (feet TOWC)	October 2010 Water Level Elevation (feet msl)
SITE 6																
MW-45	15.3	5-15	-0.55	3931.97	10.98	3920.99	11.73	3920.24	11.49	3920.48	11.79	3920.18	11.08	3920.89	11.46	3920.51
MW-47	15.3	5-15	-0.21	3924.79	5.60	3919.19	NM	--	NM	--	NM	--	NM	--	NM	--
MW-48	14.51	4.5-14.5	-0.07	3923.69	3.95	3919.74	NM	--	4.39	3919.30	4.65	3919.04	3.97	3919.72	3.98	3919.71
MW-49	16	6-16	0.01	3926.86	NM	--	NM	--	7.78	3919.08	8.01	3918.85	7.54	3919.32	7.6	3919.26
MW-56	9.98	5-10	-0.06	3925.54	6.13	3919.41	6.71	3918.83	NM	--	NM	--	NM	--	NM	--
MW-58	10.08	5-10	3.52	3930.47	10.43	3920.04	11.05	3919.42	10.88	3919.59	11.21	3919.26	10.46	3920.01	10.7	3919.77
TT06-MW01	20.3	5.3-20.3	2.19	3928.05	7.01	3921.04	7.71	3920.34	7.42	3920.63	7.88	3920.17	7.14	3920.91	7.45	3920.60
TT06-MW02	20.4	5.4-20.4	2.04	3929.09	8.86	3920.23	9.59	3919.50	9.32	3919.77	9.68	3919.41	8.98	3920.11	9.39	3919.70
TT06-MW03	20.4	5.4-20.4	2.61	3927.89	8.15	3919.74	8.81	3919.08	8.60	3919.29	8.93	3918.96	8.26	3919.63	8.65	3919.24
TT06-MW04	19.9	4.9-19.9	2.41	3926.07	7.15	3918.92	7.53	3918.54	7.45	3918.62	7.68	3918.39	7.30	3918.77	7.46	3918.61
TT06-MW05	19.9	4.9-19.9	2.03	3929.15	8.52	3920.63	9.22	3919.93	NM	--	9.35	3919.80	8.58	3920.57	8.91	3920.24
SITE 14																
CW14-1-3	14	4-14	-0.26	3926.041	NM	--	NM	--	7.73	3918.31	7.77	3918.27	7.18	3918.86	7.27	3918.77
MW-18L	21	16-21	-0.09	3926.83	7.68	3919.15	8.13	3918.70	8.33	3918.50	8.38	3918.45	10.82	3916.01	7.93	3918.90
MW-19	15.17	5-15	-0.31	3926.42	7.40	3919.02	7.91	3918.51	8.01	3918.41	8.05	3918.37	7.40	3919.02	7.56	3918.86
MW-22	15.14	5-15	-0.26	3926.08	NM	--	7.54	3918.54	NM	--	7.72	3918.36	7.11	3918.97	7.25	3918.83
MW-23	15.21	5-15	0.03	3926.74	8.10	3918.64	8.42	3918.32	8.50	3918.24	8.56	3918.18	8.03	3918.71	7.98	3918.76
MW-24	14.73	5-15	-0.30	3925.04	6.59	3918.45	NM	--	NM	--	NM	--	NM	--	6.62	3918.42
MW-27	15.17	5-15	3.04	3926.03	8.21	3917.82	8.50	3917.53	8.67	3917.36	8.21	3917.82	8.06	3917.97	7.50	3918.53
MW-54	15.35	5-15	-0.66	3925.53	7.02	3918.51	7.37	3918.16	7.52	3918.01	7.44	3918.09	6.98	3918.55	6.84	3918.69
MW-55	15.3	5-15	-0.09	3926.85	8.21	3918.64	NM	--	NM	--	NM	--	NM	--	NM	--
MW-73	22.35	5-20	-0.51	3924.81	NM	--	6.51	3918.30	6.67	3918.14	NM	--	6.15	3918.66	6.09	3918.72
MW-75	21.66	5-20	-0.04	3925.31	7.03	3918.28	7.38	3917.93	7.51	3917.80	7.31	3918.00	6.93	3918.38	6.68	3918.63
MW-76	21.98	5-20	3.55	3929.00	10.85	3918.15	NM	--	NM	--	NM	--	NM	--	NM	--
TT14-MW01	18	3-18	2.27	3930.43	NM	--	11.51	3918.92	11.63	3918.80	11.14	3919.29	11.20	3919.23	11.36	3919.07
TT14-MW02	18	3-18	2.49	3925.83	8.05	3917.78	8.40	3917.43	8.43	3917.40	8.11	3917.72	7.78	3918.05	7.43	3918.40
TT14-MW03	18	3-18	2.21	3928.76	NM	--	10.22	3918.54	NM	--	NM	--	NM	--	NM	--
SITE 16																
MW-16-2	18.6	5-15	3.54	3927.90	9.81	3918.09	10.23	3917.67	10.22	3917.68	10.18	3917.72	9.53	3918.37	9.30	3918.60
MW-16-3	19.92	5-15	3.13	3926.56	7.85	3918.71	8.44	3918.12	8.44	3918.12	8.59	3917.97	7.88	3918.68	7.88	3918.68
MW-16-4	19.13	5.5-15	3.13	3927.15	8.15	3919.00	NM	--	8.69	3918.46	8.83	3918.32	8.27	3918.88	8.19	3918.96
MW-25U	15	5-15	1.43	3926.60	NM	--	NM	--	8.22	3918.38	8.33	3918.27	NM	--	7.72	3918.88
MW-25L	18	13-18	-0.19	3925.06	NM	--	NM	--	6.74	3918.32	6.86	3918.20	NM	--	6.18	3918.88
MW-26	15	5-15	3.15	3927.99	10.26	3917.73	NM	--	NM	--	NM	--	NM	--	NM	--
MW-28	15.15	5-15	3.81	3928.57	11.19	3917.38	11.60	3916.97	11.41	3917.16	11.21	3917.36	10.80	3917.77	10.47	3918.10
MW-29U	15.16	5-15	3.28	3927.52	9.67	3917.85	NM	--	9.90	3917.62	9.75	3917.77	9.26	3918.26	8.96	3918.56
MW-29L	19.44	14.5-19.5	3.44	3927.54	9.70	3917.84	NM	--	10.01	3917.53	9.86	3917.68	9.37	3918.17	9.05	3918.49
MW-30	13.75	5-15	2.91	3927.84	9.91	3917.93	10.26	3917.58	NM	--	NM	--	NM	--	NM	--
MW-63	22.69	4-19	-0.36	3924.60	5.43	3919.17	6.18	3918.42	NM	--	6.31	3918.29	5.74	3918.86	5.71	3918.89
MW-74	21.83	5-20	3.37	3926.77	7.81	3918.96	8.35	3918.42	8.34	3918.43	8.41	3918.36	7.71	3919.06	7.58	3919.19
MW-77	16.96	5-15	3.21	3926.55	8.53	3918.02	8.96	3917.59	8.99	3917.56	8.88	3917.67	8.33	3918.22	8.04	3918.51
MW-78	21.69	5-20	3.03	3926.44	9.08	3917.36	9.55	3916.89	9.53	3916.91	9.28	3917.16	8.91	3917.53	8.48	3917.96
MW-79	22.45	5-20	-0.07	3923.59	6.22	3917.37	6.60	3916.99	6.33	3917.26	6.20	3917.39	5.80	3917.79	5.51	3918.08
TT16-MW01	20	4.5-19.5	2.69	3927.34	8.86	3918.48	9.31	3918.03	9.28	3918.06	9.41	3917.93	8.63	3918.71	8.48	3918.86
TT16-MW02	20	4.5-19.5	3.04	3926.51	8.07	3918.44	8.61	3917.90	8.58	3917.93	8.68	3917.83	7.88	3918.63	7.69	3918.82
TT16-MW03	20	5-20	3.05	3926.16	7.89	3918.27	8.36	3917.80	8.31	3917.85	8.38	3917.78	7.56	3918.60	7.35	3918.81
TT16-MW04	19.5	4-19	2.90	3927.55	9.41	3918.14	9.77	3917.78	9.68	3917.87	9.67	3917.88	8.93	3918.62	8.64	3918.91
TT16-MW05	19.5	4-19	3.05	3926.60	9.20	3917.40	9.64	3916.96	9.45	3917.15	9.26	3917.34	8.87	3917.73	8.54	3918.06
TT16-MW06	20	3-18	2.56	3925.82	8.45	3917.37	8.91	3916.91	8.85	3916.97	8.56	3917.26	8.32	3917.50	7.82	3918.00
TT16-MW07	18	3-18	2.49	3926.20	9.01	3917.19	9.54	3916.66	9.47	3916.73	9.09	3917.11	8.95	3917.25	8.36	3917.84
TT16-MW08	18	3-18	2.41	3924.84	7.47	3917.37	7.99	3916.85	7.90	3916.94	7.71	3917.13	7.39	3917.45	6.92	3917.92
TT16-MW09	19	3-18	1.91	3925.87	7.62	3918.25	8.20	3917.67	8.13	3917.74	8.28	3917.59	7.47	3918.40	7.35	3918.52
TT16-MW10	14	3-13	2.53	3926.51	NM	--	8.44	3918.07	NM	--	NM	--	NM	--	NM	--
TT16-MW11	20	3-18	2.26	3925.77	NM	--	7.67	3918.10	NM	--	NM	--	NM	--	NM	--
TT16-MW12	18.5	3-18	2.22	3927.08	8.25	3918.83	8.73	3918.35	8.79	3918.29	NM	--	8.27	3918.81	8.27	3918.81
TT16-MW13	15	3-15	2.50	3925.77	6.91	3918.86	7.40	3918.37	7.45	3918.32	NM	--	6.90	3918.87	6.87	3918.90
TT16-MW14	20	3-18	-0.41	3924.15	5.61	3918.54	6.07	3918.08	6.99	3917.16	6.88	3917.27	5.48	3918.67	5.68 (5.34P)	3918.205
TT16-MW15	20.3	5-20	2.04	3925.39	6.51	3918.88	7.01	3918.38	7.04	3918.35	7.05	3918.34	6.41	3918.98	6.24	3919.15
TT16-MW16	18.5	3-18	2.47	3928.04	9.72	3918.32	10.18	3917.86	10.19	3917.85	10.16	3917.88	6.55	3921.49	9.34	3918.70

Table 2-7 Groundwater Elevation Data, 2008-2010

Monitoring Well	Total Depth (feet bgs)	Screened Interval (feet bgs)	Stickup (feet, ags)	TOWC Elevation (feet msl)	May 2008 Depth to Water (feet bgs)	May 2008 Water Level Elevation (feet msl)	October 2008 Depth to Water (feet bgs)	October 2008 Water Level Elevation (feet msl)	March 2009 Depth to Water (feet bgs)	March 2009 Water Level Elevation (feet msl)	October 2009 Depth to Water (feet bgs)	October 2009 Water Level Elevation (feet msl)	March 2010 Depth to Water (feet bgs)	March 2010 Water Level Elevation (feet msl)	October 2010 Depth to Water (feet TOWC)	October 2010 Water Level Elevation (feet msl)
SITE 16 (continued)																
TT16-MW17	19.5	4.5-19.5	0.12	3926.78	8.32	3918.46	8.90	3917.88	8.85	3917.93	8.99	3917.79	8.21	3918.57	8.02	3918.76
TT16-MW18	18	3-18	2.40	3926.14	NM	--	8.56	3917.58	8.40	3917.74	8.57	3917.57	7.79	3918.35	7.62	3918.52
TT16-MW19	18	3-18	2.77	3929.22	NM	--	11.48	3917.74	11.40	3917.82	11.51	3917.71	10.75	3918.47	10.63	3918.59
TT16-STW01	--	No Screen	3.12	3921.28	NM	--	NM	--	NM	--	2.24	3919.04	NM	--	1.80	3919.48
TT16-TW01	7.6	2.6-7.6	2.40	3922.18	NM	--	NM	--	NM	--	5.06	3917.12	3.42	3918.76	3.28	3918.90
SPZ-1	--	No Screen	NM	3923.12	NM	--	4.92	3918.20	4.93	3918.19	4.68	3918.44	4.02	3919.10	3.79	3919.33
DPZ-1	5	2-5	NM	3922.76	NM	--	4.98	3917.78	4.93	3917.83	4.99	3917.77	4.19	3918.57	4.05	3918.71
SPZ-2	--	No Screen	NM	3922.51	NM	--	4.26	3918.25	4.24	3918.27	4.07	3918.44	3.34	3919.17	3.12	3919.39
DPZ-2	5	2-5	NM	3922.02	NM	--	4.16	3917.86	4.12	3917.90	4.03	3917.99	3.31	3918.71	2.99	3919.03
SPZ-3	--	No Screen	NM	3922.13	NM	--	4.45	3917.68	4.47	3917.66	4.17	3917.96	4.22	3917.91	3.82	3918.31
DPZ-3	5	2-5	NM	3922.71	NM	--	5.25	3917.46	5.20	3917.51	4.92	3917.79	4.84	3917.87	4.14	3918.57
UST-R SITE 1 (395)																
395C	18	5-15	-0.761	3934.85	NM	--	NM	--	7.59	3927.26	7.77(7.58P)	3926.933	NM	3926.933	7.02	3926.933
395F	22	15-20	1.12	3936.05	NM	--	NM	--	11.58 (10.86P)	3923.906	11.45(11.00P)	3924.246	NM	3924.246	11.46(10.43P)	3924.563
395G	21	5-20	3.08	3937.76	9.86	3927.90	10.3	3927.46	NM	--	NM	--	NM	--	NM	--
395H	16	5-15	-0.06	3935.69	8.11	3927.58	8.57	3927.12	8.63	3927.06	8.75	3926.94	7.90	3927.79	8.07	3927.62
TT395-MW01	18	3-18	-0.41	3934.85	7.19	3927.66	7.57	3927.28	NM	--	NM	--	NM	--	NM	--
TT395-MW02	18.5	3-18	-0.26	3935.41	7.35	3928.06	7.84	3927.57	7.93	3927.48	8.04	3927.37	7.15	3928.26	7.49	3927.92
TT395-MW04	18.5	3-18	-0.35	3935.49	NM	--	7.74	3927.75	NM	--	NM	--	NM	--	NM	--
UST-R SITE 2 (800 COMPLEX)																
TT806-MW01	18	3-18	2.29	3928.52	7.92	3920.60	9.07	3919.45	9.05	3919.47	9.01	3919.51	7.81	3920.71	7.44	3921.08
TT806-MW02	18	3-18	2.44	3927.47	7.28	3920.19	8.49	3918.98	8.45	3919.02	8.28	3919.19	7.36	3920.11	7.03	3920.44
TT806-MW03	20	4-19	2.54	3927.47	7.31	3920.16	8.32	3919.15	8.44	3919.03	8.40	3919.07	7.31	3920.16	7.05	3920.42
TT806-MW04	18	3-18	2.54	3928.05	NM	--	8.61	3919.44	8.77	3919.28	8.48	3919.57	7.41	3920.64	7.05	3921.00
HOT PIT WELLS																
BA-HP3-MW1	16	5-15	-0.19	3933.47	NM	--	NM	--	7.01	3926.46	NM	--	NM	--	NM	--
BA-HP3-MW2	16	5-15	-0.20	3933.73	NM	--	NM	--	6.96	3926.77	NM	--	NM	--	NM	--
BA-HP3-MW3	16	5-15	-0.27	3933.49	NM	--	NM	--	6.72	3926.77	6.87	3926.62	6.08	3927.41	6.32	3927.17
SITE 18																
MW-32	15	5-15	4.24	3926.85	10.19	3916.66	11.01	3915.84	11.03	3915.82	10.96	3915.89	10.43	3916.42	10.04	3916.81
SITE 20																
BA20-MW01	16	5-14	3.49	3933.16	NM	--	NM	--	9.92	3923.24	10.21	3922.95	9.08	3924.08	10.13	3923.03
BA20-MW02	16	5-15	3.32	3933.51	8.24	3925.27	8.97	3924.54	9.54	3923.97	8.55	3924.96	8.40	3925.11	8.91	3924.60
BA20-MW03	16	5.5-14.5	2.96	3930.99	9.21	3921.78	NM	--	9.87	3921.12	10.24	3920.75	9.24	3921.75	9.38	3921.61
BA20-MW04	15.5	5.5-14.5	3.40	3933.47	8.45	3925.02	9.89	3923.58	10.22	3923.25	9.09	3924.38	9.63	3923.84	10.13	3923.34
BA20-MW05	16	5.5-14.5	3.50	3931.52	7.05	3924.47	8.72	3922.80	9.64	3921.88	6.79	3924.73	8.60	3922.92	7.23	3924.29
TT20-MW02	20	3-18	1.99	3928.60	7.24	3921.36	8.22	3920.38	8.14	3920.46	7.95	3920.65	7.14	3921.46	7.61	3920.99
MW-33U	15	5-15	2.95	3929.46	8.56	3920.90	9.62	3919.84	9.53	3919.93	9.17	3920.29	8.55	3920.91	8.54	3920.92
MW-33L	27	22-27	2.38	3929.10	8.18	3920.92	9.25	3919.85	NM	--	8.68	3920.42	NM	--	8.20	3920.90
MW-36	15	5-15	-0.26	3928.67	6.96	3921.71	7.86	3920.81	7.72	3920.95	7.92	3920.75	6.99	3921.68	7.65	3921.02
SITE 21																
BA21-MW01	16	5.5-14.5	3.32	3934.12	10.35	3923.77	NM	--	10.78	3923.34	11.03	3923.09	10.21	3923.91	10.66	3923.46
BA21-MW02	16	5-15	3.28	3931.64	9.18	3922.46	10.25	3921.39	9.67	3921.97	10.00	3921.64	9.22	3922.42	9.71	3921.93
BA21-MW03	15.5	5-15	2.97	3931.07	9.12	3921.95	9.85	3921.22	9.87	3921.77	9.85	3921.79	9.21	3921.86	9.55	3921.52
BA21-MW04	16	5.5-14.5	3.89	3933.89	11.64	3922.25	NM	--	12.08	3919.56	Dry	--	11.76	3922.13	12.22	3921.67
BA21-MW05	16	5.5-14.5	3.36	3931.86	11.30	3920.56	NM	--	11.78	3919.86	12.12	3919.52	11.38	3920.48	11.76	3920.10
MW-12L	~83.5	74-84	-0.21	3930.70	2.66	3928.04	3.21	3927.49	3.01	3928.63	3.21	3928.43	2.64	3928.06	2.82	3927.88
MW-94	21.2	4-19	-0.01	3928.81	7.21	3921.60	7.94	3920.87	7.82	3923.82	7.96	3923.68	7.34	3921.47	7.64	3921.17
SITE 22																
BA22-MW01	15	5-14	3.08	3927.32	6.85	3920.47	NM	--	7.31	3920.01	7.65	3919.67	6.90	3920.42	7.04	3920.28
BA22-MW02	16	5-14	2.99	3931.69	NM	--	NM	--	10.65	3921.04	10.99	3920.70	10.37	3921.32	10.45	3921.24
BA22-MW03	16	5.5-14.5	3.35	3932.35	NM	--	NM	--	11.06	3921.29	11.44	3920.91	10.80	3921.55	11.05	3921.30
BA22-MW04	16	5.5-14.5	3.24	3933.09	11.41	3921.68	NM	--	11.81	3921.28	12.27	3920.82	11.52	3921.57	11.96	3921.13
TT22-MW02	18	3-18	2.14	3928.04	7.07	3920.97	NM	--	NM	--	NM	--	NM	--	NM	--

Table 2-7 Groundwater Elevation Data, 2008-2010

Monitoring Well	Total Depth (feet bgs)	Screened Interval (feet bgs)	Stickup (feet, ags)	TOWC Elevation (feet msl)	May 2008 Depth to Water (feet bgs)	May 2008 Water Level Elevation (feet msl)	October 2008 Depth to Water (feet bgs)	October 2008 Water Level Elevation (feet msl)	March 2009 Depth to Water (feet bgs)	March 2009 Water Level Elevation (feet msl)	October 2009 Depth to Water (feet bgs)	October 2009 Water Level Elevation (feet msl)	March 2010 Depth to Water (feet bgs)	March 2010 Water Level Elevation (feet msl)	October 2010 Depth to Water (feet TOWC)	October 2010 Water Level Elevation (feet msl)
BASEWIDE (SENTINEL) WELLS																
MW-82	21.75	5-20	2.84	3939.70	10.15	3929.55	11.15	3928.55	10.76	3928.94	9.60	3930.10	9.81	3929.89	9.92	3929.78
MW-85	22.46	5-20	3.06	3926.02	9.89	3916.13	10.86	3915.16	10.90	3915.12	10.37	3915.65	10.21	3915.81	9.53	3916.49
MW-83	22.64	6-21	3.23	3940.28	11.32	3928.96	12.19	3928.09	11.83	3928.45	10.47	3929.81	10.94	3929.34	10.88	3929.40
TTBW-MW01	18	3-18	2.31	3944.33	9.11	3935.22	9.84	3934.49	9.81	3934.52	9.35	3934.98	9.32	3935.01	9.48	3934.85
TTBW-MW02	18	3-18	2.10	3935.03	6.65	3928.38	6.51	3928.52	8.57	3926.46	6.45	3928.58	7.63	3927.40	5.61	3929.42
TTBW-MW03	18	3-18	2.39	3937.85	8.41	3929.44	9.29	3928.56	8.96	3928.89	7.78	3930.07	8.03	3929.82	8.21	3929.64
TTBW-MW04	19.5	4.4-19.5	2.46	3934.70	10.82	3923.88	11.41	3923.29	11.09	3923.61	11.25	3923.45	10.61	3924.09	11.15	3923.55
TTBW-MW05	23	8-23	2.13	3937.99	14.78	3923.21	15.37	3922.62	15.02	3922.97	15.30	3922.69	14.63	3923.36	15.08	3922.91
TTBW-MW06	17.3	2.3-17.3	2.02	3931.10	8.34	3922.76	9.35	3921.75	9.15	3921.95	8.91	3922.19	8.56	3922.54	7.78	3923.32
TTBW-MW07	18	3-18	2.39	3927.07	7.66	3919.41	8.88	3918.19	8.98	3918.09	8.98	3918.09	7.96	3919.11	7.95	3919.12
TTBW-MW08	18	3-18	2.30	3927.26	9.48	3917.78	9.92	3917.34	10.07	3917.19	9.60	3917.66	9.56	3917.70	9.01	3918.25
TTBW-MW09	18	3-18	2.11	3925.63	8.12	3917.51	8.15	3917.48	8.72	3916.91	7.87	3917.76	8.31	3917.32	7.23	3918.40
TTBW-MW10	18	3-18	2.20	3924.67	7.42	3917.25	8.23	3916.44	7.93	3916.74	7.86	3916.81	7.51	3917.16	7.20	3917.47
TTBW-MW11	19.5	4.4-19.5	2.34	3929.94	12.59	3917.35	13.08	3916.86	13.44	3916.50	12.88	3917.06	12.99	3916.95	12.14	3917.80
TTBW-MW12	18	3-18	2.13	3924.89	7.98	3916.91	8.78	3916.11	8.81	3916.08	8.65	3916.24	8.28	3916.61	7.79	3917.10
TTBW-MW13	18	3-18	1.98	3923.85	7.82	3916.03	7.67	3916.18	9.43	3914.42	8.71	3915.14	8.94	3914.91	6.86	3916.99
TTBW-MW14	18	3-18	-0.41	3919.61	5.13	3914.48	5.77	3913.84	5.86	3913.75	5.53	3914.08	5.26	3914.35	4.51	3915.10
TTBW-MW15	18	3-18	2.48	3924.19	10.07	3914.12	10.8	3913.39	10.69	3913.50	10.31	3913.88	10.23	3913.96	9.48	3914.71
TTBW-MW16	19.5	3.5-18.5	1.72	3923.22	8.25	3914.97	8.97	3914.25	8.92	3914.30	8.80	3914.42	8.30	3914.92	8.27	3914.95
TTBW-MW17	13	3-13	2.28	3937.41	8.25	3929.16	5.81	3931.60	7.00	3930.41	5.79	3931.62	5.38	3932.03	5.79	3931.62

Notes:

ags	Above ground surface
bgs	Below ground surface
MSL	Mean sea level
NM	Not measured
TOWC	Top of well casing
--	Not calculated

TABLE 3-1: SUMMARY OF RESULTS OF FIELD ACTIVITIES RELATED TO WELL UTILIZATION PLAN DEVELOPMENT

Site ID	Existing Wells Redeveloped		Existing Wells Repaired	New Wells Constructed	Micropurge Pumps Installed	Transducers Installed
	Developed Properly	Plug				
Site 1	17	2	8	1	8	2
Sites 2/4	12	7	0	6	14	6
Site 3	8	1	0	6	11	1
Site 6	6	2	1	5	8	4
Site 14	12	1	5	3	11	3
Site 16	13	3	11	19	28	20
UST-R Site 1 (395)	2	3	2	4	6	1
UST-R Site 2 (806)	0	0	0	4	4	1
Site 18	1	0	0	0	1	1
Site 20	3	1	0	2	9	3
Site 21	2	0	0	0	6	0
Site 22	0	0	0	2	6	0
Basewide Wells	3	1	3	17	20	18
Total	79	21	30	69	132	60

TABLE 3-2: SUMMARY OF RESULTS FOR THE CURRENT GROUNDWATER MONITORING WELL NETWORK AND RECOMMENDATIONS FOR PLUGGING

Site ID	Monitoring Wells Sampled Semiannually for Water Quality	Observation Wells Used for Semiannual Water Level Monitoring	Supplemental Monitoring Wells and Piezometers		Wells and Piezometers Recommended for Plugging
			Water Quality/Water Levels	Remedial Use	
Site 1	1	12	5	6	36
Sites 2 and 4	1	17	4	44	19
Site 3	4	4	9	0	11
Site 6	1	8	1	1	22
Site 14	8	4	3	40	23
Site 16	17	21	4	5	26
UST-R Site 1 (395)	0	4	4	1	3
UST-R Site 2 (806)	0	4	0	0	0
Site 18	1	0	0	0	1
Site 20	0	9	0	0	2
Site 21	0	7	0	0	0
Site 22	0	4	2	0	0
Site 348	0	0	0	0	2
Hot Pit Wells	0	1	2	0	0
Basewide Wells	16	4	4	0	1
Unknown	0	0	0	0	7
Total	49	99	38	97	153

APPENDIX A
STANDARD OPERATING PROCEDURES

SOP APPROVAL FORM

TETRA TECH EM INC.

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

GENERAL EQUIPMENT DECONTAMINATION

SOP NO. 002

REVISION NO. 2

Last Reviewed: December 1999

Quality Assurance Approved	*February 2, 1993* Date

1.0 BACKGROUND

All nondisposable field equipment must be decontaminated before and after each use at each sampling location to obtain representative samples and to reduce the possibility of cross-contamination.

1.1 PURPOSE

This standard operating procedure (SOP) establishes the requirements and procedures for decontaminating equipment in the field.

1.2 SCOPE

This SOP applies to decontaminating general nondisposable field equipment. To prevent contamination of samples, all sampling equipment must be thoroughly cleaned prior to each use.

1.3 DEFINITIONS

Alconox: Nonphosphate soap

1.4 REFERENCES

U.S. Environmental Protection Agency (EPA). 1992. "RCRA Ground-Water Monitoring: Draft Technical Guidance. Office of Solid Waste. Washington, DC. EPA/530-R-93-001. November.

EPA. 1994. "Sampling Equipment Decontamination." Environmental Response Team SOP #2006 (Rev. #0.0, 08/11/94). On-Line Address: http://204.46.140.12/media_resrcs/media_resrcs.asp?Child1=

1.5 REQUIREMENTS AND RESOURCES

The equipment required to conduct decontamination is as follows:

- Scrub brushes
- Large wash tubs or buckets
- Squirt bottles

- Alconox
- Tap water
- Distilled water
- Plastic sheeting
- Aluminum foil
- Methanol or hexane
- Dilute (0.1 N) nitric acid

2.0 PROCEDURE

The procedures below discuss decontamination of personal protective equipment (PPE), drilling and monitoring well installation equipment, borehole soil sampling equipment, water level measurement equipment, and general sampling equipment.

2.1 PERSONAL PROTECTIVE EQUIPMENT DECONTAMINATION

Personnel working in the field are required to follow specific procedures for decontamination prior to leaving the work area so that contamination is not spread off-site or to clean areas. All used disposable protective clothing, such as Tyvek coveralls, gloves, and booties, will be containerized for later disposal. Decontamination water will be containerized in 55-gallon drums.

Personnel decontamination procedures will be as follows:

1. Wash neoprene boots (or neoprene boots with disposable booties) with Liquinox or Alconox solution and rinse with clean water. Remove booties and retain boots for subsequent reuse.

2. Wash outer gloves in Liquinox or Alconox solution and rinse in clean water. Remove outer gloves and place into plastic bag for disposal.

3. Remove Tyvek or coveralls. Containerize Tyvek for disposal and place coveralls in plastic bag for reuse.

4. Remove air purifying respirator (APR), if used, and place the spent filters into a plastic bag for disposal. Filters should be changed daily or sooner depending on use and application. Place respirator into a separate plastic bag after cleaning and disinfecting.

5. Remove disposable gloves and place them in plastic bag for disposal.

6. Thoroughly wash hands and face in clean water and soap.

2.2 DRILLING AND MONITORING WELL INSTALLATION EQUIPMENT DECONTAMINATION

All drilling equipment should be decontaminated at a designated location on-site before drilling operations begin, between borings, and at completion of the project.

Monitoring well casing, screens, and fittings are assumed to be delivered to the site in a clean condition. However, they should be steam cleaned on-site prior to placement downhole. The drilling subcontractor will typically furnish the steam cleaner and water.

After cleaning the drilling equipment, field personnel should place the drilling equipment, well casing and screens, and any other equipment that will go into the hole on clean polyethylene sheeting.

The drilling auger, bits, drill pipe, temporary casing, surface casing, and other equipment should be decontaminated by the drilling subcontractor by hosing down with a steam cleaner until thoroughly clean. Drill bits and tools that still exhibit particles of soil after the first washing should be scrubbed with a wire brush and then rinsed again with a high-pressure steam rinse.

All wastewater from decontamination procedures should be containerized.

2.3 BOREHOLE SOIL SAMPLING EQUIPMENT DECONTAMINATION

The soil sampling equipment should be decontaminated after each sample as follows:

1. Prior to sampling, scrub the split-barrel sampler and sampling tools in a bucket using a stiff, long bristle brush and Liquinox or Alconox solution.
2. Steam clean the sampling equipment over the rinsate tub and allow to air dry.
3. Place cleaned equipment in a clean area on plastic sheeting and wrap with aluminum foil.
4. Containerize all water and rinsate.

5. Decontaminate all pipe placed down the hole as described for drilling equipment.

2.4 WATER LEVEL MEASUREMENT EQUIPMENT DECONTAMINATION

Field personnel should decontaminate the well sounder and interface probe before inserting and after removing them from each well. The following decontamination procedures should be used:

1. Wipe the sounding cable with a disposable soap-impregnated cloth or paper towel.
2. Rinse with deionized organic-free water.

2.5 GENERAL SAMPLING EQUIPMENT DECONTAMINATION

All nondisposable sampling equipment should be decontaminated using the following procedures:

1. Select an area removed from sampling locations that is both downwind and downgradient. Decontamination must not cause cross-contamination between sampling points.
2. Maintain the same level of protection as was used for sampling.
3. To decontaminate a piece of equipment, use an Alconox wash; a tap water wash; a solvent (methanol or hexane) rinse, if applicable or dilute (0.1 N) nitric acid rinse, if applicable; a distilled water rinse; and air drying. Use a solvent (methanol or hexane) rinse for grossly contaminated equipment (for example, equipment that is not readily cleaned by the Alconox wash). The dilute nitric acid rinse may be used if metals are the analyte of concern.
4. Place cleaned equipment in a clean area on plastic sheeting and wrap with aluminum foil.
5. Containerize all water and rinsate.

SOP APPROVAL FORM

TETRA TECH EM INC.

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

GROUNDWATER SAMPLE COLLECTION
USING MICROPURGE TECHNOLOGY

SOP NO. 015

REVISION NO. 0

Last Reviewed: January 2000

	April 7, 1998
Quality Assurance Approved	Date

1.0 BACKGROUND

Groundwater sample collection is an integral part of site characterization at many contaminant release investigation sites. Often, a requirement of groundwater contaminant investigation is to evaluate contaminant concentrations in the aquifer. Since data quality objectives of most investigations require a laboratory setting for chemical analysis, samples must be collected from the aquifer and submitted to a laboratory for analysis. Therefore, sample collection and handling must be conducted in a manner that minimizes alteration of chemical characteristics of the groundwater.

In the past, most sample collection techniques followed federal and state guidance. Acceptable protocol included removal of water in the casing of a monitoring well (purging), followed by sample collection. The water in the casing was removed so groundwater from the formation could flow into the casing and be available for sample collection. Sample collection was commonly completed with a bailer, bladder pump, controlled flow impeller pump, or peristaltic pump. Samples were preserved during collection. Often, samples to be analyzed for metals contamination were filtered through a 0.45-micron filter prior to preservation and placement into the sample container.

Research conducted by several investigators has demonstrated that a significant component of contaminant transport occurs while the contaminant is sorbed onto colloid particles. Colloid mobility in an aquifer is a complex, aquifer-specific transport issue, and its description is beyond the scope of this Standard Operating Procedure (SOP). However, concentrations of suspended colloids have been measured during steady state conditions and during purging activities. Investigation results indicate standard purging procedures can cause a significant increase in colloid concentrations, which in turn may bias analytical results.

Micropurge sample collection provides a method of minimizing increased colloid mobilization by removing water from the well at the screened interval at a rate that preserves or minimally disrupts steady-state flow conditions in the aquifer. During micropurge sampling, groundwater is discharged from the aquifer at a rate that the aquifer will yield without creating a cone of depression around the sampled well. Research indicates that colloid mobilization will not increase above steady-state conditions during low-flow discharge. Therefore, the collected sample is more likely to represent steady-state groundwater chemistry.

1.1 PURPOSE

The purpose of this SOP is to describe the procedures to be used to collect a groundwater sample from a well using the micropurge technology. The following sections describe the equipment to be used and the methods to be followed to promote uniform sample collection techniques by field personnel that are experienced in sample collection and handling for environmental investigations.

1.2 SCOPE

This SOP applies to groundwater sampling using the micropurge technology. It is intended to be used as an alternate SOP to the general "Groundwater Sampling" SOP (SOP No. 10) that provides guidance for the general aspects of groundwater sampling.

1.3 DEFINITIONS

Colloid: Suspended particles that range in diameter from 5 nanometers to 0.2 micrometers.

Dissolved oxygen: The ratio of the concentration or mass of oxygen in water relative to the partial pressure of gaseous oxygen above the liquid which is a function of temperature, pressure, and concentration of other solutes.

Flow-through cell: A device connected to the discharge line of a groundwater purge pump that allows regular or continuous measurement of selected parameters of the water and minimizes contact between the water and air.

pH: The negative base-10 log of the hydrogen-ion activity in moles per liter.

Reduction and oxidation potential: A numerical index of the intensity of oxidizing or reducing conditions within a system, with the hydrogen-electrode potential serving as a reference point of zero volts.

Specific conductance: The reciprocal of the resistance in ohms measured between opposite faces of a centimeter cube of aqueous solution at a specified temperature.

Turbidity: A measurement of the suspended particles in a liquid that have the ability to reflect or refract part of the visible portion of the light spectrum.

1.4 REFERENCES

Puls, R. W. and M. J. Barcelona. 1996. Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures. U.S. Environmental Protection Agency. Office of Research and Development. EPA/540/S-95/504. April.

1.5 REQUIREMENTS AND RESOURCES

The following equipment is required to complete micropurge sample collection :

- Water level indicator
- Adjustable flow rate pump (bladder, piston, peristaltic, or impeller)
- Discharge flow controller
- Flow-through cell
- pH probe
- Dissolved oxygen (DO) probe
- Turbidity meter
- Oxidation and reduction (Redox or Eh) probe
- Specific conductance (SC) probe (optional)
- Temperature probe (optional)
- Meter to display data for the probes
- Calibration solutions for pH, SC, turbidity, and DO probes, as necessary
- Container of known volume for flow measurement or calibrated flow meter
- Data recording and management system

2.0 PROCEDURE

The following procedures and criteria were modified from the U. S. Environmental Protection Agency guidance titled "Low-Flow (Minimal Drawdown) Ground-Water Sampling Procedures" (Puls and Barcelona 1996). This reference may be consulted for a more detailed description of micropurge sampling theory.

Micropurging is most commonly accomplished with low-discharge rate pumps, such as bladder pumps, piston pumps, controlled velocity impeller pumps, or peristaltic pumps. Bailers and high capacity submersible pumps are not considered acceptable micropurge sample collection devices. The purged water is monitored (in a flow-through cell or other constituent monitoring device) for chemical and optical parameters that indicate steady state flow conditions between the sample extraction point and the aquifer. Samples are collected when steady state conditions are indicated.

Groundwater discharge equipment may be permanently installed in the monitoring well as a dedicated system, or it can be installed in each well as needed. Most investigators agree that dedicated systems will provide the best opportunity for collecting samples most representative of steady state aquifer conditions, but the scope of a particular investigation and available investigation funds will dictate equipment selection.

2.1 EQUIPMENT CALIBRATION

Prior to sample collection, the monitoring equipment used to measure pH, Eh, DO, turbidity, and SC should be calibrated or checked according to manufacturer's directions. Typically, calibration activities are completed at the field office at the beginning of sampling activities each day. The pH meter calibration should bracket the pH range of the wells to be sampled (acidic to neutral pH range [4.00 to 7.00] or neutral to basic pH range [7.00 to 10.00]). The DO meter should be calibrated to one point (air-saturated water) or two points (air-saturated water and water devoid of all oxygen). The SC meter cannot be calibrated in the field. It is checked against a known standard (typical standards are 1, 10, and 50 millimhos per centimeter at 25 EC). The offset of the measured value of the calibration standard can be used as a correction value. Similarly, the Eh probe cannot be calibrated in the field, but is checked against a known standard, such as Zobell solution. The instrument should display a millivolt (mv) value that falls within the

range set by the manufacturer. Because Eh is temperature dependent, the measured value should be corrected for site-specific variance from standard temperature (25 EC). The Eh probe should be replaced if the reading is not within the manufacturer's specified range. All calibration data should be recorded on the Micropurging Groundwater Sampling Data Sheet attached to this SOP or in a logbook.

2.2 WELL PURGING

The well to be sampled should be opened and groundwater in the well allowed to equilibrate to atmospheric pressure. Equilibration should be determined by measuring depth to water below the marked reference on the wellhead (typically the top of the well casing) over two or more 5-minute intervals. Equilibrium conditions exist when the measured depth to water varies by less than 0.01 foot over two consecutive readings. Total depth of well measurement should be made following sample collection, unless the datum is required to place nondedicated sample collection equipment. Depth to water and total well depth measurements should be made in accordance with procedures outlined in SOP No. 014 (Static Water Level, Total Well Depth, and Immiscible Layer Measurement).

If the well does not have a dedicated sample collection device, a new or previously decontaminated portable sample collection device should be placed within the well. The intake of the device should be positioned at the midpoint of the well screen interval. The device should be installed slowly to minimize turbulence within the water in the casing and mixing of stagnant water above the screened interval with water in the screened interval. Following installation, the flow controller should be connected to the sample collection device and the flow-through cell connected to the outlet of the sample collection device. The calibrated groundwater chemistry monitoring probes should be installed in the flow-through cell. If a flow meter is used, it should be installed ahead of the flow-through cell.

If the well has a dedicated sample collection device, the controller for the sample collection device should be connected to the sample collection device. The flow meter and flow-through cell should be connected in line to the discharge tube, and the probes installed in the flow-through cell.

The controller should be activated and groundwater extracted (purged) from the well. The purge rate should be monitored, and should not exceed the capacity of the well. The well capacity is defined as the

maximum discharge rate that can be obtained with less than 0.1 meter (0.3 foot) drawdown. Typically, the discharge rate will be less than 0.5 liters per minute (L/min) (0.13 gallons per minute). The maximum purge rate should not exceed 1 L/min (0.25 gallons per minute), and should be adjusted to achieve minimal drawdown.

Water levels, effluent chemistry, and effluent flow rate should be continuously monitored while purging the well. Purging should continue until the measured chemical and optical parameters are stable. Stable parameters are defined as monitored chemistry values that do not fluctuate by more than the following ranges over three successive readings at 3-minute intervals: ±0.1 pH unit; ±3 percent for SC; ±10 mv for Eh; and ±10 percent for turbidity and DO. Purging will continue until these stabilization criteria have been met or three well casing volumes have been purged. If three casing volumes of water have been purged and the stabilization criteria have not been met, a comment should be made on the data sheet that sample collection began after three well casing volumes were purged. The final pH, SC, Eh, turbidity, and DO values will be recorded. All data should be recorded on the Micropurging Groundwater Sampling Data Sheet attached to this SOP or in a logbook.

2.3 SAMPLE COLLECTION

Following purging, the flow through cell shall be disconnected, and groundwater samples collected directly from the discharge line. Discharge rates should be adjusted so that groundwater is dispensed into the sample container with minimal aeration of the sample. Samples collected for volatile organic compound analysis should be dispensed into the sample container at a flow rate equal to or less than 100 milliliters per minute. Samples should be preserved and handled as described in the investigation field sampling plan or quality assurance project plan.

Tetra Tech EM Inc.

MICROPURGING GROUNDWATER SAMPLING DATA SHEET

Page _____ of _____

Date _____

Well Name _____
Project _____
Project No. _____
Well Location _____
Sample Date _____
Sampling Personnel _____
_____
_____
Sample ID _____
Duplicate ID _____

Screen Interval _____
Station Elevation _____ GND ____ TOC _____
Static Water Level (from TOC) _____
Well Stick Up _____
Static Elevation _____
Well Depth _____ MEAS ____ RPTD _____
Feet of Water _____
Gallons/Foot _____
Casing Volume _____

Immiscible Phases Present ☐ Yes ☐ No
Type _____
Measured with _____
PID Readings (background) _____
PID Reading (TOC) _____
Wells Installed by _____
Installation Date _____
Development Date(s) _____

FIELD CHEMISTRY CALIBRATIONS

Date/Time _____ Spec. Conductance: Standard _____ µmhos/cm at 25EC Reading _____ µmhos/cm at _____EC
pH: pH 4.00 - _____ at _____ EC pH 7.00 - _____ at _____ EC pH 10.00 - _____ at _____ EC Slope _____
Dissolved Oxygen: D.O. Meter _____ mg/L at _____EC PID: Calibration Gas _____ PPM _____ Span _____ Reading _____

PURGING

Time	Discharge Rate (mL/min)	Dissolved Oxygen (mg/L)	pH	Eh/ORP (mV)	Temp. (EC)	Specific Conduct. (µmhos/cm at EC)	Turbidity (NTU)	Cumulative Volume of Water Removed (Purged)		PID/OVA Reading		Depth to Water (ft)	Comments
								Gallons	Casing Vol.	Location	Value		

SAMPLE PARAMETERS

Condition of well: _____

Remarks: _____

FIELD EQUIPMENT

pH Meter _____ Serial Number _____
Spec. Cond. Meter _____ Serial Number _____
Pump _____ Serial Number _____
Water Level Meter _____ Serial Number _____
D.O. Meter _____ Serial Number _____
Filter Apparatus _____ Filters _____
Temperature Measure _____
Interface Probe _____ Serial Number _____
PID/OVA _____ Serial Number _____

Field Chemistry Calibrations

Fractions _____
_____
_____
Number of Bottles _____
Sample Depth _____
Field Notebook _____
Sample Method _____
_____
Discharge Water Containerized ☐ Yes ☐ No

SOP APPROVAL FORM

TETRA TECH EM INC.

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

PACKAGING AND SHIPPING SAMPLES

SOP NO. 019

REVISION NO. 6

December 2008

Quality Assurance Approved	December 18, 2008 Date

1.0 BACKGROUND

In any sampling program, the integrity of a sample must be ensured from its point of collection to its final disposition. Procedures for classifying, packaging, and shipping samples are described below. Steps in the procedures should be followed to ensure sample integrity and to protect the welfare of persons involved in shipping and receiving samples. When hazardous substances and dangerous goods are sent by common carrier, their packaging, labeling, and shipping are regulated by four primary agencies that have regulatory or advisory guidelines: (1) the U.S. Department of Transportation (DOT) Hazardous Materials Regulations (HMR, *Code of Federal Regulations*, Title 49 [49 CFR] Parts 106 through 180); (2) the International Air Transportation Association (IATA) Dangerous Goods Regulations (DGR); (3) International Civil Aviation Organization (ICAO), which provides technical instructions for safe transportation of hazardous materials (dangerous goods) by air; and (4) United Nations (UN) "Recommendations of the Committee of Experts on Transport of Dangerous Goods."

1.1 PURPOSE

This standard operating procedure (SOP) establishes the requirements and procedures for packaging and shipping samples. It has been prepared in accordance with the U.S. Environmental Protection Agency (EPA) "Sampler's Guide to the Contract Laboratory Program (CLP)," the DGR, the HMR, ICAO, and UN. Sample packaging and shipping procedures described in this SOP should be followed for all sample packaging and shipping. Deviations from the procedures in this SOP must be documented in a field logbook. This SOP assumes that samples are already collected in the appropriate sample jars and that the sample jars are labeled and tagged appropriately.

1.2 SCOPE

This SOP applies to sample classification, packaging, and shipping.

1.3 DEFINITIONS

Custody seal: A custody seal is a tape-like seal. Placement of the custody seal is part of the chain-of-custody process and is used to prevent tampering with samples after they have been packaged for shipping.

Dangerous goods: Dangerous goods are articles or substances that can pose a significant risk to health, safety, or property when transported by air; they are classified as defined in Section 3 of the DGR (IATA 2008).

Environmental samples: Environmental samples include drinking water, most groundwater and ambient surface water, soil, sediment, treated municipal and industrial wastewater effluent, and biological specimens. Environmental samples typically contain low concentrations of contaminants and when handled require only limited precautionary procedures.

Hazardous Materials Regulations: The HMR are DOT regulations for the shipment of hazardous materials by air, water, and land; they are located in 49 CFR 106 through 180.

Hazardous samples: Hazardous samples include dangerous goods and hazardous substances. Hazardous samples shipped by air should be packaged and labeled in accordance with procedures specified by the DGR; ground shipments should be packaged and labeled in accordance with the HMR.

Hazardous substance: A hazardous substance is any material, including its mixtures and solutions, that is listed in Appendix A of 49 CFR 172.101 <u>and</u> its quantity, in one package, equals or exceeds the reportable quantity (RQ) listed in the appendix.

IATA Dangerous Goods Regulations: The DGR are regulations that govern the international transport of dangerous goods by air. The DGR are based on the International Civil Aviation Organization (ICAO) Technical Instructions. The DGR contain all of the requirements of the ICAO Technical Instructions and are more restrictive in some instances.

Nonhazardous samples: Nonhazardous samples are those samples that do not meet the definition of a hazardous sample and **do not** need to be packaged and shipped in accordance with the DGR or HMR.

Overpack: An enclosure used by a single shipper to contain one or more packages and to form one handling unit (IATA 2008). For example, a cardboard box may be used to contain three fiberboard boxes to make handling easier and to save on shipping costs.

1.4 REFERENCES

U.S. Department of Transportation (DOT). 2007. Code of Federal Regulations, Title 49, Parts 171 through 180, especially Parts 171 (general), 172 (table, emergency response, and so on), and 173 (for shippers). Available from http://www.access.gpo.gov/nara/cfr/cfr-table-search.html#page1. Updated annually, late in the year or early in the following year.

DOT. 2008. "Hazardous Materials Table". (49 CFR 172.101 Table) Available on-line from http://phmsa.dot.gov/hazmat/library. Updated irregularly.

DOT. 2008. "Emergency Response Guidebook". Available on-line at http://phmsa.dot.gov/hazmat/library/erg. Updated annually.

Federal Express. 2008. "Dangerous Goods Shipping". Available on-line from http://www.fedex.com/us/services/options/dangerousgoods/index.html. Note especially "Declaration Forms", which can be filled out on-line or downloaded for future use, and "Resources", which includes the "Dangerous Goods Job Aid" on how to fill out the form, mark the package, and so on, the "Shipping Checklists" and the 1-800 numbers for assistance.

International Air Transport Association (IATA). 2008. "Dangerous Goods Regulations. 2009". For sale at http://www.iata.org/ps/publications/dgr.htm. Updated annually, with new edition available late in year.

U.S. Environmental Protection Agency. 2007. "Contract Laboratory Program Guidance for Field Samplers". EPA 540-R-07-06. Available on-line at http://www.epa.gov/superfund/programs/clp/download/sampler/clp_sampler_guidance.pdf. July.

The following additional in-house resources are also available:

Email: Contact either the TtEMI Health & Safety Director and the Regional Safety Officers at EMI.HASPApprovers or your Office Health and Safety Representative (all are included at EMI.HealthSafety).

On-line: TtEMI Intranet Page "Dangerous Goods Shipping" at http://home.ttemi.com/C14/Dangerous%20Goods%20Shipping/default.aspx. Includes the "Dangerous Goods Shipping Manual", various "Emergency Response Guide" excerpts, and other information, updated regularly.

1.5 REQUIREMENTS AND RESOURCES

The procedures for packaging and shipping **nonhazardous** samples require the following:

- Coolers
- Ice
- Vermiculite, bubble wrap, or similar cushioning material
- Chain-of-custody forms and seals
- Airbills
- Resealable plastic bags for sample jars and ice
- Tape (strapping and clear)

The procedures for packaging and shipping **hazardous** samples require the following:

- Ice
- Vermiculite or other non-combustible, absorbent packing material
- Chain-of-custody forms and seals
- Appropriate dangerous goods airbills and emergency response information to attach to the airbill
- Resealable plastic bags for sample jars and ice
- Tape (strapping and clear)
- Appropriate shipping containers as specified in the DGR
- Labels that apply to the shipment such as hazard labels, address labels, “Cargo Aircraft Only” labels, and package orientation labels (up arrows)

2.0 PROCEDURES

The following procedures apply to packaging and shipping nonhazardous and hazardous samples.

2.1 SAMPLE CLASSIFICATION

Prior to sample shipment, it must be determined whether the sample is subject to the DGR. Samples subject to these regulations shall be referred to as hazardous samples. If the hazardous sample is to be shipped by air, then the DGR should be followed. Any airline, including FedEx, belonging to IATA must follow the DGR. As a result, FedEx **may not** accept a shipment that is packaged and labeled in accordance with the HMR (although in most cases, the packaging and labeling would be the same for either set of regulations). The HMR states that a hazardous material may be transported by aircraft in accordance with the ICAO Technical Instruction (49 CFR 171.11) upon which the DGR is based. Therefore, the use of the DGR for samples to be shipped by air complies with the HMR, but not vice versa.

Most environmental samples are not hazardous samples and do not need to be packaged in accordance with any regulations. Hazardous samples are those samples that can be classified as specified in Section 3 of the DGR, can be found in the List of Dangerous Goods in the DGR in bold type, are considered a hazardous substance (see definition), or are mentioned in “Section 2 - Limitations” of the DGR for countries of transport or airlines (such as FedEx). The hazard classifications specified in the DGR (and the HMR) are as follows:

Class 1 - Explosives

- Division 1.1 - Articles and substances having a mass explosion hazard
- Division 1.2 - Articles and substances having a projection hazard but not a mass explosion hazard
- Division 1.3 - Articles and substances having a fire hazard, a minor blast hazard and/or a minor projection hazard but not a mass explosion hazard
- Division 1.4 - Articles and substances presenting no significant hazard
- Division 1.5 - Very sensitive substances mass explosion hazard
- Division 1.6 - Extremely insensitive articles which do not have a mass explosion hazard

Class 2 - Gases

Division 2.1 - Flammable gas
Division 2.2 - Non-flammable, non-toxic gas
Division 2.3 - Toxic gas

Class 3 - Flammable Liquids

Class 4 - Flammable Solids; Substances Liable to Spontaneous Combustion; Substances, which, in Contact with Water, Emit Flammable Gases

Division 4.1 - Flammable solids
Division 4.2 - Substances liable to spontaneous combustion
Division 4.3 - Substances, which, in contact with water, emit flammable gases

Class 5 - Oxidizing Substances and Organic Peroxides

Division 5.1 - Oxidizers
Division 5.2 - Organic peroxides

Class 6 - Toxic and Infectious Substances

Division 6.1 - Toxic substances
Division 6.2 - Infectious substances

Class 7 - Radioactive Materials

Class 8 - Corrosives

Class 9 - Miscellaneous Dangerous Goods

The criteria for each of the first eight classes are very specific and are outlined in Section 3 of the DGR and 49 CFR 173 of the HMR. Some classes and divisions are further divided into packing groups based on their level of danger. Packing group I indicates a great danger, packing group II indicates a medium danger, and packing group III indicates a minor danger.

Class 1, explosives, includes any chemical compound, mixture, or device that by itself is capable of chemical chain reaction sufficient to produce a substantial, instantaneous release of gas, heat, and/or pressure. Tetra Tech does not ship substances that fall under this class.

Class 2, gases, includes any compressed gas being shipped and any noncompressed gas that is either flammable or toxic. A compressed gas is defined as having a pressure over 40 pounds per square inch (psi) absolute (25 psi gauge). Most air samples and empty cylinders that did not contain a flammable or toxic gas are exempt from the regulations. An empty hydrogen cylinder, as in a flame ionization detector (FID), is considered a dangerous good unless it is properly purged with nitrogen in accordance with the HMR. A landfill gas sample is usually considered a flammable gas because it may contain a high percentage of methane.

Class 3, flammable liquids, are based on the boiling point and flash point of a substance. DOT defines flammable liquids as substances with a flash point less than 140 °F. Most class 3 samples include solvents, oil, gas, or paint-related material collected from drums, tanks, or pits.

Class 4 are flammable solids; substances liable to spontaneous combustion; and substances which, in contact with water, emit flammable gasses. Tetra Tech does not ship substances that fall under this class.

Class 5, oxidizers and organic peroxides, include substances that readily yields oxygen, which may result in the ignition of combustible materials. Organic peroxide is combustible and reacts as an oxidizer in contact with other combustible materials. By itself, an organic peroxide can be flammable or explosive. Tetra Tech does not ship substances that fall under this class.

Division 6, toxic and infectious substances, is based on oral toxicity (LD_{50} [lethal dose that kills 50 percent of the test animals]), dermal toxicity (LD_{50} values), and inhalation toxicity (LC_{50} [lethal concentration that kills 50 percent of the test animals] values). Division 6.1 substances include pesticides and cyanide. Tetra Tech does not ship substances that fall under this class.

Class 7, radioactive material, is defined as any article or substance with a specific activity greater than 70 kiloBecquerels (kBq/kg) (0.002 [microCuries per gram [**:**Ci/g]). If the specific activity exceeds this level, the sample should be shipped in accordance with Section 10 of the DGR.

Class 8, corrosives, are based on the rate at which a substance destroys skin tissue or corrodes steel; they are not based on pH. Class 8 materials include the concentrated acids used to preserve water samples. Preserved water samples are not considered Class 8 substances and should be packaged as nonhazardous samples.

Class 9, miscellaneous dangerous goods, are substances that present a danger but are not covered by any other hazard class. Examples of Class 9 substances include asbestos, polychlorinated biphenyls (PCB), and dry ice.

Unlike the DGR, the HMR includes combustible liquids in hazard class 3. The definition of a combustible liquid is specified in 49 CFR 173.120 of the HMR. The HMR has an additional class, ORM-D, that is not specified in the DGR. "ORM-D material" refers to a material such as a consumer commodity that, although otherwise subject to the HMR, presents a limited hazard during transport due to its form, quantity, and packaging. It must be a material for which exceptions are provided in the table of 49 CFR 172.101. The DGR lists consumer commodities as a Class 9 material.

In most instances, the hazard of a material sampled is unknown because no laboratory testing has been conducted. A determination as to the suspected hazard of the sample must be made using knowledge of the site, field observations, field tests, and other available information.

According to 40 CFR 261.4(d) and (e), samples transported to a laboratory for testing or treatability studies, including samples of hazardous wastes, are **not** hazardous wastes. FedEx will not accept a shipment of hazardous waste.

2.2 PACKAGING NONHAZARDOUS SAMPLES

Nonhazardous samples, after being appropriately containerized, labeled, and tagged, should be packaged in the following manner. Note that these are general instructions; samplers should be aware of any client-specific requirements concerning the placement of custody seals or other packaging provisions.

1. Place the sample in a resealable plastic bag.
2. Place the bagged sample in a cooler and pack it to prevent breakage.
3. Prevent breakage of bottles during shipment by either wrapping the sample container in bubble wrap, or lining the cooler (bottom and sides) with a noncombustible material such as vermiculite. Vermiculite is especially recommended because it will absorb any free liquids inside the cooler. It is recommended that the cooler be lined with a large plastic garbage bag before samples, ice, and absorbent packing material are placed in the cooler.

4. Add a sufficient quantity of ice to the cooler to cool samples to 4 °C. Ice should be double bagged in resealable plastic bags to prevent the melted ice from leaking out. As an option, a temperature blank (a sample bottle filled with distilled water) can be included with the cooler.

5. Seal the completed chain-of-custody forms in a plastic bag and tape the plastic bag to the inside of the cooler lid.

6. Tape any instructions for returning the cooler to the inside of the lid.

7. Close the lid of the cooler and tape it shut by wrapping strapping tape around both ends and hinges of the cooler at least once. Tape shut any drain plugs on the cooler.

8. Place two signed custody seals on the cooler, ensuring that each one covers the cooler lid and side of the cooler. Place clear plastic tape over the custody seals.

9. Place address labels on the outside top of the cooler.

10. Ship samples overnight by a commercial carrier such as FedEx.

2.3 PACKAGING HAZARDOUS SAMPLES

The procedures for packaging hazardous samples are summarized below. Note that according to the DGR, all spellings must be exactly as they appear in the List of Dangerous Goods, and only approved abbreviations are acceptable. The corresponding HMR regulations are provided in parentheses following any DGR referrals. The HMR must be followed only if shipping hazardous samples by ground transport.

1. Determine the proper shipping name for the material to be shipped. All proper shipping names are listed in column B of the List of Dangerous Goods table in Section 4 of the DGR (or column 2 of the Hazardous Materials Table in 49 CFR 172.101). In most instances, a generic name based on the hazard class of the material is appropriate. For example, a sample of an oily liquid collected from a drum with a high photoionization detector (PID) reading should be packaged as a flammable liquid. The proper shipping name chosen for this sample would be “flammable liquid, n.o.s.” The abbreviation “n.o.s.” stands for “not otherwise specified” and is used for generic shipping names. Typically, a specific name, such as acetone, should be inserted in parentheses after most n.o.s. descriptions. However, a technical name is not required when shipping a sample for testing purposes and the components are not known. If shipping a hazardous substance (see definition), then the letters “RQ” must appear in front of the proper shipping name.

2. Determine the United Nations (UN) identification number, class or division, subsidiary risk if any, required hazard labels, packing group, and either passenger aircraft or cargo aircraft packing instructions based on the quantity of material being shipped in one

package. This information is provided in the List of Dangerous Goods (or Hazardous Materials Table in 49 CFR 172.101) under the appropriate proper shipping name. A "Y" in front of a packing instruction indicates a limited quantity packing instruction. If shipping dry ice or a limited quantity of a material, then UN specification shipping containers do not need to be used.

3. Determine the proper packaging required for shipping the samples. Except for limited quantity shipments and dry ice, these are UN specification packages that have been tested to meet the packing group of the material being shipped. Specific testing requirements of the packages is listed in Section 6 of the DGR (or 49 CFR 178 of the HMR). All UN packages are stamped with the appropriate UN specification marking. Prior planning is required to have the appropriate packages on hand during a sampling event where hazardous samples are anticipated. Most samples can be shipped in either a 4G fiberboard box, a 1A2 steel drum, or a 1H2 plastic drum. Drums can be purchased in 5- and 20-gallon sizes and are ideal for shipping multiple hazardous samples. When FedEx is used to ship samples containing PCBs, the samples must be shipped in an inner metal packaging (paint can) inside a 1A2 outer steel drum. This method of packaging PCB samples is in accordance with FedEx variation FX-06, listed in Section 2 of the DGR.

4. Place each sample jar in a separate resealable plastic bag. Some UN specification packagings contain the sample jar and plastic bag to be used when shipping the sample.

5. Place each sealed bag inside the approved UN specification container (or other appropriate container if a limited quantity or dry ice) and pack with enough noncombustible, absorbent, cushioning material (such as vermiculite) to prevent breakage and to absorb liquid.

6. Place chain-of-custody forms in a resealable plastic bag and either attach it to the inside lid of the container or place it on top inside the container. Place instructions for returning the container to the shipper on the inside lid of the container as appropriate. Close and seal the shipping container in the manner appropriate for the type of container being used.

7. Label and mark each package appropriately. All irrelevant markings and labels need to be removed or obliterated. All outer packagings must be marked with proper shipping name; identification number; and name, address, and phone numbers of the shipper and the recipient. For carbon dioxide, solid (dry ice), the net weight of the dry ice within the package needs to be marked on the outer package. For limited quantity shipments, the words "limited quantity" or "LTD. QTY." must be marked on the outer package. Affix the appropriate hazard label to the outer package. If the material being shipped contains a subsidiary hazard, then a subsidiary hazard label must also be affixed to the outer package. The subsidiary hazard label is identical to the primary hazard label except that the class or division number is not present. It is acceptable to obliterate the class or division marking on a primary hazard label and use it as the subsidiary hazard label. If using cargo aircraft only packing instructions, then the "Cargo Aircraft Only" label must be used. Package orientation labels (up arrows) must be placed on opposite sides of the outer package. Figure 1 depicts a properly marked and labeled package.

8. If using an overpack (see definition), mark and label the overpack and each outer packaging within the overpack as described in step 7. In addition, the statement "INNER PACKAGES COMPLY WITH PRESCRIBED SPECIFICATIONS" must be marked on the overpack.

9. Attach custody seals, and fill out the appropriate shipping papers as described in Section 2.4.

2.4 SHIPPING PAPERS FOR HAZARDOUS SAMPLES

A "Shippers Declaration for Dangerous Goods" and "Air Waybill" must be completed for each shipment of hazardous samples. Four copies of the Shipper's Declaration are required and it must be typed. FedEx supplies a Dangerous Goods Airbill to its customers; the airbill combines both the declaration and the waybill. An example of a completed Dangerous Goods Airbill is depicted in Figure 2. A shipper's declaration must contain the following:

- Name and address of shipper and recipient
- Air waybill number (not applicable to the HMR)
- Page ___ of ___
- Shipper's reference number (project number)
- Deletion of either "Passenger and Cargo Aircraft" or "Cargo Aircraft Only," whichever does not apply
- Airport or city of departure
- Airport or city of destination
- Deletion of either "Non-Radioactive" or "Radioactive," which ever does not apply
- The nature and quantity of dangerous goods. This includes the following information in the following order (obtained from the List of Dangerous Goods in the DGR): proper shipping name, class or division number, UN identification number, packing group number, subsidiary risk, quantity in liters or kilograms (kg), type of packaging used, packing instructions, authorizations, and additional handling information. Authorizations include the words "limited quantity" or "LTD. QTY." if shipping a limited quantity, any special provision numbers listed in the List of Dangerous Goods in the DGR, and the variation "USG-14" when a technical name is required after the proper shipping name but not entered because it is unknown.

- Signature for the certification statement
- Name and title of signatory
- Place and date of signing certification
- A 24-hour emergency response telephone number for use in the event of an incident involving the dangerous good
- Emergency response information attached to the shipper's declaration. This information can be in the form of a material safety data sheet or the applicable North American Emergency Response Guidebook (NAERG; DOT 1996) pages. Figure 3 depicts the appropriate NAERG emergency response information for "Flammable liquids, n.o.s." as an example.

Note that dry ice does not require an attached shipper's declaration. However, the air waybill must include the following on it: "Dry ice, 9, UN1845, ____ x ____ kg." The blanks must include the number of packages and the quantity in kg in each package. If using FedEx to ship dry ice, the air waybill includes a box specifically for dry ice. Simply check the appropriate box and enter in the number of packages and quantity in each package.

The HMR requirements for shipping papers are located in 49 CFR 172 Subpart C.

3.0 POTENTIAL PROBLEMS

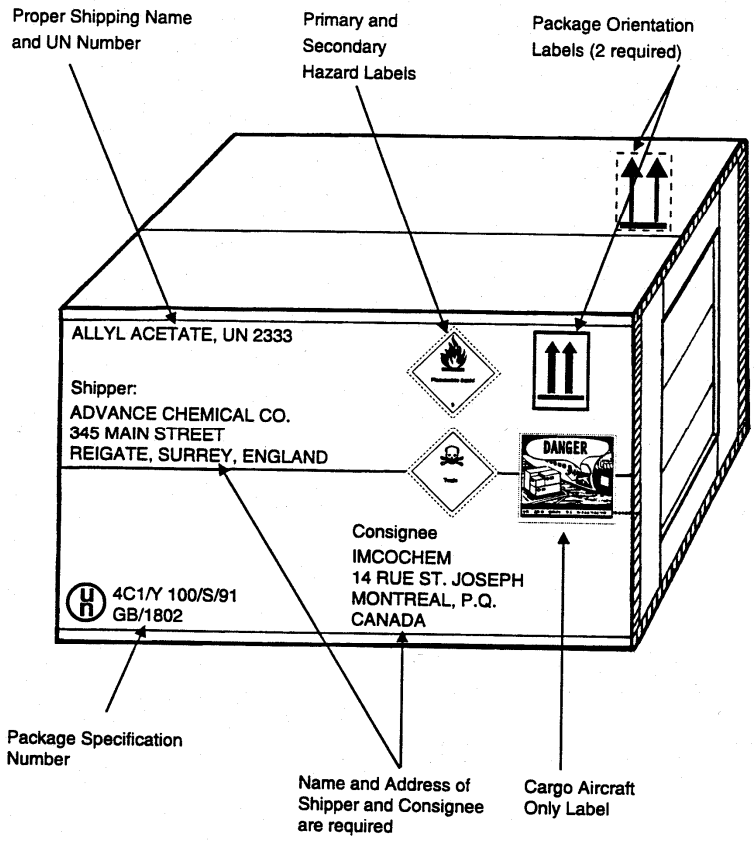
The following potential problems may occur during sample shipment:

- Leaking package. If a package leaks, the carrier may open the package, return the package, and if a dangerous good, inform the Federal Aviation Administration (FAA), which can result in fines.
- Improper labeling and marking of package. If mistakes are made in labeling and marking the package, the carrier will most likely notice the mistakes and return the package to the shipper, thus delaying sample shipment.
- Improper, misspelled, or missing information on the shipper's declaration. The carrier will most likely notice this as well and return the package to the shipper.

Contact FedEx with questions about dangerous goods shipments by calling 1-800-463-3339 and asking for a dangerous goods expert.

Also contact Tetra Tech health and safety representatives using the website identified on Page 3 of this SOP.

FIGURE 1
EXAMPLE OF A CORRECTLY MARKED AND LABELED DANGEROUS GOODS PACKAGE



Source: International Air Transport Association (IATA). 1997.

FIGURE 2

EXAMPLE OF A DANGEROUS GOODS AIRBILL

Filling Out the FedEx Dangerous Goods Airbill

- The Dangerous Goods Airbill has two sections
  - The top section of the page is the airbill portion.
  - The bottom section is the Shipper's Declaration for Dangerous Goods.
- The sender *must complete* the following fields on the pre-printed airbill:
  - Section 1: Date
  - Section 1: Sender's Name
  - Section 7: Total Packages
  - Section 7: Total Weight
- Declaration for Dangerous Goods:
  - Under the section labeled "Proper Shipping Name" fill in the infectious substance (i.e., HIV, HCV, etc.) in the parentheses.
  - Under the "Quantity and Type of Packing" section, fill in the amount of specimen in the box (in mls).
  - List an emergency telephone number in the space provided at the bottom of the airbill.
  - Sign and date the airbill in the bottom right corner.

IMPORTANT: You must follow explicitly all packaging and labeling instructions for shipping infectious substances. Correct spelling and legibility are important. Otherwise, your package will be delayed or may be rejected by FedEx.

FIGURE 3
NAERG EMERGENCY RESPONSE INFORMATION
FOR FLAMMABLE LIQUIDS, N.O.S.

GUIDE 128 FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE) NAERG96

POTENTIAL HAZARDS

FIRE OR EXPLOSION

- **HIGHLY FLAMMABLE: Will be easily ignited by heat, sparks or flames.**
- Vapors may form explosive mixtures with air.
- Vapors may travel to source of ignition and flash back.
- Most vapors are heavier than air. They will spread along ground and collect in low or confined areas (sewers, basements, tanks).
- Vapor explosion hazard indoors, outdoors or in sewers.
- Some may polymerize (P) explosively when heated or involved in a fire.
- Runoff to sewer may create fire or explosion hazard.
- Containers may explode when heated.
- Many liquids are lighter than water.
- Substance may be transported hot.

HEALTH

- Inhalation or contact with material may irritate or burn skin and eyes.
- Fire may produce irritating, corrosive and/or toxic gases.
- Vapors may cause dizziness or suffocation.
- Runoff from fire control or dilution water may cause pollution.

PUBLIC SAFETY

- **CALL Emergency Response Telephone Number on Shipping Paper first. If Shipping Paper not available or no answer, refer to appropriate telephone number listed on the inside back cover.**
- Isolate spill or leak area immediately for at least 25 to 50 meters (80 to 160 feet) in all directions.
- Keep unauthorized personnel away.
- Stay upwind.
- Keep out of low areas.
- Ventilate closed spaces before entering.

PROTECTIVE CLOTHING

- Wear positive pressure self-contained breathing apparatus (SCBA).
- Structural firefighters' protective clothing will only provide limited protection.

EVACUATION

Large Spill

- Consider initial downwind evacuation for at least 300 meters (1000 feet).

Fire

- If tank, rail car or tank truck is involved in a fire, ISOLATE for 800 meters (1/2 mile) in all directions; also, consider initial evacuation for 800 meters (1/2 mile) in all directions.

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NAERG96 FLAMMABLE LIQUIDS (NON-POLAR/WATER-IMMISCIBLE) GUIDE 128

EMERGENCY RESPONSE

FIRE

CAUTION: All these products have a very low flash point: Use of water spray when fighting fire may be inefficient.

Small Fires

- Dry chemical, CO_2, water spray or regular foam.

Large Fires

- Water spray, fog or regular foam.
- Do not use straight streams.
- Move containers from fire area if you can do it without risk.

Fire involving Tanks or Car/Trailer Loads

- Fight fire from maximum distance or use unmanned hose holders or monitor nozzles.
- Cool containers with flooding quantities of water until well after fire is out.
- Withdraw immediately in case of rising sound from venting safety devices or discoloration of tank.
- ALWAYS stay away from the ends of tanks.
- For massive fire, use unmanned hose holders or monitor nozzles; if this is impossible, withdraw from area and let fire burn.

SPILL OR LEAK

- ELIMINATE all ignition sources (no smoking, flares, sparks or flames in immediate area).
- All equipment used when handling the product must be grounded.
- Do not touch or walk through spilled material.
- Stop leak if you can do it without risk.
- Prevent entry into waterways, sewers, basements or confined areas.
- A vapor suppressing foam may be used to reduce vapors.
- Absorb or cover with dry earth, sand or other non-combustible material and transfer to containers.
- Use clean non-sparking tools to collect absorbed material.

Large Spills

- Dike far ahead of liquid spill for later disposal.
- Water spray may reduce vapor; but may not prevent ignition in closed spaces.

FIRST AID

- Move victim to fresh air. • Call emergency medical care.
- Apply artificial respiration if victim is not breathing.
- Administer oxygen if breathing is difficult.
- Remove and isolate contaminated clothing and shoes.
- In case of contact with substance, immediately flush skin or eyes with running water for at least 20 minutes.
- Wash skin with soap and water.
- Keep victim warm and quiet.
- Ensure that medical personnel are aware of the material(s) involved, and take precautions to protect themselves.

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Source: DOT and others. 1996.

SOP APPROVAL FORM

TETRA TECH EM INC.

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

MONITORING WELL INSTALLATION

SOP NO. 020

REVISION NO. 3

Last Reviewed: December 2000

	December 19, 2000
Quality Assurance Approved	Date

1.0 BACKGROUND

Groundwater monitoring wells are designed and installed for a variety of reasons including: (1) detecting the presence or absence of contaminants, (2) collecting groundwater samples representative of in situ aquifer chemical characteristics, or (3) measuring water levels for determining groundwater potentiometric head and groundwater flow direction.

Although detailed specifications for well installation may vary in response to site-specific conditions, some elements of well installation are common to most situations. This standard operating procedure (SOP) discusses common methods and minimum standards for monitoring well installation for Tetra Tech EM Inc. (Tetra Tech) projects. The SOP is based on widely recognized methods described by the U.S. Environmental Protection Agency (EPA) and American Society for Testing and Materials (ASTM). However, well type, well construction, and well installation methods will vary with drilling method, intended well use, subsurface characteristics, and other site-specific criteria. In addition, monitoring wells should be constructed and installed in a manner consistent with all local and state regulations. Detailed specifications for well installation should be identified within a site-specific work plan, sampling plan, or quality assurance project plan (QAPP).

General specifications and installation procedures for the following monitoring well components are included in this SOP:

- Monitoring well materials
  - Casing materials
  - Well screen materials
  - Filter pack materials
  - Annular sealant (bentonite pellets or chips)
  - Grouting materials
  - Tremie pipe
  - Surface completion and protective casing materials
  - Concrete surface pad and bumper posts
  - Uncontaminated water
- Monitoring well installation procedures
  - Well screen and riser placement
  - Filter pack placement
  - Temporary casing retrieval

  - Annular seal placement
  - Grouting
  - Surface completion and protective casing (aboveground and flush-mount)
  - Concrete surface pad and bumper posts
  - Permanent and multiple casing well installation

- Recordkeeping procedures
  - Surveying
  - Permits and well construction records
  - Monitoring well identification

Well installation methods will depend to some extent on the boring method. Specific boring or drilling protocols are detailed in other SOPs. The boring method, in turn, will depend on site-specific geology and hydrogeology and project requirements. Boring methods commonly used for well installation include:

- Hollow-stem augering
- Cable tool drilling
- Mud rotary drilling
- Air rotary drilling
- Rock coring

The hollow-stem auger method is preferred in areas where subsurface materials are unconsolidated or loosely consolidated and where the depth of the boring will be less than 100 feet. This maximum effective depth for hollow-stem augering depends on the diameter of the augers, the formation characteristics, and the strength and durability of the drilling equipment. This method is preferred because under the right conditions it is cost effective, addition of water into the subsurface is limited, continuous soil samples can easily be collected, and monitoring wells can easily be constructed within the hollow augers.

Cable tool drilling is a preferred method when the subsurface contains boulders, coarse gravels, or flowing sands, or when the operational depth of the hollow-stem auger is exceeded. However, this method is slow.

Rotary methods are generally used when other methods cannot be used. The use of drilling fluids or large amounts of water to maintain an open borehole, and the difficulty in obtaining representative samples limit the utility of rotary methods. However, rotary methods can be used to quickly and effectively drill deep wells through consolidated or unconsolidated materials. Modifications to this method such as dual-tube

drilling procedures, drill-through casing hammers, or eccentric-type drill systems, can reduce the amount of fluids introduced into the well borehole.

Rock coring is an effective method when drilling in competent consolidated rock. Intact, continuous cores can be obtained, and limited amounts of fluid are required if the formations are not fractured.

1.1 PURPOSE

This SOP establishes the requirements and procedures for monitoring well installation. Monitoring wells should be designed to function properly throughout the duration of the monitoring program. The performance objectives for monitoring well installation are as follows:

- Ensure that the monitoring well will provide water samples representative of in situ aquifer conditions.
- Ensure that the monitoring well construction will last for duration of the project.
- Ensure that the monitoring well will not serve as a conduit for vertical migration of contaminants, particularly vertical migration between discrete aquifers.
- Ensure that the well diameter is adequate for all anticipated downhole monitoring and sampling equipment.

1.2 SCOPE

This SOP applies to the installation of monitoring wells. Although some of the procedures may apply to the installation of water supply wells, this SOP is not intended to cover the design and construction of such wells. The SOP identifies several well drilling methods related to monitoring well installation, but the scope of this SOP does not include drilling methods.

Other relevant SOPs include SOP 002 for decontamination of drilling and well installation equipment, SOP 005 for soil sampling, SOP 021 for monitoring well development, SOPs 010 and 015 for groundwater sampling from monitoring wells, and SOP 014 for measuring static water levels within monitoring wells.

1.3 DEFINITIONS

Annulus: The space between the monitoring well casing and the wall of the well boring.

Bentonite seal: A colloidal clay seal separating the sand pack from the annular grout seal.

Centralizer: A stainless-steel or plastic spacer that keeps the well screen and casing centered in the borehole.

Filter pack: A clean, uniform sand or gravel placed between the borehole wall and the well screen to prevent formation material from entering the screen.

Grout seal: A fluid mixture of (1) bentonite and water, (2) cement, bentonite, and water, or (3) cement and water placed above the bentonite seal between the casing and the borehole wall to secure the casing in place and keep water from entering the borehole.

Tremie pipe: A rigid pipe used to place the well filter pack, bentonite seal, or grout seal. The tremie pipe is lowered to the bottom of the well or area to be filled and pulled up ahead of the material being placed.

Well casing: A solid piece of pipe, typically polyvinyl chloride (PVC) or stainless steel, used to keep a well open in either unconsolidated material or unstable rock.

Well screen: A PVC or stainless steel pipe with openings of a uniform width, orientation, and spacing used to keep materials other than water from entering the well and to stabilize the surrounding formation.

1.4 REFERENCES

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1.5 REQUIREMENTS AND RESOURCES

Well installation requires a completed boring with stable or supported walls. The type of drilling rig needed to complete the boring and the well construction materials required for monitoring well installation will depend on the drilling method used, the geologic formations present, and chemicals of concern in groundwater. The rig and support equipment used to drill the borehole is usually used to install the well. Under most conditions, the following items are also required for the proper installation of monitoring wells:

- Tremie pipe and funnel
- Bentonite pellets or chips
- Grouting supplies
- Casing materials
- Well screen materials
- Filter pack materials
- Surface completion materials (protective casing, lockable and watertight well cover, padlock)
- Electronic water level sounding device for water level measurement
- Measuring tape with weight for measuring the depth of the well and determining the placement of filter pack materials
- Decontamination equipment and supplies

- Site-specific work plan, field sampling plan, health and safety plan, and QAPP
- Monitoring Well Completion Record (see Figure 1)

2.0 MONITORING WELL INSTALLATION PROCEDURES

This section presents standard procedures for monitoring well installation and is divided into three subsections. Section 2.1 addresses monitoring well construction materials, while Section 2.2 describes typical monitoring well installation procedures. Section 2.3 addresses recordkeeping requirements associated with monitoring well installation. Monitoring well installation procedures described in work plans, sampling plans, and QAPPs should be fully consistent with the procedures outlined in this SOP as well as any applicable local and state regulations and guidelines.

2.1 MONITORING WELL CONSTRUCTION MATERIALS

Monitoring well construction materials should be specified in the site-specific work plan as well as in the statement of work for any subcontractors assisting in the well installation. Well construction materials that come in contact with groundwater should not measurably alter the chemical quality of groundwater samples with regard to the constituents being examined. The riser, well screen, and filter pack and annular sealant placement equipment should be steam cleaned or high-pressure water cleaned immediately prior to well installation. Alternatively, these materials can be certified by the manufacturer as clean and delivered to the site in protective wrapping. Samples of the filter pack, annular seal, and mixed grout should be retained as a quality control measure until at least one round of groundwater sampling and analysis is completed.

This section discusses material specifications for the following well construction components: casing, well screen, filter pack, annular sealant (bentonite pellets or chips), grout, tremie pipes, surface completion components (protective casing, lockable and water tight cap, and padlock), concrete surface pad, and uncontaminated water. Figure 2 shows the construction details of a typical monitoring well.

2.1.1 Casing Materials

The material type and minimum wall thickness of the casing should be adequate to withstand the forces of installation. If the casing has not been certified as clean by the manufacturer or delivered to and maintained in clean condition at the site, the casing should be steam cleaned or high-pressure water cleaned with water from a source of known chemistry immediately prior to installation (see Tetra Tech SOP No. 002). The ends of each casing section should be either flush-threaded or beveled for welding.

Schedule 40 or Schedule 80 PVC casing is typically used for monitoring well installation. Either type of casing is appropriate for monitoring wells with depths less than 100 feet below ground surface (bgs). If the well is deeper than 100 feet bgs, Schedule 80 PVC should be used.

Stainless steel used for well casing is typically Type 304 and is of 11-gauge thickness.

2.1.2 Well Screen Materials

Well screens should be new, machine-slotted or continuous wrapped wire-wound, and composed of materials most suited for the monitoring environment based on site characterization findings. Well screens are generally constructed of the same materials used for well casing (PVC or stainless steel). The screen should be plugged at the bottom with the same material as the well screen. Alternatively, a short (1- to 2-foot) section of casing material with a bottom (sump) should be attached below the screen. This assembly must be able to withstand installation and development stresses without becoming dislodged or damaged. The length of the slotted area should reflect the interval to be monitored.

If the well screen has not been certified as clean by the manufacturer or delivered to and maintained in clean condition at the site, the screen should be steam cleaned or high-pressure water cleaned with water from a source of known chemistry immediately prior to installation (see Tetra Tech SOP No. 002).

The minimum internal diameter of the well screen should be chosen based on the particular application. A minimum diameter of 2 inches is usually needed to allow for the introduction and withdrawal of sampling devices. Typical monitoring well screen diameters are 2 inches and 4 inches.

The slot size of the well screen should be determined relative to (1) the grain size of particles in the aquifer to be monitored and (2) the gradation of the filter pack material.

Screen length and monitoring well diameter will depend on site-specific considerations such as intended well use, contaminants of concern, and hydrogeology. Some specific considerations include the following:

- Water table wells should have screens of sufficient length and diameter to monitor the water table and provide sufficient sample volume under high and low water table conditions.
- Wells with low recharge should have screens of sufficient length and diameter so that adequate sample volume can be collected.
- Wells should be screened over sufficiently short intervals to allow for monitoring of discrete migration pathways.
- Where light nonaqueous-phase liquids (LNAPL) or contaminants in the upper portion of a hydraulic unit are being monitored, the screen should be set so that the upper portion of the water-bearing zone is below the top of the screen.
- Where dense nonaqueous-phase liquids (DNAPL) are being monitored, the screen should be set within the lower portion of the water-bearing zone, just above a relatively impermeable lithologic unit.
- The screened interval should not extend across an aquiclude or aquitard.
- If contamination is known to be concentrated within a portion of a saturated zone, the screen should be constructed in a manner that minimizes the potential for cross-contamination within the aquifer.
- If downhole geophysical surveys are to be conducted, the casing and screen must be of sufficient diameter and constructed of the appropriate material to allow for effective use of the geophysical survey tools.
- If aquifer tests are to be conducted in a monitoring well, the slot size must allow sufficient flux to produce the required drawdown and recovery. The diameter of the well must be sufficient to house the pump and monitoring equipment, and allow sufficient water flux (in combination with the screen slot size) to produce the required drawdown or recovery.

2.1.3 Filter Pack Materials

The primary filter pack consists of a granular material of known chemistry and selected grain size and gradation. The filter pack is installed in the annulus between the well screen and the borehole wall. The grain size and gradation of the filter pack are selected to stabilize the hydrologic unit adjacent to the screen and to prevent formation material from entering the well during development. After development, a properly filtered monitoring well is relatively free of turbidity.

A secondary filter pack is a layer of material placed in the annulus directly above the primary filter pack and separates the filter pack from the annular sealant. The secondary filter pack should be uniformly graded fine sand, with 100 percent by weight passing through a No. 30 U.S. Standard sieve, and less than 2 percent by weight passing through a No. 200 U.S. Standard sieve.

2.1.4 Annular Sealant (Bentonite Pellets or Chips)

The materials used to seal the annulus may be prepared as a slurry or used as dry pellets, granules, or chips. Sealants should be compatible with ambient geologic, hydrogeologic, and climatic conditions and any man-induced conditions anticipated to occur during the life of the well.

Bentonite (sodium montmorillonite) is the most commonly used annular sealant and is furnished in sacks or buckets in powder, granular, pelletized, or chip form. Bentonite should be obtained from a commercial source and should be free of impurities that may adversely impact the water quality in the well. Pellets are compressed bentonite powder in roughly spherical or disk shapes. Chips are large, coarse, irregularly shaped units of bentonite. The diameter of the pellets or chips should be less than one-fifth the width of the annular space into which they will be placed in order to reduce the potential for bridging. Granules consist of coarse particles of unaltered bentonite, typically smaller than 0.2 inch in diameter. Bentonite slurry is prepared by mixing powdered or granular bentonite with water from a source of known chemistry.

2.1.5 Grouting Materials

The grout backfill that is placed above the bentonite annular seal is ordinarily liquid slurry consisting of either (1) a bentonite (powder, granules, or both) base and water, (2) a bentonite and Portland cement base and water, or (3) a Portland cement base and water. Often, bentonite-based grouts are used when flexibility is desired during the life of the well installation (for example, to accommodate freeze-thaw cycles). Cement- or bentonite-based grouts are often used when cracks in the surrounding geologic material must be filled or when adherence to rock units, or a rigid setting is desired.

Each type of grout mixture has slightly different characteristics that may be appropriate under various physical and chemical conditions. However, quick-setting cements containing additives are not recommended for use in monitoring well installation because additives may leach from the cement and influence the chemistry of water samples collected from the well.

2.1.6 Tremie Pipe

A tremie pipe is used to place the filter pack, annular sealant, and grouting materials into the borehole. The tremie pipe should be rigid, have a minimum internal diameter of 1.0 inch, and be made of PVC or steel. The length of the tremie pipe should be sufficient to extend to the full depth of the monitoring well.

2.1.7 Surface Completion and Protective Casing Materials

Protective casings that extend above the ground surface should be made of aluminum, steel, stainless steel, cast iron, or a structural plastic. The protective casing should have a lid with a locking device to prevent vandalism. Sufficient clearance, usually 6 inches, should be maintained between the top of the riser and the top of protective casing. A water-tight well cap should be placed on the top of the riser to seal the well from surface water infiltration in the event of a flood. A weep hole should be drilled in the casing a minimum of 6 inches above the ground surface to enable water to drain out of the annular space.

Flush-mounted monitoring wells (wells that do not extend above ground surface) require a water-tight protective cover of sufficient strength to withstand heavy traffic. The well riser should be fitted with a locking water-tight cap.

2.1.8 Concrete Surface Pad and Bumper Posts

A concrete surface pad should be installed around each well when the outer protective casing is installed. The surface pad should be formed around the well casing. Concrete should be placed into the formed pad and into the borehole (on top of the grout), typically to a depth of 1 to 3 feet bgs (depending on state, federal, and local regulations). The protective casing is then installed into the concrete. As a general guideline, if the well casing is 2 inches in diameter, the concrete pad should be 3 feet square and 4 inches thick. If the well casing is 4 inches in diameter, the pad should be 4 feet square and 6 inches thick. Round concrete pads are also acceptable.

The finished pad should be sloped so that drainage flows away from the protective casing and off the pad. The finished pad should extend at least 1 inch below grade. If the monitoring wells are located in high traffic areas, a minimum of three bumper posts should be installed around the pad to protect the well. Bumper posts, consisting of steel pipes 3 to 4 inches in diameter and at least 5 feet long, should be installed in a radial pattern around the protective casing, beyond the edges of the cement pad. The base of the bumper posts should be installed 2 feet bgs in a concrete footing; the top of the post should be capped or filled with concrete.

2.1.9 Uncontaminated Water

Water used in the drilling process, to prepare grout mixtures, and to decontaminate the well screen, riser, and annular sealant injection equipment, should be obtained from a source of known chemistry. The water should not contain constituents that could compromise the integrity of the monitoring well installation.

2.2 MONITORING WELL INSTALLATION PROCEDURES

This section describes the procedures used to install a single-cased monitoring well, with either temporary casing or hollow-stem augers to support the walls of the boring in unconsolidated formations. The procedures are described in the order in which they are conducted, and include: (1) placement of well screen and riser pipe, (2) placement of filter pack, (3) progressive retrieval of temporary casing, (4) placement of annular seal, (5) grouting, (6) surface completion and installation of protective casing, and (7) installation of concrete pad and bumper posts.

The additional steps necessary to install a well with permanent or multiple casing strings are described at the end of this section.

2.2.1 Well Screen and Riser Placement

After the total depth of the boring is confirmed and the well screen depth interval and the height of the aboveground completion are determined, the screen and riser is assembled from the bottom up as it is lowered down the hole. The following procedures should be followed:

1. Measure the total depth of the boring using a weighted tape.
2. Determine the length of screen and casing materials required to construct the well.
3. Assemble the well parts from the bottom up, starting with the well sump or cap, well screen, and then riser pipe. Progressively lower the assembled length of pipe.
4. The length of the assembled pipe should not extend above the top of the installation rig.

The well sump or cap, well screen, and riser should be certified clean by the manufacturer or should be decontaminated before assembly and installation. No grease, oil, or other contaminants should contact any portion of the assembly. Flush joints should be tightened, and welds should be water tight and of good quality. The riser should extend above grade and be capped temporarily to prevent entrance of foreign materials during the remaining well completion procedures.

When the well screen and riser assembly is lowered to the predetermined level, it may float and require a method to hold it in place. For borings drilled using cable tool or air rotary drilling methods, centralizers should be attached to the riser at intervals of between 20 and 40 feet.

2.2.2 Filter Pack Placement

The filter pack is placed after the well screen and riser assembly has been lowered into the borehole. The steps below should be followed:

1. Determine the volume of the annular space in the filter pack interval. The filter pack should extend from the bottom of the borehole to at least 2 feet above the top of the well screen.

2. Assemble the required material (sand pack and tremie pipe).

3. Lower a clean or decontaminated tremie pipe down the annulus to within 1 foot of the base of the hole.

4. Pour the sand down the tremie pipe using a funnel; pour only the quantity estimated to fill the first foot.

5. Check the depth of sand in the hole using a weighted tape.

6. Pull the drill casing up ahead of the sand to keep the sand from bridging.

7. Continue with this process (steps 4 through 6) until the filter pack is at the appropriate depth.

If bridging of the filter pack occurs, break out the bridge prior to adding additional filter pack material. For wells less than 30 feet deep installed inside hollow-stem augers, the sand may be poured in 1-foot lifts without a tremie pipe.

Sufficient measurements of the depth to the filter pack material and the depth of the bottom of the temporary casing should be made to ensure that the casing bottom is always above the filter pack. The filter pack should extend 2 feet above the well screen (or more if required by state or local regulations). However, the filter pack should not extend across separate hydrogeologic units. The final depth interval, volume, and type of filter pack should be recorded on the Monitoring Well Completion Record (Figure 1).

A secondary filter pack may be installed above the primary filter pack to prevent the intrusion of the bentonite grout seal into the primary filter pack. A measured volume of secondary filter material should be added to extend 1 to 2 feet above the primary filter pack. As with the primary filter pack, a secondary filter pack must not extend into an overlying hydrologic unit. An on-site geologist should evaluate the need for a secondary filter pack by considering the gradation of the primary filter pack, the hydraulic head difference between adjacent units, and the potential for grout intrusion into the primary filter pack.

The secondary filter material is poured into the annular space through tremie pipe as described above. Water from a source of known chemistry may be added to help place the filter pack into its proper location.

The tremie pipe or a weighed line inserted through the tremie pipe can be used to measure the top of the secondary filter pack as work progresses. The amount and type of secondary filter pack used should be recorded on the Monitoring Well Completion Record (Figure 1).

2.2.3 Temporary Casing Retrieval

The temporary casing or hollow-stem auger should be withdrawn in increments. Care should be taken to minimize lifting the well screen and riser assembly during withdrawal of the temporary casing or auger. It may be necessary to place the top head of the rig on the riser to hold it down. To limit borehole collapse in formations consisting of unconsolidated materials, the temporary casing or hollow-stem auger is usually withdrawn until the lowest point of the casing or auger is at least 2 feet, but no more than 5 feet, above the filter pack. When the geologic formation consists of consolidated materials, the lowest point of the casing or auger should be at least 5 feet, but no more than 10 feet, above the filter pack. In highly unstable formations, withdrawal intervals may be much less. After each increment, the depth to the primary filter pack should be measured to check that the borehole has not collapsed or that bridging has not occurred.

2.2.4 Annular Seal Placement

A bentonite pellet, chip, or slurry seal should be placed between the borehole and the riser on top of the primary or secondary filter pack. This seal retards the movement of grout into the filter pack. The thickness of the bentonite seal will depend on state and local regulations, but the seal should generally be between 3 and 5 feet thick.

The bentonite seal should be installed using a tremie pipe, lowered to the top of the filter pack and slowly raised as the bentonite pellets or slurry fill the space. Care must be taken so that bentonite pellets or chips do not bridge in the augers or tremie pipe. The depth of the seal should be checked with a weighted tape or the tremie pipe.

If a bentonite pellet or chip seal is installed above the water level, water from a known source should be added to allow proper hydration of the bentonite. Sufficient time should be allowed for the bentonite seal to hydrate. The volume and thickness of the bentonite seal should be recorded on the Monitoring Well Completion Record (Figure 1).

2.2.5 Grouting

Grouting procedures vary with the type of well design. The volume of grout needed to backfill the remaining annular space should be calculated and recorded on the Monitoring Well Completion Record (Figure 1). The use of alternate grout materials, including grouts containing gravel, may be necessary to control zones of high grout loss. Bentonite grouts should not be used in arid regions because of their propensity to desiccate. Typical grout mixtures include the following:

- Bentonite grout: about 1 to 1.25 pounds of bentonite mixed with 1 gallon of water
- Cement-bentonite grout: about 5 pounds of bentonite and one 94-pound bag of cement mixed with 7 to 8 gallons of water
- Cement grout: one 94-pound bag of cement mixed with 6 to 7 gallons of water

The grout should be installed by gravity feed through a tremie pipe. The grout should be mixed in batches in accordance with the appropriate requirements and then pumped into the annular space until full-strength grout flows out at the ground surface without evidence of drill cuttings or fluid. The tremie pipe should then be removed to allow the grout to cure.

The riser should not be disturbed until the grout sets and cures for the amount of time necessary to prevent a break in the seal between the grout and riser. For bentonite grouts, curing times are typically around 24 hours; curing times for cement grouts are typically 48 to 72 hours. However, the curing time required will vary with grout content and climatic conditions. The curing time should be documented in the Monitoring Well Completion Record (Figure 1).

2.2.6 Surface Completion and Protective Casing

Aboveground completion of the monitoring well should begin once the grout has set (no sooner than 24 hours after the grout was placed). The protective casing is lowered over the riser and set into the cured grout. The protective casing should extend below the ground surface to a depth below the frost line (typically 3 to 5 feet, depending on local conditions). The protective casing is then cemented in place. A minimum of 6 inches of clearance should be maintained between the top of the riser and the protective casing. A 0.5-inch diameter drainage or weep hole should be drilled in the protective casing approximately

6 inches above the ground surface to enable water to drain out of the annular space between the casing and riser. A water-tight cap should be placed on top of the riser to seal the well from surface water infiltration in the event of a flood. A lock should be placed on the protective casing to prevent vandalism.

For flush-mounted monitoring wells, the well cover should be raised above grade and the surrounding concrete pad sloped so that water drains away from the cover. The flush-mount completion should be installed in accordance with applicable state and local regulations.

2.2.7 Concrete Surface Pad and Bumper Posts

The concrete pad installed around the monitoring well should be sloped so that the drainage will flow away from the protective casing and off the pad. The finished pad should extend at least 1 inch below grade. If the monitoring wells are located in high traffic areas, a minimum of three bumper posts should be installed in a radial pattern around the protective casing, outside the cement pad. Specifications for concrete surface pads and bumper posts are described in Section 2.1.8.

2.2.8 Permanent and Multiple Casing Well Installation

When wells are installed through multiple saturated zones, special well construction methods should be used to assure well integrity and limit the potential for cross-contamination between geologic zones. Generally, these types of wells are necessary if relatively impermeable layers separate hydraulic units. Two procedures that may be used are described below.

In the first procedure, the borehole is advanced to the base of the first saturated zone. Casing is then anchored in the underlying impermeable layer (aquitard) by advancing the casing at least 1 foot into the aquitard and grouting to the surface. After the grout has cured, a smaller diameter borehole is drilled through the grout. This procedure is repeated until the zone of interest is reached. After the zone is reached, a conventional well screen and riser are set. A typical well constructed in this manner is shown on Figure 3.

A second acceptable procedure involves driving a casing through several saturated layers

while drilling ahead of the casing. However, this method is not acceptable when the driven casing may structurally damage a competent aquitard or aquiclude and result in cross-contamination of the two saturated layers. This method should also be avoided when highly contaminated groundwater or nonaqueous-phase contamination may be dragged down into underlying uncontaminated hydrologic units.

2.3 RECORDKEEPING PROCEDURES

Recordkeeping procedures associated with monitoring well installation are described in the following sections. These include procedures for surveying, obtaining permits, completing well construction records, and identifying monitoring wells.

2.3.1 Surveying

Latitude, longitude, and elevation at the top of the riser should be determined for each monitoring well. A permanent notch or black mark should be made on the north side of the riser. The top of the riser and ground surface should be surveyed.

2.3.2 Permits and Well Construction Records

Local and state regulations should be reviewed prior to monitoring well installation, and any required well permits should be in-hand before the driller is scheduled.

Monitoring well installation activities should be documented in both the field logbook and on the Monitoring Well Completion Record (Figure 1). Geologic logs should be completed and, if necessary, filed with the appropriate regulatory agency within the appropriate time frame.

2.3.3 Monitoring Well Identification

Each monitoring well should have an individual well identification number or name. The well identification may be stamped in the metal surface upon completion or permanently marked by using another method. Current state and local regulations should be checked for identification requirements (such as township, range, section, or other identifiers in the well name).

FIGURE 1

MONITORING WELL COMPLETION RECORD

TETRATECH EM INC

MONITORING WELL COMPLETION RECORD

MONITORING WELL
MONITORING WELL NO.: _____
PROJECT: _____
SITE: _____
BOREHOLE NO.: _____
WELL PERMIT NO.: _____
TOC TO BOTTOM OF WELL: _____

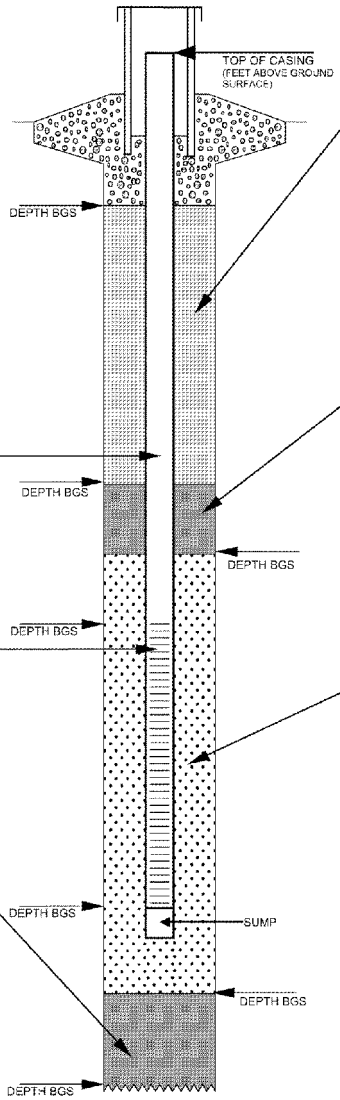
DRILLING INFORMATION
DRILLING BEGAN:
DATE: _____ TIME: _____
WELL INSTALLATION BEGAN:
DATE: _____ TIME: _____
WELL INSTALLATION FINISHED:
DATE: _____ TIME: _____
DRILLING CO.: _____
DRILLER: _____
LICENSE: _____
DRILL RIG: _____
DRILLING METHOD:
❑ HOLLOW-STEM AUGER
❑ AIR ROTARY
❑ OTHER: _____
DIAMETER OF AUGERS:
ID: _____ OD: _____

WELL CASING
❑ SCHEDULE 40 PVC
❑ OTHER: _____
PRODUCT: _____
MFG. BY: _____
CASING DIAMETER:
ID: _____ OD: _____
LENGTH OF CASING: _____

WELL SCREEN
❑ SCHEDULE 40 PVC
❑ OTHER: _____
PRODUCT: _____
MFG. BY: _____
CASING DIAMETER:
ID: _____ OD: _____
SLOT SIZE: _____
LENGTH OF SCREEN: _____

BOREHOLE BACKFILL
AMOUNT CALCULATED: _____
AMOUNT USED: _____
❑ BENTONITE CHIPS, SIZE: _____
❑ BENTONITE PELLETS, SIZE: _____
❑ SLURRY: _____
❑ FORMATION COLLAPSE: _____
❑ OTHER: _____
PRODUCT: _____
MFG. BY: _____
METHOD INSTALLED:
❑ POURED ❑ TREMIE
❑ OTHER: _____

SURFACE COMPLETION
❑ FLUSH MOUNT
❑ ABOVE GROUND WITH BUMPER POST
❑ CONCRETE ❑ ASPHALT



SURVEY INFORMATION
TOC ELEVATION: _____
GROUND SURFACE ELEVATION: _____
NORTHING: _____
EASTING: _____
DATE SURVEYED: _____
SURVEY CO.: _____

ANNULAR SEAL
VOLUME CALCULATED: _____
AMOUNT USED: _____
❑ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT: _____
BENTONITE: _____
WATER: _____
❑ PREPARED MIX
PRODUCT: _____
MFG. BY: _____
METHOD INSTALLED:
❑ POURED ❑ TREMIE
❑ OTHER: _____

BENTONITE SEAL
VOLUME CALCULATED: _____
AMOUNT USED: _____
❑ PELLETS, SIZE: _____
❑ CHIPS, SIZE: _____
❑ OTHER: _____
PRODUCT: _____
MFG. BY: _____
METHOD INSTALLED:
❑ POURED ❑ TREMIE
❑ OTHER: _____
AMOUNT OF WATER USED: _____

FILTER PACK
❑ PREPACKED FILTER
VOLUME CALCULATED: _____
AMOUNT USED: _____
❑ SAND, SIZE: _____
PRODUCT: _____
MFG. BY: _____
METHOD INSTALLED:
❑ POURED ❑ TREMIE
❑ OTHER: _____
WATER LEVEL: _____
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?
❑ YES ❑ NO;
CENTRALIZER DEPTHS: _____ _____

LEGEND
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING
ID = INSIDE DIAMETER
OD = OUTSIDE DIAMETER

FIGURE 2

MONITORING WELL CONSTRUCTION DIAGRAM

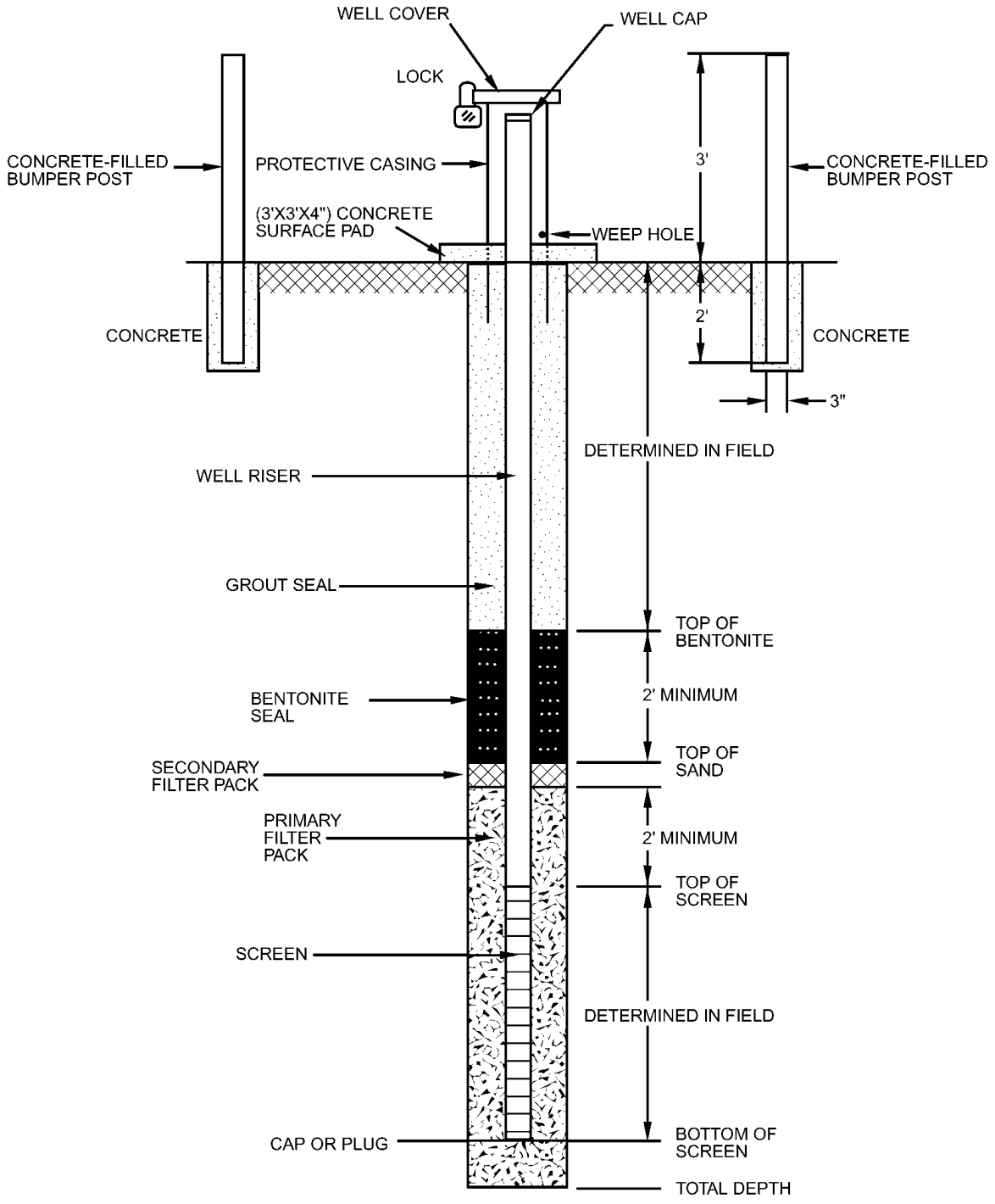
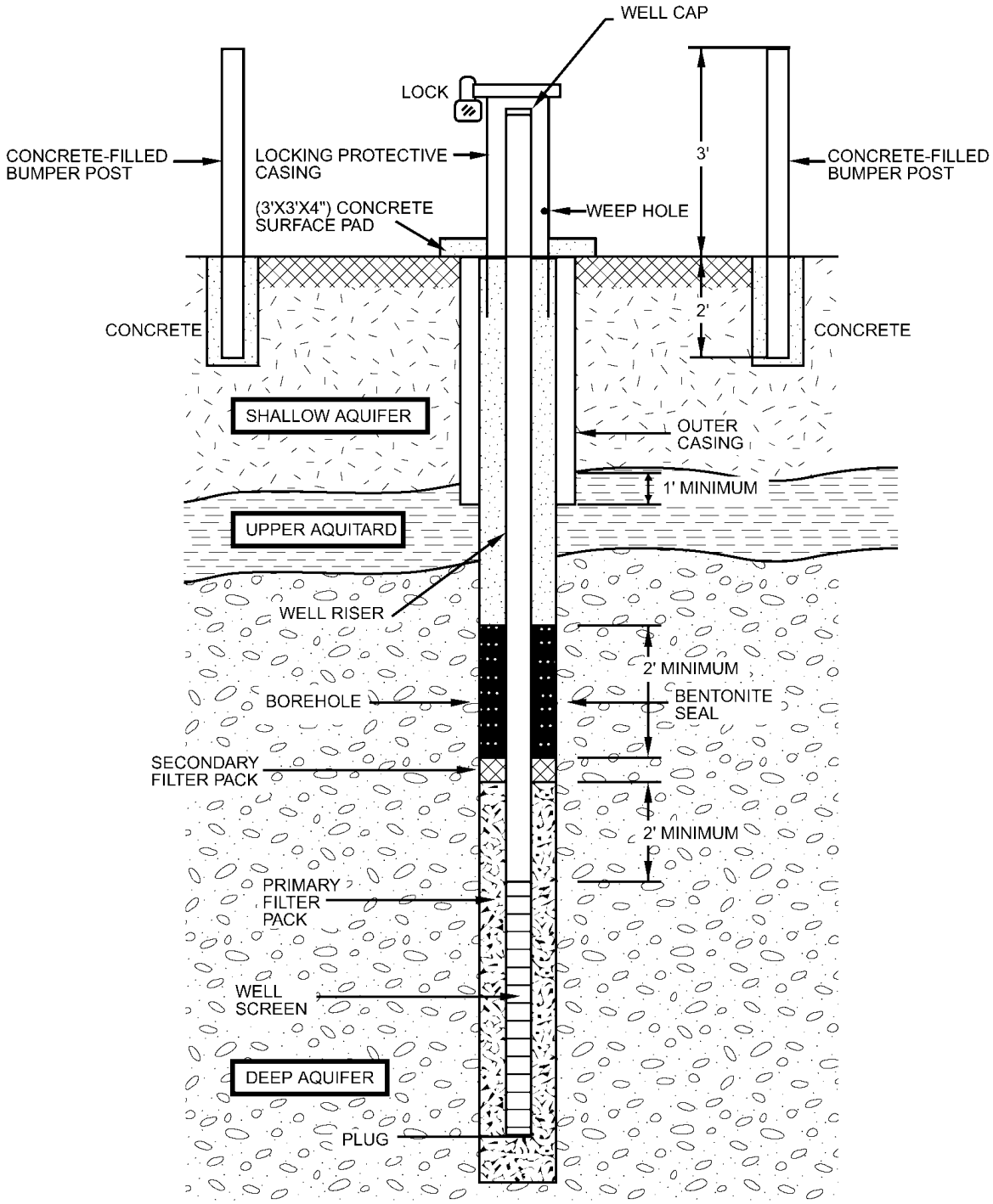


FIGURE 3

MULTIPLE CASING WELL CONSTRUCTION DIAGRAM



SOP APPROVAL FORM

TETRA TECH EM INC.

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

MONITORING WELL DEVELOPMENT

SOP NO. 021

REVISION NO. 3

Last Reviewed: October 2000

	October 5, 2000
Quality Assurance Approved	Date

1.0 BACKGROUND

All drilling methods impair the ability of an aquifer to transmit water to a drilled hole. This impairment is typically a result of disturbance of soil grains (smearing) or the invasion of drilling fluids or solids into the aquifer during the drilling process. The impact to the hydrologic unit surrounding the borehole must be remediated so that the well hydraulics and samples collected from the monitoring well are representative of the aquifer.

Well development should be conducted as an integral step of monitoring well installation to remove the finer-grained material, typically clay and silt, from the geologic formation near the well screen and filter pack. (Monitoring well installation is discussed in standard operating procedure [SOP] No. 020.) The fine-grained particles may interfere with water quality analyses and alter the hydraulic characteristics of the filter pack and the hydraulic unit adjacent to the well screen. Well development improves the hydraulic connection between water in the well and water in the formation. The most common well development methods are surging, jetting, overpumping, and bailing.

The health and safety plan for the site should be followed to avoid exposure to chemicals of concern. Water, sediment, and other waste removed from a monitoring well should be disposed of in accordance with applicable federal, state, and local requirements.

1.1 PURPOSE

This SOP establishes the requirements and procedure for monitoring well development. Well development improves the hydraulic characteristics of the filter pack and borehole wall by performing the following functions:

- Reducing the compaction and the intermixing of grain sizes produced during drilling by removing fine material from the pore spaces.
- Removing the filter cake or drilling fluid film that coats the borehole as well as much or all of the drilling fluid and natural formation solids that have invaded the formation.
- Creating a graded zone of sediment around the screen, thereby stabilizing the formation so that the well can yield sediment-free water.

1.2 SCOPE

This SOP applies to the development of newly installed monitoring wells. The SOP identifies the most commonly used well development methods; these methods can be used individually or in combination to achieve the most effective well development. Selection of a particular method will depend on site conditions, equipment limitations, and other factors. The method selected and the rationale for selection should be documented in a field logbook or appropriate project reports.

1.3 DEFINITIONS

Aquifer: A geologic formation, group of formations, or part of a formation that is saturated and capable of storing and transmitting water.

Aquitard: a geologic formation, group of formations, or part of a formation through which virtually no water moves.

Bailer: A cylindrical sampling device with valves on either end, used to extract water from a well or borehole.

Bentonite seal: A colloidal (extremely fine particle that will not settle out of solution) clay seal separating the sand pack from the surface seal.

Drilling fluid: A fluid (liquid or gas) that may be used in drilling operations to remove cuttings from the borehole, to clean and cool the drill bit, and to maintain the integrity of the borehole during drilling.

Filter pack: A clean, uniform sand or gravel placed between the borehole wall and the well screen to prevent formation material from entering the screen.

Grout seal: A fluid mixture of (1) cement and water or (2) cement, bentonite, and water that is placed above the bentonite seal between the casing and the borehole wall to secure the casing in place and keep water from entering the borehole.

Hydraulic conductivity: A measure of the ease with which water moves through a geologic formation. Hydraulic conductivity, K, is typically measured in units of distance per time in the direction of groundwater flow.

Hydrologic units: Geologic strata that can be distinguished on the basis of capacity to yield and transmit fluids. Aquifers and confining units are types of hydrologic units.

Oil air filter: A filter or series of filters placed in the airflow line from an air compressor to reduce the oil content of the air.

Oil trap: A device used to remove oil from the compressed air discharged from an air compressor.

Riser: The pipe extending from the well screen to or above the ground surface.

Specific conductance: A measure of the ability of the water to conduct an electric current. Specific conductance is related to the total concentration of ionizable solids in the water and is inversely proportional to electrical resistance.

Static water level: The elevation of the top of a column of water in a monitoring well or piezometer that is not influenced by pumping or conditions related to well installation, hydrologic testing, or nearby pumpage.

Transmissivity: The volume of water transmitted per unit width of an aquifer over the entire thickness of the aquifer flow, under a unit hydraulic gradient.

Well screen: A cylindrical pipe with openings of a uniform width, orientation, and spacing used to keep materials other than water from entering the well and to stabilize the surrounding formation.

Well screen jetting (hydraulic jetting): A jetting method used for development; nozzles and a high pressure pump are used to force water outwardly through the screen, the filter pack, and sometimes into the adjacent geologic unit.

1.4 REFERENCES

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1.5 REQUIREMENTS AND RESOURCES

The type of equipment used for well development will depend on the well development method. Well development methods and the equipment required are discussed in Section 2.1 of this SOP. In general, monitoring wells should be developed shortly after they are installed but no sooner than 24 hours after the placement of the grout seal, depending on the grout cure rate and well development method. Most drilling or well development rigs have pumps, air compressors, bailers, surge blocks, and other equipment that can be used to develop a monitoring well.

All downhole equipment should be properly decontaminated before and after each well is developed. See SOP No. 002 (General Equipment Decontamination) for details.

2.0 WELL DEVELOPMENT PROCEDURES

This section describes common well development methods, factors to be considered in selecting a well development method, procedures for initiating well development, well development duration, and calculations typically made during well development. In addition to this, procedures described in any work plans for well development should be fully consistent with local and state regulations and guidelines.

2.1 WELL DEVELOPMENT METHODS

Well development methods vary with the physical characterization of hydrologic units in which the monitoring well is screened and the drilling method used. The most common methods include mechanical surging, overpumping, air lift pumping, backwashing, surge bailing, and well jetting. These methods may be effective alone or may need to be combined (for example, overpumping combined with backwashing). Factors such as well design and hydrogeologic conditions will determine which well development method will be most practical and cost-effective. Commonly used well development methods are described in Sections 2.1.1 through 2.1.6.

The use of chemicals for monitoring well development should be avoided as much as possible. Introduction of chemicals may significantly alter groundwater chemistry in and around the well.

2.1.1 Mechanical Surging

The mechanical surging method forces water to flow in and out of the well screen by operating a plunger (or surge block) in the casing, similar to a piston in a cylinder. A typical surge block is shown in Figure 1. The surge block should fit snugly in the well casing to increase the surging action. The surge block is attached to a drill rod or drill stem and is of sufficient weight to cause the block to drop rapidly on the down stroke, forcing water contained in the borehole into the aquifer surrounding the well. In the recovery stroke or upstroke, water is lifted by the surge block, allowing water and fine sediments to flow back into the well from the aquifer. Down strokes and recovery strokes are usually 3 to 5 feet in length.

The surge block should be lowered into the water column above the well screen. The water column will effectively transmit the action of the block to the filter pack and hydrologic unit adjacent to the well screen. Development should begin above the screen and move progressively downward to prevent the surge block from becoming sand locked in the well. The initial surging action should be relatively gentle, allowing any material blocking the screen to break up, go into suspension, and then move into the well. As water begins to move easily both in and out of the screen, the surge block is usually lowered in increments to a level just above the screen. As the block is lowered, the force of the surging movement should be increased. In wells

equipped with long screens, it may be more effective to operate the surge block in the screen to concentrate its actions at various levels.

A pump or bailer should be used periodically to remove dislodged sediment that may have accumulated at the bottom of the well during the surging process. The pump or bailer should be moved up and down at the bottom of the well to suspend and collect as much sediment as possible.

The accumulation of material developed from a specific screen interval can be measured by sounding the total depth of the well before and after surging. Continue surging until little or no sand accumulates.

2.1.2 Overpumping

Overpumping involves pumping the well at a rate substantially higher than it will be pumped during well purging and groundwater sampling. This method is most effective on coarse-grained formations and is usually conducted in conjunction with mechanical surging or backwashing. Overpumping is commonly implemented using a submersible pump. In cases were the water table is less than 30 feet from the top of the casing, it is possible to overpump the well with a centrifugal pump. The intake pipe is lowered into the water column at a depth sufficient to ensure that the water in the well is not drawn down to the pump intake level. The inflow of water at the well screen is not dependent on the location of the pump intake as long as it remains submerged.

Overpumping will induce a high velocity water flow, resulting in the flow of sand, silt, and clay into the well, opening clogged screen slots and cleaning formation voids and fractures. The movement of these particles at high flow rates should eliminate particle movement at the lower flow rates used during well purging and sampling. The bridging of particles against the screen because of the flow rate and direction created by overpumping may be overcome by using mechanical surging or backwashing in conjunction with this method.

2.1.3 Air Lift Pumping

Air lift pumping uses a two-pipe system consisting of an air injection pipe and a discharge pipe. In this well development method, an air lift pump is operated by cycling the air pressure on and off for short periods of time. This operation provides a surging action that can dislodge fine-grained particles in the vicinity of the well screen. Subsequently applying a steady low pressure removes the fines drawn into the well by the surging action.

The bottom of the air lift should be at least 10 feet above the top of the well screen. Air is injected through an inner pipe at sufficient pressure to bubble out directly into the surrounding discharge pipe. The bubbles formed by the injected air cause the column of water in the discharge pipe to be lifted upward and allow water from the aquifer to flow into the well. This arrangement prevents injected air from entering the well screen. Pumping air through the well screen and into the filter pack and adjacent hydrologic unit should be avoided because it can cause air entrainment, inhibiting future sampling efforts and possibly altering groundwater chemistry.

The air injected into the well should be filtered using an oil/air filter and oil trap to remove any compressor lubricant entrained in the air. Air pressures required for this well development method are relatively low; an air pressure of 14.8 pounds per square inch should move a 30-foot column of water. For small-diameter, shallow wells where the amount of development water is likely to be limited, tanks of inert gas (such as nitrogen) can be used as an alternative to compressed air.

2.1.4 Backwashing

Effective development procedures should cause flow reversals through the screen openings that will agitate the sediment, remove the finer fraction, and then rearrange the remaining formation particles. Backwashing overcomes the bridging that results from overpumping by allowing the water that is pumped to the top of the well to flow back through the submersible pump and out through the well screen. The backflow portion of the backwashing cycle breaks down bridging, and the inflow then moves the fine material toward the screen and into the well.

Some wells respond satisfactorily to backwashing techniques, but the surging effect is not vigorous enough to obtain maximum results in many cases.

A variation of backwashing may be effective in low-permeability formations. After the filter pack is installed on a monitoring well, clean water is circulated down the well casing, out through the well screen and filter pack, and up through the open borehole before the grout or bentonite seal is placed in the annulus. Flow rates should be controlled to prevent floating the filter pack. Because of the low hydraulic conductivity of the formation, negligible amounts of water will infiltrate into the formation. Immediately after this procedure, the bentonite seal should be installed, and the nonformation water should be pumped out of the well and filter pack.

2.1.5 Surge Bailing

Surge bailing can be an effective well development method in relatively clean, permeable formations where water flows freely into the borehole. A bailer made of stainless steel or polyvinyl chloride and slightly smaller than the well casing diameter is allowed to fall freely through the borehole until it strikes the groundwater surface. The contact of the bailer produces a downward force and causes water to flow outward through the well screen, breaking up bridging that has developed around the screen. As the bailer fills and is rapidly withdrawn from the well, the drawdown created causes fine particles to flow through the well screen and into the well. Subsequent bailing can remove these particles from the well. Lowering the bailer to the bottom of the well and using rapid short strokes to agitate and suspend solids that have settled to the well bottom can enhance removal of sand and fine particles. Bailing should continue until the water is free of suspended particles.

2.1.6 Well Jetting

Well jetting can be used to develop monitoring wells in both unconsolidated and consolidated formations. Water jetting can open fractures and remove drilling mud that has penetrated the aquifer. The discharge force of the jetting tool is concentrated over a small area of the well screen. As a result, the tool must be rotated constantly while it is raised and lowered in a very small increments to be sure that all portions of the screen are exposed to the jetting action.

Jetting is relatively ineffective on the fine screens typically used in monitoring wells (slot sizes from 0.01 to 0.02 inch). In addition, jetting requires the introduction of external water into the well and surrounding formation. This water should be obtained from a source of known chemistry. Water introduced for development should be completely removed from the aquifer immediately after development.

The use of compressed air as a jetting agent should not be employed for development of monitoring wells. Compressed air could entrain air in the formation, introduce oil into the formation, and damage the well screen.

2.2 FACTORS TO CONSIDER WHEN SELECTING A WELL DEVELOPMENT METHOD

It is important to check federal, state, and local regulatory requirements for monitoring well development requirements. This SOP may be changed to accommodate applicable regulations, site conditions, or equipment limitations.

The type of geologic material, the design and completion of the well, and the type of drilling method used are all factors to be considered during the development of a monitoring well.

Monitoring well development should usually be started slowly and gently and then performed with increasing vigor as the well is developed. Most well development methods require the application of sufficient energy to disturb the filter pack, thereby freeing fine particles and allowing them to be drawn into the well. The coarser particles then settle around and stabilize the screen.

Development procedures for wells completed in fine sand and silt strata should involve methods that are relatively gentle so that strata material will not be incorporated into the filter pack. Vigorous surging for development can produce mixing of the fine strata and filter pack and produce turbid samples from the formation. In addition, development methods should be carefully selected based upon the potential contaminants present, the quantity of wastewater generated, and requirements for containerization or treatment of wastewater.

For small diameter and small volume wells, a development bailer can be used in place of a submersible pump in the pumping method. Similarly, a bailer can be used in much the same fashion as a surge block in small diameter wells.

Any time an air compressor is used for well development, it should be equipped with an oil air filter or oil trap to minimize the introduction of oil into the screened area. The presence of oil could impact the organic constituent concentrations of the water samples collected from the well.

The presence of light nonaqueous phase liquid (LNAPL) can impact monitoring well development. Water jetting or vacuum-enhanced well development may assist in breaking down the smear zone in the LNAPL. Normal development procedures are conducted in the water-saturated zone and do not affect the LNAPL zone.

2.3 INITIATING WELL DEVELOPMENT

Newly completed monitoring wells should be developed as soon as practical, but no sooner than 24 hours after grouting is completed if rigorous well development methods are used. Development may be initiated shortly after well installation if the development method does not interfere with the grout seal. State and local regulations should be checked for guidance. The following general well development steps can be used with any of the methods described in Section 2.1.

1. Assemble the necessary equipment on a plastic sheet around the well. This may include a water level meter (or oil/water interface probe if LNAPL or dense nonaqueous phase liquid is present); personal protective equipment; pH, conductivity, temperature, and turbidity meters; air monitoring equipment; Well Development Data Sheets (see Figure 2); a watch; and a field logbook.

2. Open the well and take air monitoring readings at the top of the well casing and in the breathing zone. See SOP No. 003 (Organic Vapor Air Monitoring) for additional guidance.

3. Measure the depth to water and the total depth of the monitoring well. See SOP No. 014 (Static Water Level, Total Well Depth, and Immiscible Layer Measurement) for additional guidance.

4. Measure the initial pH, temperature, turbidity, and specific conductance of the groundwater from the first groundwater that comes out of the well. Note the time, initial color, clarity, and odor of the water. Record the results on a Well Development Data Sheet (see Figure 2) or in a field logbook. See SOPs No. 011 (Field Measurement of Water Temperature), 012 (Field Measurement of pH), 013 (Field Measurement of Specific Conductance), and 088 (Field Measurement of Water Turbidity) for additional guidance.

5. Develop the well using one or more of the methods described in Section 2.1 until the well is free of sediments and the groundwater turbidity has reached acceptable levels. Record the development method and other pertinent information on a Well Development Data Sheet see Figure 2) or in a field logbook.

6. Containerize any groundwater produced during well development if groundwater contamination is suspected. The containerized water should be sampled and analyzed to determine an appropriate disposal method.

7. Do not add water to assist in well development unless the water is from a source of known chemical quality and the addition has been approved by the project manager. If water is added, five times the amount of water introduced should be removed during development.

8. Continue to develop the well, repeating the water quality measurements for each borehole volume. Development should continue until each water quality parameter is stable to within 10 percent. Development should also continue until all the water added during development (if any) is removed or the water has a turbidity of less than 50 nephelometric turbidity units. This level may only be attainable after allowing the well to settle and testing at low flow sampling rates.

9. At the completion of well development, measure the final pH, temperature, turbidity, and specific conductance of the groundwater. Note the color, clarity, and odor of the water. Record the results on a Well Development Data Sheet (see Figure 2) or in a field logbook. In addition to the final water quality parameters, the following data should be noted on the Well Development Data Sheet: well identification, date(s) of well installation, date(s) and time of well development, static water level before and after development, quantity of water removed and time of removal, type and capacity of pump or bailer used, and well development technique.

All contaminated water produced during development should be containerized in drums or storage vessels properly labeled with the date collected, generating address, well identification, and consultant contact number.

2.4 DURATION OF WELL DEVELOPMENT

Well development should continue until representative water, free of the drilling fluids, cuttings, or other materials introduced during well construction is obtained. When pH, temperature, turbidity, and specific conductance readings stabilize and the water is visually clear of suspended solids, the water is representative of formation water. The minimum duration of well development should vary in accordance with the method used to develop the well. For example, surging and pumping the well may provide a stable, sediment free sample in a matter of minutes, whereas bailing the well may require several hours of continuous effort to obtain a clear sample.

An on-site project geologist should make the final decision as to whether well development is complete. This decision should be documented on a Well Development Data Sheet (see Figure 2) or in a field logbook.

2.5 CALCULATIONS

It is necessary to calculate the volume of water in the well. Monitoring well diameters are typically 2, 3, 4, or 6 inches. The height of water column (in feet) in the well can be multiplied by the following conversion factors to calculate the volume of water in the well casing.

Well Diameter (inches)	Volume (gallon per foot)
2	0.1631
3	0.3670
4	0.6524
6	1.4680

3.0 POTENTIAL PROBLEMS

The following potential problems can occur during development of monitoring wells:

- In some wells the pH, temperature, and specific conductance may stabilize but the water remains turbid. When this occurs, the well may still contain construction materials (such as drilling mud in the form of a mud cake) and formation soils that have not been washed out of the borehole. Excessive or thick drilling muds cannot be flushed out of a borehole with one or two well volumes of flushing. Continuous flushing over a period of several days may be necessary to complete well development. If the well is completed in a silty zone, it may be necessary to sample with low flow methods or filtering.

- Mechanical surging and well jetting disturb the formation and filter pack more than other well development methods. In formations with high clay and silt contents, surging and jetting can cause the well screen to become clogged with fines. If an excessive amount of fines is produced, sand locking of the surge block may result. Well development with these methods should be initiated gently to minimize disturbance of the filter pack and to prevent damage to the well screen.

- Effective overpumping may involve the discharge of large amounts of groundwater. This method is not recommended when groundwater extracted during well development is contaminated with hazardous constituents. If the hazardous constituents are organic compounds, this problem can be partially overcome by passing the groundwater through an activated carbon filter.

- When a well is developed by mechanical surging or bailing, rapid withdrawal of the surge block or bailer can result in a large external pressure outside of the well. If the withdrawal is too rapid and this pressure is too great, the well casing or screen can collapse.

- A major disadvantage of well jetting is that an external supply of water is needed. The water added during well jetting may alter the hydrochemistry of the aquifer; therefore, the water added in this development procedure should be obtained from a source of known chemistry. In addition, the amount of water added during well development and the amount lost to the formation should be recorded.

- The use of air in well development can chemically alter the groundwater, either directly through chemical reaction or indirectly as a result of impurities introduced through the air stream. In addition, air entrainment within the formation can interfere with the flow of groundwater into the monitoring well. Consequently, air should not be injected in the immediate vicinity of the well screen.

FIGURE 1

SCHEMATIC DRAWING OF A SURGE BLOCK

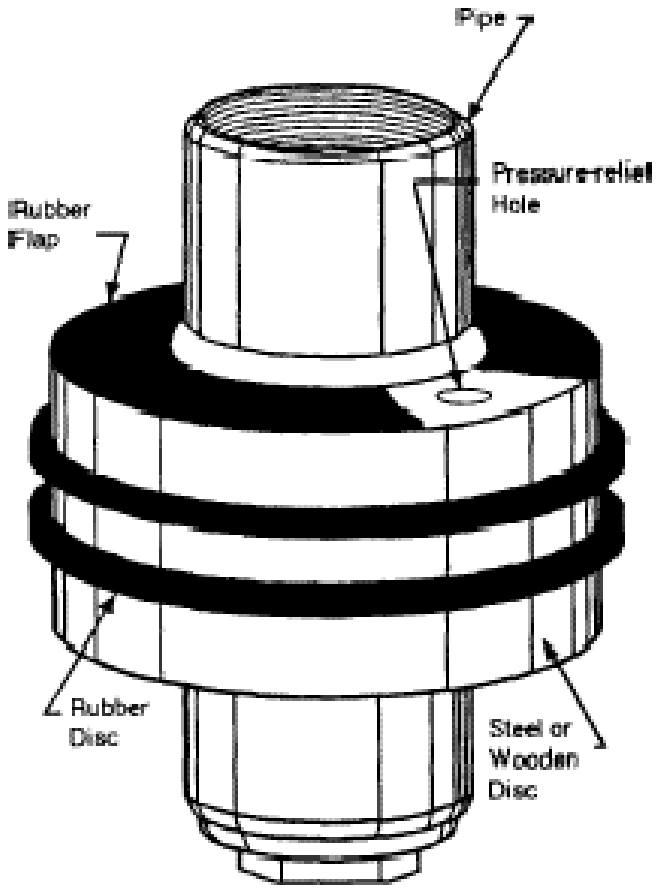


FIGURE 2

WELL DEVELOPMENT DATA SHEET

Sheet ___ of ___

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** _____

Project _____
Project No. _____
Date(s) of Installation _____
Date(s) of Development _____
Personnel/Company _____
_____
Type of Rig Used _____

Casing Diameter/Type _____
Borehole Diameter _____
Screened Interval(s) _____
Total Length of Well Casing _____
Measured Total Depth (TOC) Initial _____
Final _____
Initial Depth to Water
(TOC) _____ Date _____ Time _____
Stabilized Depth to Water
(TOC) _____ Date _____ Time _____

DEVELOPMENT TECHNIQUE(S) EQUIPMENT TYPE/CAPACITY

____ Surging _____
____ Overpumping _____
____ Air Lift Pumping _____
____ Backwashing _____
____ Bailing _____
____ Well Jetting _____

FLUIDS ADDED

Lost Drilling Fluid: _____ Gallons
Lost Purge Water: _____ Gallons
Water During Installation: _____ Gallons
Total Fluids Added: _____ Gallons
Source of Added Water: _____
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: _____ Ft. of water
x _____ Gallons/Foot
= _____ Gallons per Single Casing Volume
Sand Pack Volume: _____ Ft. of Saturated Sand Pack
x _____ Gallons/Foot (borehole diameter)
= _____ Gallons (in borehole)
- _____ Gallons of Casing Volume
= _____ x 0.3 (Assuming porosity = 30%)
= _____ Gallons Within Sand Pack
Single Purge Volume: _____ Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: _____ Gallons
Actual Purge Volume: _____ Gallons
Volume Measured by: _____
Rate of Development _____ Gallons/Minute (Hour, Day)
Pumping Rate/Depth _____ @ _____ Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness _____

Development Criteria: _____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific* Conductance	Turbidity (NTU)	D.O., Clarity, Odor, PID Readings, Other:

Development Completed at _____ Gallons Discharged. Date: _____ Time: _____

Personnel: _____
_____

* Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

SOP APPROVAL FORM

TETRA TECH EM INC.

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

RECORDING OF NOTES IN FIELD LOGBOOK

SOP NO. 024

REVISION NO. 1
May 18, 1993

Last Reviewed: December 2008

Quality Assurance Approved	*December 5, 2008* Date

1.0 BACKGROUND

The field logbook should contain detailed records of all the field activities, interviews of people, and observations of conditions at a site. Entries should be described in as much detail as possible so that personnel can accurately reconstruct, after the fact, activities and events during their performance of field assignments. Field logbooks are considered accountable documents in enforcement proceedings and may be subject to review. Therefore, the entries in the logbook must be accurate and detailed; and they must reflect the importance of the field events.

1.1 PURPOSE

The purpose of this standard operating procedure (SOP) is to provide guidance to ensure that logbook documentation for any field activity is correct, complete, and adequate. Logbooks are used for identifying, locating, labeling, and tracking samples. A logbook should document any deviations from the project approach, work plans, quality assurance project plans, health and safety plans, sampling plans, and any changes in project personnel. They also serve as documentation of any photographs taken during the course of the project. In addition, the data recorded in the logbook may assist in the interpretation of analytical results. A complete and accurate logbook also aids in maintaining good quality control. Quality control is enhanced by proper documentation of all observations, activities, and decisions.

1.2 SCOPE

This SOP establishes the general requirements and procedures for recording notes in the field logbook.

1.3 DEFINITIONS

None

1.4 REFERENCES

Compton, R.R. 1985. *Geology in the Field*. John Wiley and Sons. New York, N.Y.

1.5 REQUIREMENTS AND RESOURCES

The following items are required for field notation:

- Field logbooks
- Ballpoint pens with permanent ink
- 6-inch ruler (optional)

Field logbooks should be bound (sewn) with water-resistant and acid-proof covers; they should have preprinted lines and wide columns. They should be approximately 7 1/2 by 4 1/2 inches or 8 1/2 by 11 inches in size. Loose-leaf sheets are not acceptable for field notes. If notes are written on loose paper, they must be transcribed as soon as possible into a regular field logbook by the same person who recorded the notes.

Logbooks can be obtained from an individual's office supply room or directly from outside suppliers. Logbooks must meet the requirements specified in this SOP and should include preprinted pages that are consecutively numbered. If the numbers must be written by hand, the numbers should be circled so that they are not confused with data.

2.0 PROCEDURES

The following subsections provide general guidelines and formatting requirements for field logbooks, and detailed procedures for completing field logbooks.

2.1 GENERAL GUIDELINES

- A separate field logbook must be maintained for each project. If a site consists of multiple subsites, designate a separate logbook for each subsite. For special tasks, such as periodic well water-level measurements, data from multiple subsites may be entered into one logbook that contains only one type of information.
- All logbooks must be bound and contain consecutively numbered pages.
- No pages can be removed from the logbook for any purpose.

- All field activities, meetings, photographs, and names of personnel must be recorded in the site logbook.
- Each logbook pertaining to a site or subsite should be assigned a serial number based on the date the logbook is issued to the project manager. The first issued logbook should be assigned number 1, the next issued logbook assigned number 2, and so on. The project manager is to maintain a record of all logbooks issued under the project.
- All information must be entered with a ballpoint pen with waterproof ink. Do not use pens with "wet ink," because the ink may wash out if the paper gets wet. Pencils are not permissible for field notes because information can be erased. The entries should be written dark enough so that the logbook can be easily photocopied.
- Do not enter information in the logbook that is not related to the project. The language used in the logbook should be factual and objective.
- Begin a new page for each day's notes.
- Write notes on every line of the logbook. If a subject changes and an additional blank space is necessary to make the new subject title stand out, skip one line before beginning the new subject. Do not skip any pages or parts of pages unless a day's activity ends in the middle of a page.
- Draw a diagonal line on any blank spaces of four lines or more to prevent unauthorized entries.

2.2 LOGBOOK FORMAT

The layout and organization of each field logbook should be consistent with other field logbooks. Guidelines for the cover, spine, and internal pagination are discussed below.

2.2.1 FORMAT OF FIELD LOGBOOK COVER AND SPINE

Write the following information in clear capital letters on the front cover of each logbook using a Sharpie® or similar type permanent ink marker:

- Logbook identification number
- The serial number of the logbook (assigned by the project manager)
- Name of the site, city, and state
- Name of subsite if applicable
- Type of activity

- Beginning and ending dates of activities entered into the logbook
- "Tetra Tech EM Inc." City and State
- "REWARD IF FOUND"

Some of the information listed above, such as the list of activities and ending dates, should be entered after the entire logbook has been filled or after decision that the remaining blank pages in the logbook will not be filled.

The spine of the logbook should contain an abbreviated version of the information on the cover: for example, "1, Col. Ave., Hastings, 5/88 - 8/88."

2.2.2 First Page of the Field Logbook

Spaces are usually provided on the inside front cover (or the opening page in some logbooks), for the company name ("Tetra Tech EM Inc."), address, contact name, and telephone number. If preprinted spaces for this information are not provided in the logbook, write the information on the first available page.

2.3 ENTERING INFORMATION IN THE LOGBOOK

Enter the following information at the beginning of each day or whenever warranted during the course of a day:

- Date
- Starting time
- Specific location
- General weather conditions and approximate temperature
- Names of personnel present at the site. Note the affiliation(s) and designation(s) of all personnel
- Equipment calibration and equipment models used.
- Changes in instructions or activities at the site
- Levels of personal protective clothing and equipment

- A general title of the first task undertaken (for example, well installation at MW-11, decon at borehole BH-11, groundwater sampling at MW-11)
- Approximate scale for all diagrams. If this can't be done, write "not to scale" on the diagram. Indicate the north direction on all maps and cross-sections. Label features on each diagram.
- Corrections, if necessary, necessarily including a single line through the entry being corrected. Initial and date any corrections made in the logbook.
- After last entry on each page, initials of the person recording notes. No information is to be entered in the area following these initials.
- At the end of the day, signature of the person recording notes and date at the bottom of the last page. Indicate the end of the work day by writing "Left site at (time)." A diagonal line must be drawn across any remaining blank space at the bottom of this last page.

The following information should be recorded in the logbook after taking a photograph:

- Time, date, location, direction, and, if appropriate, weather conditions
- Description of the subject photographed and the reason for taking the picture
- Sequential number of the photograph and the film roll number or disposable camera used (if applicable)
- Name of the photographer.

The following information should be entered into the logbook when collecting samples:

- Location description
- Name(s) of sampler(s)
- Collection time
- Designation of sample as a grab or composite sample
- Type of sample (water, sediment, soil gas, etc.)
- On-site measurement data (pH, temperature, specific conductivity)
- Field observations (odors, colors, weather, etc.)
- Preliminary sample description
- Type of preservative used
- Instrument readings.

If pre-printed field data forms are available (forms such as the micropurge field data collection form), data should be entered on these pre-printed forms rather than into field logbooks. Note in the logbook that the field data are recorded on separate forms.

2.4 PRECAUTIONS

Custody of field logbooks must be maintained at all times. Field personnel must keep the logbooks in a secure place (locked car, trailer, or field office) when the logbook is not in personal possession. Logbooks are official project documents and must be treated as such.

SOP APPROVAL FORM

TETRA TECH EM INC.

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

USING THE GEOPROBE SYSTEM

SOP NO. 054

REVISION NO. 1

Last Reviewed: December 1999

March 28, 1994

Quality Assurance Approved

Date

1.0 BACKGROUND

This standard operating procedure (SOP) details all procedures for using the Geoprobe System, a hydraulically operated sampling probe, and its specialized sampling tools. The procedures described within this SOP include soil gas sampling, groundwater sampling, and soil sampling procedures as well as procedures for installing piezometers and vapor sampling implants. This SOP also describes general procedures for rod removal, backfilling, and decontamination which are common elements to all sampling procedures. This SOP No. 054 replaces former draft SOP No. 054 (Geoprobe Soil Gas Sampling) and draft SOP No. 055 (Geoprobe Groundwater Sampling).

Use of the Geoprobe System is only one of many sampling techniques used by Tetra Tech EM Inc. (Tetra Tech); however, it is a preferred sampling method when certain conditions prevail. Specifically, Geoprobe sampling should be considered when sampling is limited to relatively shallow depths and any of the following are factors: (1) costs must be kept very low, (2) the time period is short to perform the sampling, (3) maneuverability is important, and (4) the required sampling volume is limited.

Prior to the use of the Geoprobe equipment, all buried utility lines and other underground structures must be marked because this equipment can penetrate buried piping and tanks. A diagram of the Geoprobe system is shown in Figure 1.

1.1 PURPOSE

The purpose of SOP No. 054 is to establish positioning, preparing, and sampling procedures; piezometer and vapor sampling implant installation procedures; rod removal procedures; backfilling procedures; and decontamination procedures to guide field personnel.

1.2 SCOPE

The procedures outlined in SOP No. 054 are applicable to all Tetra Tech personnel involved in soil gas, soil, or groundwater sampling using the Geoprobe System or any of its specialized equipment. It also is applicable to all personnel using the Geoprobe System to install piezometers and vapor sampling implants. This SOP, in fact, applies to all uses of the Geoprobe System.

1.3 DEFINITIONS

Because Geoprobe Systems is a corporation specializing in an innovative sampling process, many of the terms used to describe its equipment are specialized and specific. For this reason, familiarity with hydraulic system, soil sampling, soil gas sampling, and groundwater sampling terms is necessary. These terms are discussed below.

1.3.1 Hydraulic System Terms

The following terms are principally used to discuss the basic operation of the hydraulic punch and its major components. If terms are encountered while using this SOP that are not listed below, check Sections 1.3.2, 1.3.3, and 1.3.4 below.

Hydraulic Punch: The principal part of the Geoprobe System, the hydraulic punch, looks very much like a small mobile drilling rig and is usually attached to a truck or van. The punch's hydraulic system uses the weight of the vehicle for support and a hydraulic system installed in the vehicle to advance sampling tools into the soil (see Figure 1).

Hammer: The hydraulic hammer pounds the rods and accessories into the soil once the hydraulic punch is unable to push it farther (see Figure 1).

Control Panel: The control panel is located near the hydraulic punch and contains the levers that control the movement of the punch (see Figure 2).

Probe Lever: This lever is found on the control panel and causes the hydraulic punch to push the drive rod and accessories into the soil. Overall, this lever controls the vertical movement of the punch (see Figure 2).

Hammer Lever: This lever is found on the control panel and engages the hydraulic hammer when the hammer release valve is moved to its extended position (see Figure 2).

Hammer Release Valve: This lever is found on the front of the hydraulic punch and allows the hammer to work when in its extended position. If the valve is not extended, pushing the hammer lever will not engage the hammer.

Foot Lever: This lever is found on the control panel and lowers the foot of the hydraulic punch so that it rests on the ground to stabilize the punch (see Figure 2).

Extend Lever: This lever is found on the control panel and controls the horizontal movement of the hydraulic punch. The lever extends the punch out of the van or truck. It also enables the hydraulic punch to extend about 2 feet from the rear of the vehicle (see Figure 2).

Fold Lever: This lever is found on the control panel and folds and unfolds the hydraulic punch so that it can be easily moved and stored (see Figure 2). This lever enables the hydraulic punch to move from the horizontal position to the vertical position.

Electrical Control Switch: This switch is found on the control panel and turns on the Geoprobe System's hydraulic system. None of the other levers work until this switch is turned on. It has slow, fast, and off speed positions (see Figure 2).

Vacuum System Panel: The vacuum system panel is located near the right rear of the vehicle and contains the vacuum system controls, the hydraulic oil cooling switch, and the remote ignition (see Figure 2).

Remote Ignition: This device is found on the vacuum system panel and allows one to start the vehicle's engine from near the hydraulic punch instead of walking around the vehicle and climbing into the vehicle's cab (see Figure 2).

Hydraulic Oil Cooling Switch: This switch is found on the vacuum system panel and turns on the auxiliary cooling system for the hydraulic oil (see Figure 2).

Vacuum/Volume (Vac/Vol) Pump Switch: This switch is found on the vacuum system panel and allows pressure to build up in the vacuum tank (see Figure 2).

Vacuum Line Valve: This valve is found on the vacuum system panel and opens and closes the vacuum line (see Figure 2).

Sample Line Gauge: This gauge is found on the vacuum system panel and registers the sample line pressure in inches of mercury (see Figure 2).

Drive Rod: The Geoprobe drive rod (sometimes called a probe rod) is a high-strength-steel, hollow tube with a 1-inch outer diameter. Though the rods come in 1-foot, 2-foot, and 3-foot lengths, the standard length is 3 feet. Each rod is threaded on both ends and has a male end and a female end (see Figure 3).

Drive Cap: This cap is a steel cap screwed onto the male end of the drive rod so that the rod can be pushed or hammered into the soil without damaging its threads. The drive cap is always installed to the top of the drive rod before advancing probe rods or sampling tools (see Figure 3).

Pull Cap: This cap is a steel cap that screws onto the male end of the drive rod and is used to pull the drive rod from the soil once the sample has been collected (see Figure 3).

Anvil: This piece of steel is placed inside the hydraulic punch at the point where the hammer actually makes contact. The anvil transfers the force of the hammer to the drive cap (see Figure 3).

Rotary-Impact Carbide-Tipped Drill Bit: This 18-inch or 24-inch steel drill bit fits directly into the hydraulic punch and is used to drill through concrete or hard asphalt. The bit does not spin with appreciable torque but is driven by the hammer, spinning only slightly to clear itself of debris (see Figure 3).

Chain-Assisted Pull Cap: This modified pull cap is attached to the hydraulic punch with a chain. It is most useful when the drive rod, for one reason or another, is not aligned directly underneath the hydraulic punch. With this cap, the rod can still be pulled using the punch (see Figure 3).

Rod Extractor: This tool threads onto a drive rod and is sent down into the hole made by a drive rod that has broken in the soil. The rod extractor, which looks a little like a drill bit, is then hammered into the broken rod and is used to pull the broken rod from the soil (see Figure 3).

Rod Pull Plate: This steel plate has a hole in its center through which a drive rod can be fitted. It is used to extract drive rods when installing piezometers, soil gas implants, or to expose the screen to groundwater when using a screen point sampler (see Figure 3).

O-Ring: An O-ring is a rubber ring used to seal sections of drive rods or various other Geoprobe tools so that, once together, they are air- and water-tight.

Teflon Tape: This inert, sticky tape can be used to create air-tight seals when pieces of the drive rod or accessories are threaded together. The tape can replace an O-ring.

1.3.2 Soil Sampling Terms

These terms are usually used when discussing soil sampling using the Geoprobe System. Sometimes, though, the terms are used when discussing other sampling techniques. If terms are encountered while using this SOP that are not listed below, check Sections 1.3.1 above and Sections 1.3.3 and 1.3.4 below.

Shelby Tube: This tube is used to collect large samples of cohesive soils. Its greatest disadvantages are that it cannot be used to sample from depths greater than about 10 feet and has no mechanism to stay closed until reaching the proper depth (see Figure 4).

Shelby-Tube-Drive Head: This 2-inch diameter piece of steel attaches to the Shelby tube using hex bolts. The Shelby-tube-drive head consists of two parts: a standard 2-inch Shelby tube drive head and a Geoprobe drive rod adapter. This allows the 2-inch wide Shelby tube to be driven by the hydraulic punch, which is actually designed for 1-inch diameter drive rods (see Figure 4).

Hex Bolts: These are the bolts used to attach a Shelby tube to a drive head (see Figure 4).

Extruder Latch: This device secures the Shelby tube to the extruder rack during the extrusion process that removes the soil from the tube (see Figure 4).

Extruder Piston: This piston is threaded onto a drive rod, and with the help of the hydraulic punch, extrudes the soil sample from the Shelby tube (see Figure 4).

Probe-Drive Systems: This sampling system allows samples to be collected at deeper depths than the Shelby tube system. Each probe-drive sampler remains closed until it reaches the depth desired and then is opened by those operating the punch by removing a stop pin (see Figure 5). The sampler is then pushed through the soil at the desired depth and removed. Three types of probe-drive samplers exist: the standard sampler, the Kansas sampler, and the large bore probe-drive sampler.

Standard Probe-Drive Sampler: This probe-drive sampler has a diameter of 1 inch and lengths of 10 or 24 inches. Its greatest difference from the other probe-drive sampler is that it does not have a removable cutting shoe (see Figure 5).

Stop Pin: This pin stops the point of a probe-drive sampler from retracting into the sampler tube. Once it is removed, the sample can be collected (see Figure 5).

Piston Rod: This rod connects the drive head of a probe-drive sampler to the sampler's point. Once the stop pin is removed, this rod slides through the sampler, allowing the point to retract inside the tube (see Figure 5).

Drive Head: This head is the top of a probe-drive sampler, which allows the piston rod to slide straight up the sample tube after the piston stop has been removed and the drive rod is advanced (see Figure 5).

Cutting Shoe: This portion of the probe-drive sampler cuts through the soil once the point is allowed to retract inside. The Kansas samplers and large-bore sampler have removable cutting shoes (see Figure 5).

Extruder Rack: This device holds soil samplers in place during extrusion. The Shelby tube extruder rack is shown in Figure 4, and the standard probe-drive extruder rack is shown in Figure 5.

Extension Rod: This long, thin, threaded, solid rod is dropped through a drive rod to the probe-drive sampler so that the stop pin can be removed. Often more than one extension rod (an extension rod string) must be put together to reach the stop pin (see Figure 5).

Extension Rod Handle: This small metal handle screws to the top of the extension rod string so that it can be turned easily while being used to remove the stop pin (see Figure 5).

Large-Bore Probe-Drive Sampler: This probe-drive sampler is 1-1/8 inches in diameter and 24 inches long. Its larger width allows for the collection of larger samples. The diameter also allows for acetate or brass liners to be used in sample collection. These liners can make viewing the sample easier and preparing it for analysis simpler.

Kansas Sampler: This specially designed probe-drive sampler has a removable cutting shoe to enable easy extraction of soil and to allow the shoe to be replaced without replacing the complete sampler.

Kansas Stainless Sampler: This sampler has a stainless-steel sampling tube. It works in the same way as the Kansas sampler.

1.3.3 Soil Gas Sampling Terms

The following terms are used principally to discuss soil gas sampling. A few terms, though, are used while discussing groundwater sampling as well. If unfamiliar terms not listed below are encountered while using this SOP, check Sections 1.3.1 and 1.3.2 above and Section 1.3.4 below.

Expendable Point: These points fit into an expendable point holder that has been threaded into the lead drive rod. When the drive rod is pulled back, these points do not move with it, leaving a gap from which soil gas can be collected. The points are ultimately left in the ground (see Figure 6).

Expendable Point Holder: This holder threads into the leading drive rod. It is used for driving expendable points (see Figure 6).

Retractable Point Holder: This holder lifts off its point, leaving a gap so that soil gas can be drawn, but unlike expendable points, the holder does not separate completely and ultimately is retrieved with the lead drive rod (see Figure 6).

Gas Sampling Cap: When using the standard soil gas sampling method, the gas sampling cap replaces the drive cap on top of the drive rod and allows tubing to be connected to the drive rod. A soil gas sample is drawn through the probe rod through this cap and into a sample container (see Figure 6).

Post-Run Tubing (PRT) System: This system collects soil gas drawn directly through a tube instead of through the drive rod itself. The system involves one of two specially designed point holders, each threaded on top so that an adapter that has been attached to the tube can be screwed into it after being advanced down the drive rod string. The two point holders differ in that one uses a retractable point and the other uses an expendable point (see Figure 7).

PRT Expendable Point Holder: This holder is threaded into the leading probe rod and is used for driving expendable points (see Figure 7).

PRT Adapter: The PRT adapter attaches the tubing through which the soil gas is to be drawn to the point holder, which has been driven to the proper sampling depth (see Figure 7).

Polyethylene Tubing: This tubing is the preferred tubing for connecting the PRT system to the sample container. Its stiff nature, however, sometimes makes it difficult to attach to the sample container and a coupler of Tygon tubing is necessary (see Figure 7).

Tygon Tubing: This tubing is the preferred tubing for connecting soil gas sampling containers to the drive rod and vacuum system. It often is also necessary as a coupler sample between the stiff polyethylene tubing used with PRT sampling systems and the sample container.

Glass Bulb: This bulb of glass has valves on each side and a neoprene septum through which gas can be withdrawn. The bulb is used to collect soil gas and can be used as the container in which the gas is taken for analysis (see Figure 8).

Tedlar Bag: This small bag has a valve on it. It is placed in an air-tight chamber, the air in the chamber is evacuated, and the bag fills with soil gas. The bags can then be taken for analysis.

Tedlar Bag Chamber: Tetra Tech uses these modified, air-tight kitchen containers as vacuum chambers. These chambers are modified with nipples on each side, which enable it to be attached to a vacuum pump, to a Tedlar bag, and to the Tygon tubing.

1.3.4 Groundwater Sampling Terms

The following terms are used to discuss groundwater sampling. If unfamiliar terms not listed below are encountered while using this SOP, check Sections 1.3.1, 1.3.2, and 1.3.3 above.

Mill-Slotted Well Point: This 3-foot long tube has 15 mill-cut slots in it, each 2 inches long and 0.020 inches wide. Only the bottom 2 feet of this tube is slotted, and sometimes mill-slotted well points come in two parts: a 2-foot slotted section and a 1-foot unslotted section. The slots allow groundwater to enter (see Figure 9).

Geoprobe Screen Point Sampler: This sampler has a 19-inch screen that encases a perforated stainless-steel sleeve. Once in place, the screen allows the water to enter the tube and prevents coarse sediment from entering the tube (see Figure 9).

Thieving Tube: This tube is used to extract the water from either mill-slotted well points or Geoprobe screen point samplers, Tetra Tech uses polyethylene tubing as thieving tubes. This tubing is lowered into the water, capped on top, and then extracted. The result is much like putting a straw into a glass of water, sealing the straw with a finger and lifting it. This method is used primarily for the collection of groundwater samples to be analyzed for volatile organic compounds. A check valve can also be attached to the thieving tube which seals the bottom and holds the groundwater within the tube.

Check Valve: This stainless steel valve has a small ball which, when attached to a thieving tube, floats to the top of the groundwater table and then sinks, ultimately sealing the thieving tube with groundwater. Oscillating the thieving tube will allow groundwater to rise within the tube for larger retrieval volume.

Well Mini-Bailer: This specially designed bailer drops through the drive rods and into the groundwater in the mill-slotted well point or screen point. A small ball in the bailer floats to the top and then sinks, ultimately sealing the bailer after it fills with about 40 milliliters of groundwater.

1.4 REFERENCES

The following references were used to prepare this SOP:

Driscoll, F.G. 1987. *Groundwater and Wells*. Second Edition. Johnson Division. St. Paul, Minnesota.

Fisher Scientific. 1991. "The Fisher Catalog of Scientific Instruments."

Geoprobe Systems. 1990. "8-M Operations Manual." July 27.

Geoprobe Systems. 1991. "Accessory Tools Catalog."

Geoprobe Systems. 1992. "Equipment and Tools Catalog."

2.0 POSITIONING, PREPARING AND SAMPLING PROCEDURES

The Geoprobe System uses a hydraulic punch that is usually installed in the back of a van or truck to first push and then to hammer its hollow drive rod through soils. Depending on which tools are attached to the end of the drive rod and which sampling equipment is attached to it, the Geoprobe can be used to remove soil, soil gas, or groundwater. It can also be used to drill through cement or concrete and can aid in the installation of piezometer wells and vapor sampling implants. The following sections detail the procedures for positioning the Geoprobe unit, preparing the sampling system, and sampling with the Geoprobe unit.

2.1 POSITIONING THE GEOPROBE UNIT

Before the Geoprobe System can be used, the Geoprobe hydraulic punch and accessories must be properly positioned near the sampling site. The hydraulic punch and other equipment also needs to be prepared. In cases where concrete or other hard surfaces hinder sampling, the Geoprobe must be used to reach soil. This section details methods to perform these activities.

To position and unload the Geoprobe System use the following procedures:

1. Drive the vehicle containing the Geoprobe System to the sampling location and align the center of the rear of the vehicle with the point at which the sample will be taken. The rear bumper should be 1 to 2 feet from the sampling point so that the foot of the hydraulic punch can be extended out over it.

2. Shut off the vehicle.

3. Put it in park.

4. Set the emergency brake before proceeding.

5. One person only should operate the hydraulic punch and the assembly and disassembly of probe rods and accessories. A second person is usually necessary to handle the samples and to decontaminate equipment. All personnel present must wear steel-toed shoes, gloves, and eye protection. When drilling through concrete or using the hydraulic hammer, ear protection is also necessary.

6. Once ready to take the sample, start the engine using the remote ignition located in the right rear of the vehicle. As a safety device, the remote ignition will not work unless the vehicle is in park.

7. Activate the hydraulic system by turning on the electrical control switch. The vehicle's engine must be running for the hydraulic system to work.

8. Slowly extend the Geoprobe out of the vehicle using the extend lever. Always use the slow speed on the hydraulic controls when positioning the hydraulic punch. The punch and mast should be far enough out of the van or truck so that the mast will not strike the roof when it is unfolded.

9. Unfold the hydraulic punch out of the vehicle using the fold lever. Once the punch has been lined up perpendicular to the ground surface, lower the foot of the punch using the foot lever until the vehicle itself is raised about 1 foot on its springs. This stabilizes the vehicle and punch. **Never lift the vehicle completely off the ground using the foot lever.** Doing so destabilizes the vehicle and hydraulic punch and may cause damage to equipment or injury to those nearby. Also, as pressure is placed on the rod, tools, and accessories, the foot of the punch may begin to lift. Do not allow it to lift farther than 6 inches from the ground. Allowing it to lift farther than 6 inches may throw the vehicle off balance and cause the rod to bend or break.

The Geoprobe System is now positioned. If it is necessary to drill through concrete or hard asphalt, use the following procedures:

1. Raise the hydraulic punch using the probe lever and then deactivate the hydraulic system by turning the electrical control switch to off. The hydraulic system should always be turned off when the hydraulic controls are not being used.

2. Place the drill bit into the hydraulic hammer. The bit is not used with a drive rod or anvil.

3. Activate the hammer rotation control knob, which is located on the hydraulic hammer, by turning the knob counter-clockwise. This allows the drill bit to rotate when the hammer lever on the control panel is pressed.

4. Activate the hammer release valve, which is located on the hydraulic hammer, by pulling the lever out and down.

5. To drill through solid surfaces, both the probe and hammer mechanisms of the hydraulic punch must be used. The hammer mechanism drives the drill bit in a percussion fashion and causes it to turn slightly. The probe mechanism allows the hammer and bit to be raised and lowered so that the bit can clear itself of debris. Once ready to begin, turn on the hydraulic system.

6. Fully depress the hammer lever. This lever needs to remain depressed throughout the drilling procedure and keeps the bit pounding and rotating.

7. Put pressure on the bit by pressing the probe lever down. Using this lever, advance the bit in small increments through the concrete or other hard surface. If advanced too quickly, the bit will bind and stop rotating. Should this happen, raise the punch slightly to allow the bit to rotate. If too little pressure is placed on the bit, too little percussion will occur, and drilling will be slow.

8. Continue drilling, in small increments, until soil has been reached. At that time prepare for sampling.

2.2 PREPARING THE SAMPLING SYSTEM

Before the hydraulic punch is used to sample, decisions must be made concerning which type of sample will be taken, whether several samples will be taken at varying depths, and which type of Geoprobe sampling equipment will be used. The following sections discuss preparation procedures for soil sampling, soil gas sampling, and groundwater sampling.

2.2.1 Soil Sampling

The samplers attached to the hydraulic punch for soil sampling come in two forms. The first type is the 2-inch diameter Shelby tube system that is common to other soil sampling methods. The second system

uses various specially designed probe-drive systems that remain completely sealed while being pushed or driven to a particular depth. They then are opened to allow a sample to be collected. The Shelby tube and probe-drive systems are discussed below.

Shelby Tube System

The Shelby tube is a thin-walled steel tube, 2 inches in diameter and 30 inches long, with four mounting holes around its top. It allows large amounts of soil to be sampled at once, but the soil must be relatively cohesive. Because the tube remains open at all times, the tube cannot be driven to great depths and must be removed and replaced after coring 30 inches of soil. Usually, the Shelby tube system is chosen when large amounts of soil are needed at depths no deeper than 10 feet. Rocky or sandy soils are not conducive to this sampling method.

To prepare for sampling using Shelby tubes, use the following procedures:

1. First attach a Shelby tube to the Shelby-tube-drive head by putting the head's hex bolts through the holes in the tube.

2. Next, screw a Geoprobe drive rod adapter into the top of the drive head to allow the 2-inch-wide Shelby tube to be driven by the hydraulic punch and hammer, which are actually made for 1-inch outer diameter drive rods.

3. A drive cap is then screwed onto the top of Geoprobe drive rod adapter. The tube is now ready to be attached to the hydraulic punch.

4. To attach the tube, raise the hydraulic punch using the probe lever and then turn off the Geoprobe hydraulic system.

5. Lift the hammer latch and insert the anvil inside.

6. Place the assembled Shelby tube sampler so that it is aligned under the anvil.

The hydraulic punch is now ready to drive a Shelby tube and collect a sample core. For collecting soil cores at depths of greater than 30 inches, attach sections of probe rod to an assembled Shelby tube sampler and drive the sampler down the same hole using a new Shelby tube for each 30-inch increment in depth.

Probe-Drive Systems

All of the probe-drive systems work in essentially the same way. A sampler is attached to a hollow drive rod, inserted into the hydraulic punch, and punched or hammered into the soil. Once the sampler reaches the depth at which the sample is to be taken, a stop pin in the sampler is removed using an extension rod that has been dropped through the inside of the hollow drive rod. The release of the stop pin allows the point of the sampler to retract inside the sample tube as the sampler is further advanced into the soil. The probe is then punched through the soil where the sample is to be taken. The rod and probe are then pulled to the surface for sample extraction.

Currently, three types of samplers are used in the probe-drive systems: the standard probe-drive sampler, the Kansas sampler, and the large bore probe-drive sampler. Preparation of each is slightly different. Each is discussed separately below.

Standard Probe-Drive Samplers

The standard probe-drive sampler comes in 10- and 24-inch lengths. The proper length is determined by the size of the sample desired. The point of this sampler is connected to a piston rod that will slide through its length. At its top, the piston rod is connected to the drive head, which keeps it centered and holds the piston stop pin, which stops the piston from sliding.

To prepare the standard probe-drive sampler, use the following procedures:

1. Insure that the sampler is assembled and complete, and that the piston stop pin which is reverse threaded is tightly locked so that the sampler point will not slide into the sampling tube.

2. Attach a shortened Geoprobe drive rod to the sampler so that the total length is nearly the standard 3 feet. If the 10-inch sampler is used, a 2-foot drive rod should be attached, and if the 24-inch sampler is used, a 1-foot drive rod should be attached.

3. Screw a drive cap onto the top of the shortened drive rod. The sampler is now ready for attachment to the hydraulic punch.

4. To insert the probe-drive sampler, raise the hydraulic punch using the probe lever, and then turn the hydraulic system off.

5. Lift the hammer latch and insert the anvil inside.

6. Place the assembled standard probe-drive sampler and shortened drive rod directly under the anvil so that the drive cap touches the anvil and the point of the sampler is aimed at the place where the sample is to be taken. The standard probe-drive sampler and the hydraulic punch should both be vertical.

Kansas Samplers

The Kansas sampler is much like the standard probe-drive sampler. However, it has a removable hardened cutting shoe near its point that allows it to penetrate rockier soils and to be easily replaced and decontaminated. Kansas samplers come in two versions: the Kansas Stainless Sampler, which has a stainless-steel tube, and the Kansas Sampler, which has an alloy steel tube.

To prepare a Kansas sampler, use the following procedures:

1. Ensure that the hardened cutting shoe is in place.

2. Assemble and install the Kansas sampler in the same manner as the standard probe-drive sampler (see Procedures 2 through 7 above).

Large Bore Samplers

The large bore sampler, similar to both types of Kansas samplers, has a removable cutting shoe and works in the same manner. It is slightly larger than the Kansas samplers, usually 24 inches long and 1-1/8 inches wide. The larger bore allows for the use of acetate or brass liners. The soil, therefore, can be removed easily by removing the liner. The acetate liner allows for easy visual examination of the core and can be easily sliced away so that the sample can be prepared for the laboratory. The brass liners come in four 6-inch sections that allow for easy separation and packaging of 6-inch soil samples. Some laboratories accept full 6-inch brass liners, allowing the samples to be collected with a very minimal disturbance to the soil matrix.

To prepare a large-bore sampler, use the following procedures:

1. Place the desired liner into the sampler by unscrewing the cutting shoe and sampler drive head from the two ends and then inserting the liner.

2. Assemble the sampler and attach a 12-inch drive rod to the sampler.

3. Screw a drive cap onto the top of the drive rod.

4. Place the assembled sampler and drive rod under the hydraulic punch in the manner detailed in the section above for preparing standard probe-drive samplers (see Procedures 5, 6, and 7 above).

2.2.2 Soil Gas Sampling

Two main methods are used to collect soil gas using the Geoprobe system: the standard method and the PRT system.

To use the standard method, the drive rods are decontaminated and assembled in an air-tight manner as they are punched into the soil. To ensure an air-tight seal, either Teflon tape or an O-ring can be placed on the male threads of the drive rods. The probe rods are driven approximately 6 inches below the area from where the sample is to be taken. The rods are then lifted approximately 6 inches leaving the expendable point and a small opening between the point and the end of the rod behind. A gas sampling cap is then attached to the top of the rod, a vacuum pump removes the necessary volume of gas, and the sample is collected.

To collect soil gas samples using the PRT system, polyethylene tubing attached to a stainless steel adapter is pushed through the drive rod after the rod is in place. The tubing and adapter is then reverse threaded onto the top of the PRT expendable point holder, and the gas is collected through the tubing. This method increases the accuracy of soil gas sampling, eliminates the potential for leaks in the rod, and simplifies probe rod decontamination.

<u>Standard Method</u>

Only decontaminated drive rods can be used with the standard method. Rods should be decontaminated using the procedures in Section 6.0 of this SOP.

To prepare a decontaminated drive rod for soil gas sampling using the standard method, use the following procedures:

1. Screw an expendable point holder into the female end of a 3-foot drive rod. (Note: a retractable point can also be used with this method; however, decontamination requirements almost always preclude its use.)
2. Place an expendable point into this holder.
3. Screw a drive cap onto the male end of the drive rod.
4. Place the rod into the hydraulic punch.
5. Turn on the hydraulic system.
6. Install the anvil within the hydraulic punch's hammer by lifting the hammer latch and inserting it.
7. Place the assembled drive rod directly under the anvil so that the drive cap faces the anvil and the expendable point is aimed at the desired sampling location.
8. Push sampler and hydraulic punch through the soil to gather the sample.

PRT System

Two types of PRT systems are available. The first uses an expendable point holder and expendable point like the standard method. The second uses a retractable point holder that lifts off of the drive-point without actually separating from it. Both systems allow the threading of a PRT adapter and tubing through the drive rod so that the gas can be taken from the depth required without being sucked through the drive rod.

To prepare the drive rod and sampler for PRT soil gas sampling, use the following procedures:

1. Select the desired PRT sampler (either one with an expendable point or one with a retractable point) and ensure that the PRT adapter easily screws into the threads on top of the sampler. This step is necessary to ensure that the adapter will fit easily when it is affixed from above ground.
2. If using the sampler with an expendable point, attach the point.

3. Screw the sampler to the end of a shortened drive rod so that the total length of the sampler is nearly 3 feet.

4. Screw the drive cap to the other end of the drive rod.

5. Attach the drive rod and sampler to the hydraulic punch using the same procedures detailed in the standard method (see Procedures 4, 5, and 6 above).

2.2.3 Groundwater Sampling

The Geoprobe System offers two systems for collecting groundwater, each with several groundwater sampling options. The first method involves the use of a mill-slotted well point. The second method uses a specially designed Geoprobe screen point sampler.

Mill-Slotted Well Points

The mill-slotted well point is a 2- or 3-foot length of hollow steel tubing with 15-millcut slots in it, each 2 inches long and 0.020 inches wide. Once in place, groundwater enters the tube through these slots. To prepare the mill-slotted well point, use the following procedures:

1. Screw a solid drive point into the female end of the sampler.

2. If a 2-foot well point is being used, screw the sampler to a 1-foot length of drive rod.

3. Screw a drive cap to the other end of the well point or 1-foot drive rod.

4. Place the sampler and rod into the hydraulic punch by raising the punch as much as necessary and turn hydraulic system off.

5. Install the anvil within the hydraulic punch's hammer by lifting the hammer latch and inserting it.

6. Place the mill-slotted well point sampler under the anvil with the drive cap near the anvil and the point aimed at the sampling location.

Geoprobe Screen Point Sampler

The Geoprobe screen point sampler has a 19-inch screen encased in a perforated stainless-steel sleeve. The screen remains encased in the sleeve until the screen point sampler reaches the desired depth. The

rod is then pulled back approximately 19 inches, leaving the screen exposed to the formation. Flexible tubing can be pushed through the drive rod and attached to the sampler using the adapters for the PRT soil gas system, enabling groundwater to be removed without touching the drive rod. Decontaminating the drive rod is subsequently easier.

To prepare a Geoprobe screen point sampler, use the following procedures:

1. Close the screen on the sampler.
2. Attach its expendable point.
3. Attach the sampler to a shortened drive rod so that the assembly is nearly 30 inches long.
4. Place the sampler into the hydraulic punch using the methods detailed for mill-slotted well points (see Procedures 4, 5, and 6 above).

2.3 SAMPLING

Sampling procedures for the Geoprobe hydraulic punch are similar for all samplers and sampling media. This section presents general procedures that apply to all samplers and sample types, and specific operating procedures for soil, soil gas, and groundwater.

2.3.1 General Procedures

All control panel switches have a slow and fast position. All switches should initially be set at the slow position when positioning the punch and the sampling tools. In all cases, the hydraulic system should be shut off when not in operation and when adapters and additional drive rods are put into place. The hydraulic punch should be turned off any time it is not actually in operation.

The Geoprobe hydraulic punch is designed with a key safety feature that will shut it off if the controls are released. If the operator senses that something is wrong, he or she must release the controls and stop operating the punch until all is well. At no time should the foot of the punch be allowed to lift higher than 6 inches off the ground because the punch will destabilize and may bend the drive rod or sampling tube.

Also, at no time should part of a human body be placed on top of a drive cap while the cap is near the anvil or under the foot of the hydraulic punch.

Once the assembled sampler or drive rod is under the anvil, both it and the hydraulic punch should be vertical. Positioning the drive rod and sampler is critical in order to drive the rod vertically. Not positioning the sampler or drive rod vertically will result in problems when attaching subsequent drive rods needed to reach the proper depth and with rod retrieval.

To begin probing in soils of normal texture, use the following procedures:

1. Activate the hydraulic punch and push down on the probe lever on the control panel so that the probe slowly lowers itself. Always use the slow control on the first rod or sampler.

2. Continue to press on the probe lever until the rod or sampler is completely forced into the soil. The point of the rod will then be nearly 3 feet into the soil.

Soils and other materials are often too hard for the hydraulic punch's probe mechanism to penetrate. When this occurs, the hammer on the hydraulic punch should be used in accordance with the following procedures:

1. Ensure that the hammer rotation valve is closed.

2. Use the hydraulic punch to put pressure on the rod, sampler, and soil. When the probe rod refuses to move, the foot of the hydraulic punch will begin lifting off the ground. Never allow the foot to lift more than 6 inches off the ground, but never use the hammer with the foot resting on the ground surface.

3. If the probe foot lifts off the ground, the hydraulic punch may no longer be perpendicular. If this occurs, use the machine's fold lever, which is located on the control panel, to correct the punch's position.

4. Press the hammer lever on the control panel. The rod should now advance. Never use the hammer unless there is downward pressure on the drive cap because doing so may damage the equipment.

5. Stop hammering periodically and check to see if the probe rods can be advanced using the probe mechanism only.

When samples are to be taken at depths of greater than 3 feet, additional drive rods must be added to those already in the ground. Shelby tube soil sampling procedures for adding rods are discussed in Section 2.3.2. For all other sampling methods, use the following procedures to add drive rods:

1. Using the probe lever, raise the hydraulic punch off the portion of the drive rod protruding from the ground.
2. Unscrew the drive cap from the drive rod.
3. If using the standard method of collecting soil gas or other sampling methods that will draw the sample through the length of the entire drive rod, wrap the threads of the drive rod with Teflon tape or push an O-ring over the threads to make the drive rod string air- and water-tight.
4. Screw another drive rod onto the first drive rod protruding from the ground. Tighten the rods together with a pipe wrench.
5. Screw a drive cap onto the top of the new drive rod.
6. Place the hydraulic punch over the new drive rod and push the rod farther into the ground.

As the rod string is pushed farther into the ground, it will sometimes begin to loosen. The rods should remain tight so that the threads are not damaged. Occasionally, stop probing and twist the rod string with a pipe wrench to ensure that all of the joints remain tightly sealed.

2.3.2 Soil Sampling

This section presents procedures used to sample soils using either the Shelby tube sampling method or any of the probe-drive systems. In all cases, sampling tools should never be advanced farther than their length once they are opened because the sampler will overfill. If the sampler overfills, it could be damaged or expand, causing it to fall off the drive head.

<u>Shelby Tube Sampling Procedures</u>

Because the Shelby tube does not remain closed until it reaches the desired sampling depth and because it is not connected to a drive rod but to a Shelby drive head, sampling procedures for Shelby tubes differ greatly from soil sampling with other methods. New drive rods cannot be continuously added. Sampling

at depths of greater than 30 inches requires a step-like procedure. For example, to sample to a depth of 90 inches, three Shelby tubes are needed. The first is advanced from 0 to 30 inches and then removed. The second is pushed through the hole made by the first and advanced to a depth of 60 inches and removed. The third is also pushed through the 60-inch deep hole and advanced from 60 to 90 inches.

Samplers must be ready to change sampling methods if necessary. For example, if soils are not cohesive, they tend to drop out of the Shelby tube as it is pulled from the ground. Also, if the soils are not cohesive, they tend to collapse into the hole left by the initial tube before the second and third tubes can be pushed into place. For this reason, use of the Shelby tube method is impractical at depths of greater than 10 feet. Rocky soils are also difficult to sample with a Shelby tube sampler because they tend to destroy the sampler while it is being driven into the ground.

To sample using the Shelby tube method, use the following procedures:

1. Turn on the hydraulic system and slowly press the Shelby tube into the soil using the probe lever on the control panel.
2. Once the tube has reached the sampling depth or has been extended to nearly its full 30-inch length, stop the hydraulic punch and raise it off the drive cap and Shelby tube drive head.
3. Unscrew the drive cap.
4. Screw on a pull cap.
5. Lower the hydraulic punch and lift the hammer latch. Remove the anvil. Place the latch around the pull cap so that the latch will hold the cap to the hydraulic hammer.
6. Using the probe lever, raise the hydraulic punch to pull the Shelby tube from the ground.

If the desired sampling depth is greater than 30 inches, additional Shelby tubes and probe rods must be used. The tubes are then prepared for probing using the methods presented in Sections 2.2.1 and 2.3.1 above. To advance the Shelby tube deeper, the tubes are pushed through the hole left by the first tube using the method detailed above.

Once a Shelby tube core has been retrieved from a sampling point, it must be extruded from the Shelby tube sampler using the following procedures:

1. Lower the hydraulic punch using the probe lever so that its mast will not strike the top of the van as it is folded.

2. Lift the foot of the hydraulic punch using the foot lever.

3. Slowly and carefully fold the hydraulic punch using the fold lever.

4. Once the punch is horizontal, the Shelby tube extruder bracket can be placed onto the punch's foot. This bracket will hold the Shelby tube in place and allow the punch to push the soil out of the tube.

5. Screw an extruder piston onto a drive rod and a drive cap on the drive rod's other end.

6. Place the drive rod into place under the horizontal drive punch.

7. Place the full Shelby tube into the extruder rack and secure it with the extruder latch.

8. A pan or container should be held at the end of the Shelby tube to collect sample material as it is extruded.

9. The probe lever activates the hydraulic punch and pushes the soil from the Shelby tube.

Tetra Tech's SOPs on packaging and documenting samples, SOPs Nos. 016, 017, 018, and 019, should be used to prepare the sample for analysis.

Probe-Drive System Sampling Procedures

All three types of probe-drive samplers work in essentially the same way. The sampler is advanced to just before the proper sampling depth and then the drive point is released by removing a stop pin using solid extension rods that have been dropped through the hollow drive rod. The point is then pushed back into the body of the sampler as the sampler fills with the soil sample.

In addition to the general procedures listed in the Section 2.3.1, the probe must be stopped at just before the desired sampling depth so that the stop pin can be removed. Pushing the probe too far will require starting over.

To use the probe-drive sampling system to sample soil, use the following procedures:

1. Attach additional drive rods as discussed in the general procedures in Section 2.3.1.

2. Stop the hydraulic probe just before the desired sampling depth.

3. Raise the hydraulic punch, turn off the hydraulic system, and remove the drive cap.

4. Insert an extension rod into the drive rod and screw additional extension rods together until the assembly reaches the same depth as the sampler.

5. Attach a small extension rod handle to the top of the extension rod.

6. Rotate the extension rod handle clockwise until the leading extension rod has turned the stop pin and disengaged it.

7. Pull and unscrew each extension rod from the hollow drive rod. The stop pin should be attached to the bottom of the extension rod string. If not, repeat Procedures 1 through 6.

8. To sample, mark the drive rod with tape or chalk about 10 inches above the ground if a 10-inch sampler is used or 24 inches from the ground if a 24-inch sampler is used.

9. Replace the drive cap and start the hydraulic system.

10. Drive the rod until the tape or chalk mark touches the ground. Be careful not to overdrive the sampler. Doing so could compact the soil in the sampler or cause it to balloon outward, making soil removal and extrusion difficult.

11. Raise the hydraulic punch and replace the drive cap with the pull cap. Remove the anvil.

12. Latch the pull cap underneath the hydraulic hammer latch and pull the rods out of the ground, disassembling the rod as needed.

13. Check to ensure that a soil sample is now in the sampler.

Once a soil sample has been removed from the ground, it can be extruded using the Geoprobe. The tools supplied by Geoprobe Systems for extruding soil from probe-drive samplers do not require the Geoprobe to be folded and horizontal. If liners are used with large-bore samplers, extrusion is usually unnecessary. When extrusion is necessary for probe-drive samplers, use the following procedures:

1. Raise the foot of the hydraulic punch off the ground using the foot lever on the control panel.

2. Attach the extruder rack onto the foot of the punch so that its crossbeam rests on top of it.

3. Completely disassemble the sampler. In all cases, remove the piston, point, and drive head of the sampler. If using the Kansas and large-bore samplers, unscrew the removable cutting shoe as well.

4. Insert the sample tube into the extruder with its cutting end up.

5. Insert a disposable wooden dowel or the reusable steel piston above the soil and below the hydraulic punch so that pressure on the dowel or piston from the punch will push the soil out of the bottom of the sample tube.

6. Position proper sampling jars or trays under the sample tube and very slowly use the probe lever to force the soil out of the tube. Injury can result if the soil is quickly forced from the tube.

The soil sample is now ready for packaging or on-site laboratory analysis. For large-bore samplers, the soil may be contained in a plastic sleeve that can be sliced away once the soil is to be packaged or in a brass sleeve that may be capped on both ends and shipped to the laboratory as is. Tetra Tech's SOPs on packaging and documenting samples for analysis should be followed when collecting samples using the Geoprobe System.

2.3.3 Soil Gas Sampling Procedures

The standard method and the PRT system are used for collecting soil gas using the Geoprobe System. The standard method requires the drive rods to be sealed together with either O-rings or Teflon tape to ensure an air-tight seal so that soil gas from depths other than the bottom of the drive-rod string cannot penetrate the system.

The PRT system draws soil gas through continuous tubing that is dropped through the drive rod after the drive rod has reached the desired level. The tubing is then attached directly to the point holder at the end of the drive-rod string.

For both methods, the drive rod should be driven to the desired depth. The drive cap should be replaced by the drive pull cap, and the rod should be pulled back out of the hole approximately 6 inches. This 6-inch void is the area where the soil gas sample is collected from. A pipe wrench or vise-grip pliers should be attached to the pipe just above the foot of the hydraulic punch so that the wrench or pliers rests on the foot to stop the drive rod from working its way back down into the hole.

Tygon tubing should be replaced between each sample for both sampling methods to avoid cross contamination.

The standard method and the PRT system sampling procedures are presented below. In addition, procedures for collecting soil gas in Tedlar bags, glass bulbs, and adsorption tubes is also presented below.

Standard Method

To gather a sample using the standard method, raise the hydraulic punch as mentioned above and replace the drive cap with a gas sampling cap. This cap is designed to fit the drive rods and is used to connect them by tube to a vacuum supply. Once the tubing has connected the gas sampling cap to the vacuum supply, remove the volume of air necessary to ensure that none of the gas being drawn was in the rod during probing, and then collect the sample in either Tedlar bags, glass bulbs, or adsorption tubes as discussed below.

PRT System

To use the PRT system (with either an expendable or a retractable point) to collect soil gas samples use the following procedures:

1. Secure the PRT adapter to the end of a piece of polyethylene tubing 1 to 2 feet longer than the total length of the drive-rod string. The adapter must fit tightly within the tubing. If it does not, tape it into place. Also, ensure that the O-ring is in place on the threaded end of the adapter.

2. Remove the drive cap from the probing rod and lower the adapter into it, holding on to the tubing.

3. Grasp the excess tubing and apply downward pressure. Turn the tubing counter-clockwise to engage the adapter threads on the sampler holder.

4. Pull up lightly on the tubing to test engagement of threads. If the adapter has not engaged, try again. If it repeatedly does not engage, soil may have intruded into the drive rod either during probing or, in the case of the retractable point, when the rod was pulled back to leave the point opening. Use the threaded extrusion rods to clean out the threads.

5. In most cases, the adapter will easily screw into place. The sampler is now ready to collect samples in either Tedlar bags, glass bulbs, or adsorption tubes using the procedures presented below. After the sample is collected and the sampler and tube is removed from the ground, the O-ring should be checked to ensure that a good seal exists between the sampler and adapter. If the O-ring is tightly smashed, the seal should be good.

6. Discard polyethylene tubing and use new polyethylene tubing for each sample.

Tedlar Bags

Soil gas can be collected for chemical analysis in a 500-cubic-centimeter Tedlar gas sampling bag by inducing a vacuum on the exterior of the bag. The following procedures should be used to collect soil gas samples in Tedlar bags:

1. For the PRT system, connect a short (6- to 12-inch) piece of Tygon tubing to the free end of the polyethylene tubing protruding out of the drive rod. For the standard method, connect the Tygon tubing to the soil gas sampling cap.

2. Attach the other end of the Tygon tubing to one end of the Tedlar bag chamber. Tetra Tech uses modified, plastic, air-tight kitchen containers for these chambers. They are inexpensive and work well.

3. Connect another piece of Tygon tubing 2 feet to 3 feet long to the other end of the Tedlar bag chamber and to the nipple on the bottom of the vacuum system panel.

4. Place the lid on the Tedlar bag chamber.

5. Turn the vacuum/volume (vac/vol) pump switch on and allow pressure to build in the vacuum tank. Make sure that the vacuum line valve is closed before turning on the pump switch.

6. Open the vacuum line valve and purge three times the volume of ambient air out of the Tedlar bag chamber and PRT tubing or probe rods. The equations for determining purge volumes are as follows:

   Probe rods or tubing

   $$V = \pi r^2 H$$

   where

   V = Volume
   π = 3.14159
   r = Radius of tube or rod
   H = Length of tube or rod

Vacuum chamber

$$V = LWH$$

where

V = Volume
L = Length of chamber
W = Width of chamber
H = Height of chamber

7. Close the line valve.

8. Clamp the Tygon tubing shut with hemostats.

9. Remove the lid from the Tedlar bag chamber.

10. Connect a Tedlar gas sampling bag to the fitting inside the Tedlar bag chamber and open the valve on the gas sampling bag.

11. Place the lid back on the Tedlar bag chamber, seal it tightly, and remove the hemostats.

12. Turn the vac/vol pump switch on and open the vacuum line valve to create a vacuum in the chamber. The Tedlar bag should fill once the vacuum is created. The rate at which the Tedlar gas sampling bag fills depends on the permeability of the soil. The minimum amount of soil gas needed for analysis is approximately 0.5 liter. If less than 0.5 liter is collected after 4 minutes of sampling, raise the soil gas probe 0.5 foot and continue to evacuate the vacuum chamber for another minute. If the minimum required volume of soil gas is not collected, repeat the procedure. If the minimum required volume of soil gas is still not collected, abandon the collection process. All steps conducted should be accurately recorded in the logbook even if no samples are satisfactorily collected.

13. After the soil gas sample is collected in the Tedlar bag, clamp the Tygon tubing with hemostats.

14. Turn off the vacuum pump.

15. Remove the vacuum chamber lid.

16. Close the valve on the Tedlar gas sampling bag and remove the bag from the chamber. Label the Tedlar bag with the appropriate information.

Glass Bulbs

The following procedures should be used to collect soil gas in glass bulbs:

1. Turn the vac/vol pump switch on and allow pressure to build in the vacuum tank. Make sure that the vacuum line valve is closed before starting the vacuum pump. The inside scale of the vacuum tank gauge is calibrated in inches of mercury. The outside scale is calibrated for volume in liters (at standard temperature and pressure). Obtain the desired vacuum and turn the vacuum pump off.

2. Connect a short (6- to 12-inch) piece of Tygon tubing to the sample cap or PRT protruding from the drive rod.

3. Connect one end of the labeled glass bulb to the Tygon tubing.

4. Connect another piece of Tygon tubing 3 feet to 5 feet long to the other end of the glass bulb and to the nipple on the bottom of the vacuum system panel.

5. Open the two stopcocks on the glass bulb.

6. Turn off the vacuum pump.

7. Turn the vacuum line valve to its open position.

8. Purge three times the volume of ambient air within the rods, bulb, and tubing. Equations for figuring out volumes are presented in the Tedlar bag discussion.

9. Turn the vacuum line valve to its closed position. Allow the pressure in the sample train to equalize (the sample line gauge should read zero).

10. Close the stopcocks on the glass bulb.

11. Remove the glass bulb and label it with the appropriate information.

Adsorption Tubes

The following procedure should be used to collect soil gas in adsorption tubes:

1. Connect a short (6- to 12-inch) piece of Tygon tubing to the sample cap or PRT protruding from the drive rod.

2. Connect this piece of tubing to the nipple on the bottom of the vacuum system panel and purge three volumes of air from the drive rod or PRT system as described in the discussion of the Tedlar bag method.

3. Use hemostats to clamp the Tygon tubing attached to the drive rod or PRT.

4. Insert the adsorption tube between the Tygon tubing from the drive rod or PRT and the Tygon tubing attached to the vacuum system panel.

5. Remove the hemostats and draw the required volume of air through the adsorption tube.

6. Remove the adsorption tube and place the appropriate caps on the tube ends.

7. Clearly label package, and ship the samples as required by the laboratory or Tetra Tech and U.S. Environmental Protection Agency (EPA) SOPs.

Soil Gas Sampling Pointers

If the needle on the vacuum line valve does not move, the soil at the sampling depth may be saturated, pore space may be too tight to yield a sample, or sampling train may be plugged. If the needle moves back to zero very quickly, either the soil at the sampling depth is very permeable or a leak is present in the sampling train.

In some soils, the needle may return to zero very slowly. The time it takes for the needle to return to zero is called the "recovery" time. Recovery time should be noted for each sample taken. This information will allow relative comparison of soil permeability. Recovery times of greater than 10 minutes should be considered suspect. The effect of leakage in the sampling system increases with longer recovery times. After 10 minutes, the operator should consider either changing the sampling depth, location, or length of pullback from the sampling tip, or switching entirely from soil gas sampling to grab sampling and analysis of soil.

2.3.4 Groundwater Sampling

The two options for sampling groundwater using the Geoprobe System follow procedures similar to those presented in Sections 2.3.2 and 2.3.3 above. The sections below detail procedures for using mill-slotted well point samplers and Geoprobe screen point samplers to sample groundwater.

<u>Mill-Slotted Well Point Sampler</u>

Once the mill-slotted well point reaches groundwater, the water will begin to flow through the slots. When the sample is to be analyzed for volatile organic compounds, do not use a vacuum to suck groundwater from the drive rod. If the sample is to be analyzed for other parameters such as metals, semivolatiles, pesticides, or explosives, using a vacuum on the drive rod is acceptable. In all cases,

polyethylene tubing can be used as a thieving rod by lowering its end into the drive rod, capping or sealing the tube's top, and then removing it. The preferred method for collecting samples for volatile organic analysis is to use a well mini-bailer. To collect groundwater samples with a mini-bailer, use the following procedures:

1. Raise the hydraulic punch, turn off the hydraulic system, and remove the drive cap.
2. Lower a well mini-bailer into the drive rod until it reaches the bottom. As it reaches the bottom, the check ball on the bailer's end will float in the groundwater and then slowly sink to the bottom.
3. Allow a couple of seconds for the ball to sink and set.
4. Pull the well mini-bailer out of the drive rod. The bailer should contain about 20 milliliters of groundwater.
5. Package and document the samples in accordance with Tetra Tech SOPs No. 016, 017, 018, and 019, or a similar EPA-approved procedure.

If a bailer is not required and volatile organic samples are not being collected, a foot valve sampler, vacuum trap, or peristaltic pump can be used to collect samples. Once the sample has been removed and packaged, the mill-slotted well point can be removed and decontaminated.

Geoprobe Screen Point Sampler

The Geoprobe screen point sampler contains a screen and screen plug that allows water to enter the rod. To collect groundwater samples with a Geoprobe screen point sampler, use the following procedures:

1. Push the sampler below the depth necessary to reach groundwater.
2. Raise the hydraulic punch and replace the drive cap with a pull cap. Also, remove the anvil.
3. Latch the pull cap under the hammer latch, and use the probe lever to lift the drive rod about 18 inches. Because the sampler has a expendable point, the point should stay at the deepest depth, and the screen and screen connector should fall out of the bottom of the sampler. Sometimes, however, the screen stays within the sampler and is lifted the 18 inches with the drive rod.
4. To ensure that the screen is exposed, attach a vice grip or pipe wrench to the rod above the foot of the hydraulic punch and raise the hydraulic punch. Then remove the pull cap

and place an extension rod through the tubing to push the screen into place. Additional extension rods can be attached to reach the desired depth.

To remove the groundwater sample for volatile organic analysis, with a well mini-bailer, follow steps 1 through 5 under the mill-slotted well point section above. Tubing can be used as a thieving rod with or without a check valve to collect groundwater samples as well. If the sampler is supplied with the optional PRT expendable point holder, then a PRT adapter can be pushed through the drive rod and threaded into place by following the PRT system Procedures previously discussed. A vacuum trap system or peristaltic pump can then be used to withdraw the sample. The PRT system method, however, should never be used when the sample is to be analyzed for volatile organic compounds because it involves using a vacuum to remove the sample.

3.0 PIEZOMETER AND VAPOR SAMPLING IMPLANT INSTALLATION PROCEDURES

The Geoprobe System's ability to quickly probe into soil allows for easy installation of both piezometers and vapor sampling implants. Both installation procedures are discussed below.

3.1 PIEZOMETER INSTALLATION

Piezometers are tubes that extend to groundwater and enable easy sampling of groundwater on a routine basis (see Figure 10). In addition to installing the piezometer, piezometers must be protected from the weather and from contamination. A well-head protector must therefore be installed around them. In some soil types, preparing the well-head protector may be the first step to installing a piezometer. For this reason, the directions below should be read completely before beginning piezometer installation. If a post-hole digger is to be used for well-head protector installation, Procedure 5 should be performed first. The piezometer should then be advanced through this hole.

To install temporary or permanent piezometers, use the following procedures:

1. Use the hydraulic punch to drive the temporary casing to the desired piezometer installation depth. Use the general procedures outlined in Section 2.3.1 above for details on driving the piezometer casing. The different temporary casings that can be used are described below. Geoprobe Systems also manufactures special drive caps, expendable points, and pull caps that fit these types and sizes of pipe.

a) 1-7/16-inch outside diameter by 1-3/16-inch inside diameter, RW-flush threaded pipe can be used as a temporary casing. This casing can be driven to an approximately 25- to 30-foot depth. Two sizes of piezometer wells can be installed inside of the temporary casing: (1) 3/4-inch outside diameter by 1/2-inch inside diameter, polyvinyl chloride (PVC) pipe, or (2) 1-inch outside diameter by 3/4-inch inside diameter, PVC pipe.

b) 1-13/16-inch outside diameter by 1-1/2-inch inside diameter, EW-flush threaded pipe can be used as a temporary casing. This casing can be driven to an approximately 15- to 20-foot depth. Three sizes of piezometer wells can be installed inside of the temporary casing: (1) 3/4-inch outside diameter by 1/2-inch insider diameter PVC pipe, or (2) 1-inch outside diameter by 3/4-inch inside diameter, PVC pipe, or (3) 1-1/2-inch outside diameter by 1-inch inside diameter, PVC pipe.

c) 1-1/4-inch outside diameter by 1-inch inside diameter, NPT-threaded pipe can be used as a temporary casing. This casing can be driven to an approximately 25- to 30-foot depth. Only 3/4-inch outside diameter by 1/2-inch inside diameter, PVC pipe piezometer wells can be installed inside of the temporary casing. If using NPT-threaded pipe, couplers are needed to attach each section of pipe.

2. Once the piezometer casing is at the proper depth, remove the drive cap and install the selected size piezometer pipe inside of the temporary casing.

3. Using a pull plate, remove the temporary casing.

4. If the hole stays open, attempt to install a sand pack around the slotted portion of the piezometer, and then place dry granular bentonite on top of the sand pack as a seal. One foot of bentonite is recommended for a good seal.

5. Dig an 8-inch nominal-diameter hole around the piezometer pipe. This hole should extend to a depth of 1.5 to 2 feet. A post-hole digger can be used for this procedure if the hole is dug prior to driving the temporary casing. The bottom 6 inches of this hole should be filled with dry granular or slurry bentonite. The remainder of the hole should be filled with concrete. A steel, locking, aboveground or flush-mount well protector should be inserted into the wet concrete to provide well-head security. A concrete pad can also be constructed around the steel well-head protector.

3.2 VAPOR SAMPLING IMPLANT INSTALLATION

Figure 11 presents diagrams of vapor sampling implants. To install vapor sampling implants, first punch a drive rod to the desired depth using an expendable point holder and an expendable point. Once at the desired sampling depth, use the following procedures:

1. Disengage the expendable point and retract the probe rod about 1 foot by raising the hydraulic punch, replacing the drive cap with a pull cap, removing the anvil, latching the pull cap onto the hydraulic hammer using its latch, and raising the hydraulic punch again using the probe lever.

2. Lock the rod into place so that it does not sink back into the hole by using vice grip pliers or a pipe wrench.

3. Unlatch the pull cap and raise the hydraulic punch again, leaving room to work freely.

4. Remove the pull cap.

5. Attach appropriate stainless-steel tubing to the vapor implant. If tubing is precut, allow 48 inches more than the required depth of the implant.

6. Insert the implant and tubing down the inside diameter of the probe rods until it stops. Note the length of the tubing inserted to ensure that the desired depth has been reached. Allow the excess tubing to extend out of the drive rod's top.

7. Pour glass beads down the inside diameter of the probe rod using a funnel to create a permeable layer around the implant.

8. Use the tubing extending from the drive rod to stir the beads into place. Do not lift up on the tubing while doing so.

9. Position the remaining tubing through the hole on a rod pull plate, and then place the drive rod through that hole.

10. Attach the plate to the hydraulic punch using its chain and slowly pull the rod up another 18 to 24 inches. While the punch pulls the rod, push down on the tubing so that it stays in place.

11. Pour bentonite seal mixture down the inside diameter of the probe rod. Stir the mixture using the tubing as before. The initial mixture may also be topped with distilled water to initiate the bentonite seal depending on the site and on the role the vapor implant is to play.

12. Pull the drive rod from the hole using the probe rod pull plate already attached, and then plug the hole using granular bentonite or a bentonite slurry mixture.

The vapor sampling implant should now be in place and the stainless steel tubing connected to it should be protruding from the ground. The vapor implant tubing should be protected by a well-head protector in the same manner as the top of the piezometer. Procedure 5 in Section 3.1 describes well-head protector installation.

4.0 ROD REMOVAL PROCEDURES

Throughout the above discussions, it has occasionally been necessary to remove drive rods and samplers. The standard removal procedures involve raising the hydraulic punch, turning off the hydraulic system, replacing the drive cap with a pull cap, removing the anvil, and then latching the pull cap under the hammer latch. The hydraulic punch can then be used to pull the rod from the ground.

Two deviations to this procedure often occur. The first deviation is necessary when sampling tubes are to be left inside the hole as the drive rod is removed, especially when soil gas implants or piezometers have been installed. Because of the presence of these sampling tubes, a pull cap cannot be screwed onto the top of the drive rod. Instead, a rod pull plate is used. This plate is a piece of steel with a hole in it large enough for a drive rod to fit through it. The plate has a hook on one end. The tubing and rod are pushed through the plate, and the pull plate is attached to the latch on the hydraulic punch by a chain. As the punch pulls up, the plate shifts, and the inside of the hole binds on the rod. This binding usually holds the rod to the plate and results in the rod being pulled up as the punch is raised.

The second deviation occurs when the rods have not been pushed perpendicular to the ground. In these cases, a specially designed chain-assisted pull cap is used. This cap looks like a pull cap but has a chain on it that fits under the latch of the hammer. Once the cap is screwed to the drive rod and latched to the probe, raising the probe raises the rod.

In a few cases, drive rods break while in the ground. To retrieve these rods, a rod extractor is used. This extractor looks something like a drill bit and is screwed to the end of a probe rod. A hammer is then used to pound the extractor into the top of the broken rod. The extractor joins the broken rod to the second drive rod so that they can be pulled out together.

5.0 BACKFILLING PROCEDURES

Unless otherwise specified in the site-specific sampling plan, holes made by sampling with Geoprobe System tools are to be backfilled with dry, fine, granular bentonite. Water may be added to activate the bentonite. Tops of the holes may then be filled with soil or concrete as necessary for each particular site.

6.0 DECONTAMINATION PROCEDURES

Between holes, the probe rods and sampling tools must be decontaminated. Because no provisions for decontamination are included in the Geoprobe System, a separate decontamination station must be provided. A wire brush, a barrel brush for reaming out the rods, and soft brushes will clean sticky soil from the probe rods and sampling tools. Follow Tetra Tech SOP No. 002 decontamination procedures when sampling soil or groundwater.

When sampling for soil gas by the standard method, Geoprobe rods and samplers are heated approximately 15 to 20 minutes by a 100,000-British thermal unit heater until they are too hot to touch with the bare hand. They are then allowed to cool before reuse. Do not heat the rods too much or the rod metal will fatigue.

When sampling for soil gas by the PRT method, the probe rods do not have to be decontaminated. However, the PRT expendable point holder and PRT adapter do need to be decontaminated. They can be heated on the dash of the vehicle with the defrost system or scrubbed in Alconox and water. Equipment blank samples can be collected, if necessary, as part of the quality control process.

Sampling plans may have different decontamination requirements. Most plans also require rinsate sample collection as part of the quality control process.

FIGURE 1

GEOPROBE SYSTEM

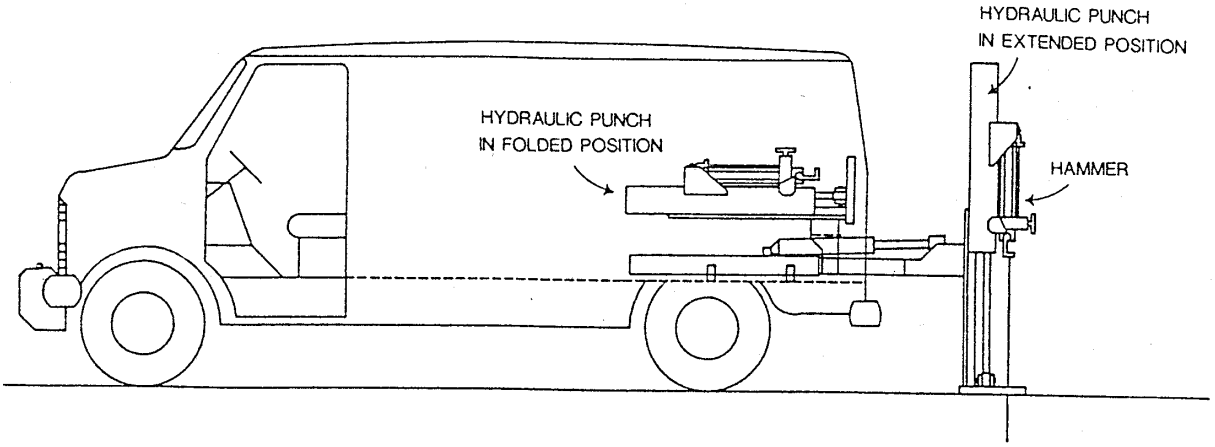
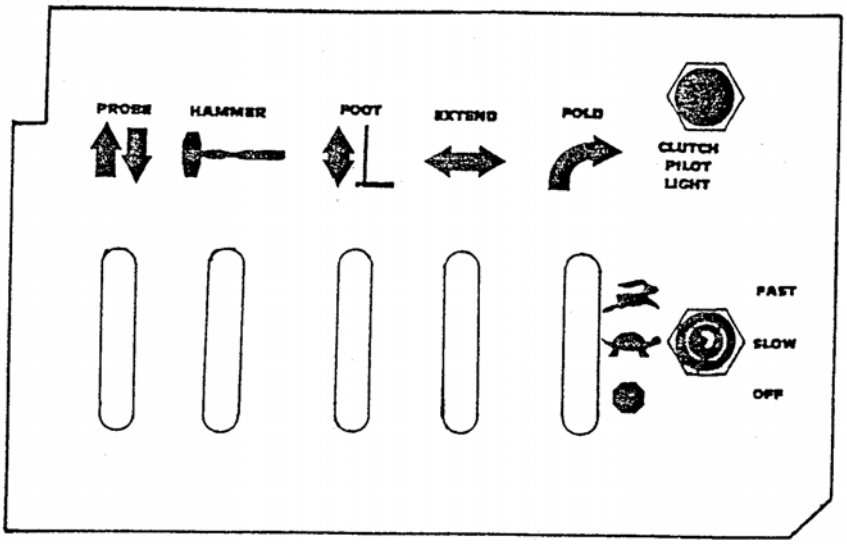
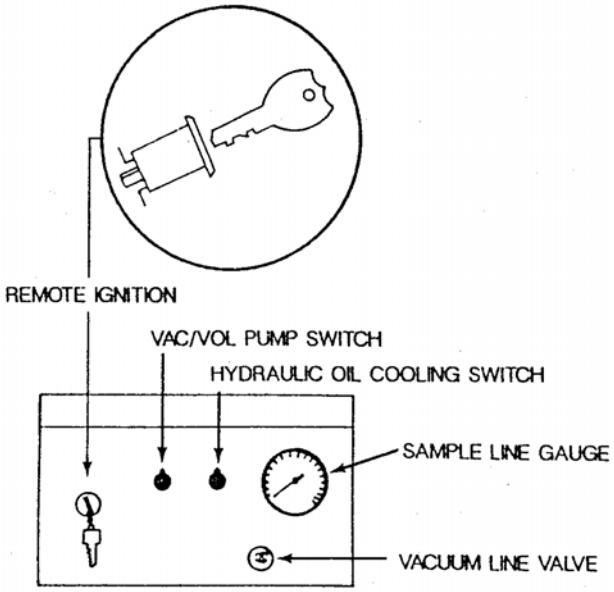


FIGURE 2

CONTROL AND VACUUM SYSTEM PANELS



CONTROL PANEL



VACUUM SYSTEM PANEL

FIGURE 3

GENERAL ACCESSORY TOOLS

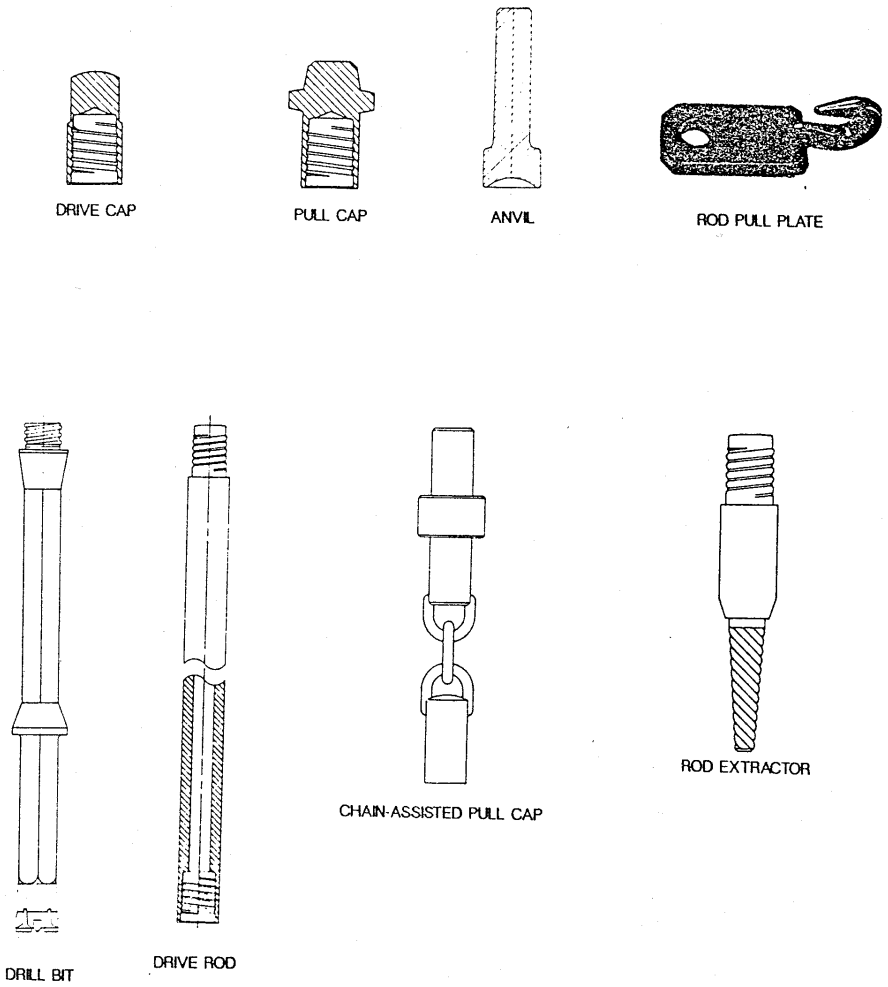
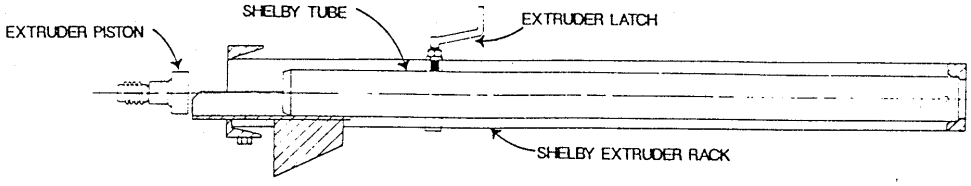


FIGURE 4

SHELBY TUBE ACCESSORIES



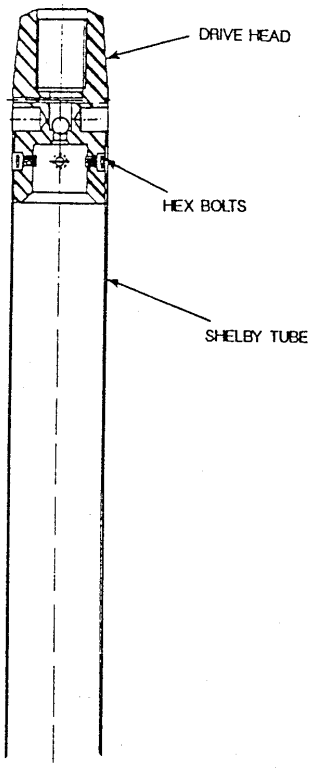
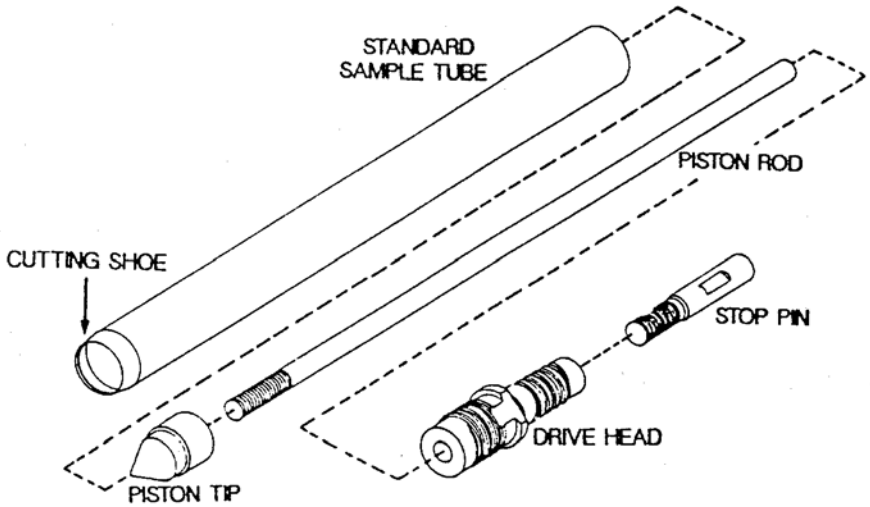


FIGURE 5

PROBE-DRIVE SYSTEM



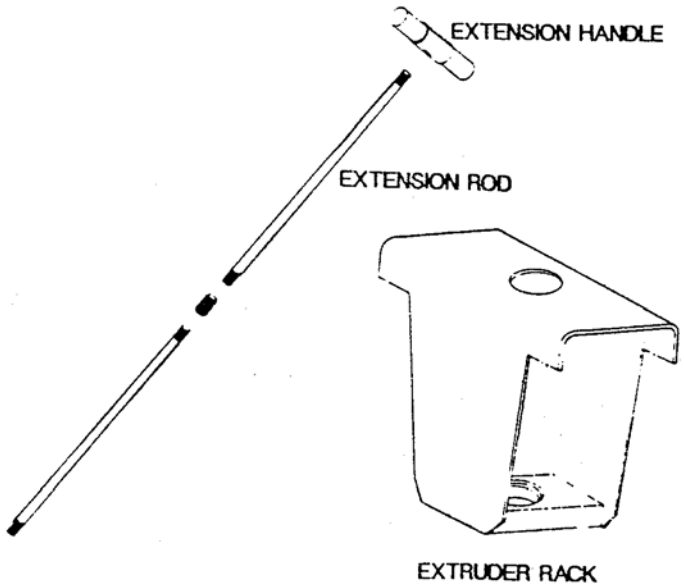
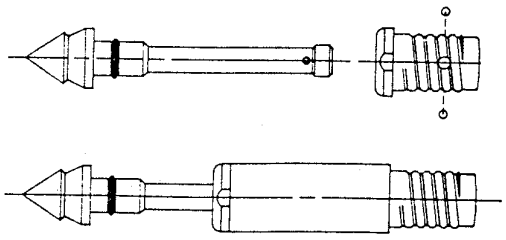
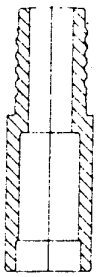


FIGURE 6

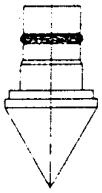
STANDARD SOIL GAS TOOLS



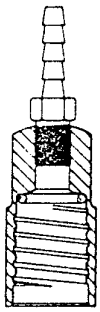
RETRACTABLE POINT HOLDER



EXPENDABLE POINT HOLDER



EXPENDABLE POINT



GAS SAMPLING CAP

FIGURE 7

POST-RUN TUBING (PRT) SYSTEM

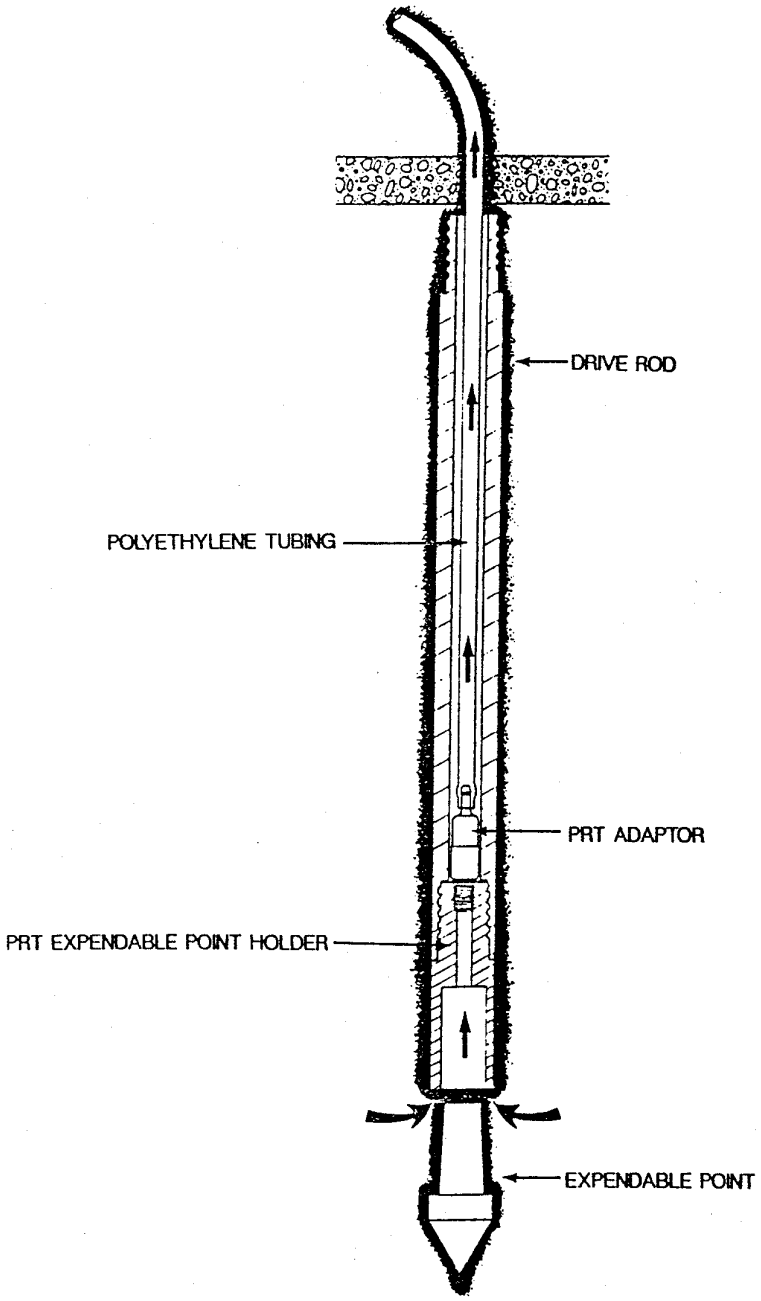
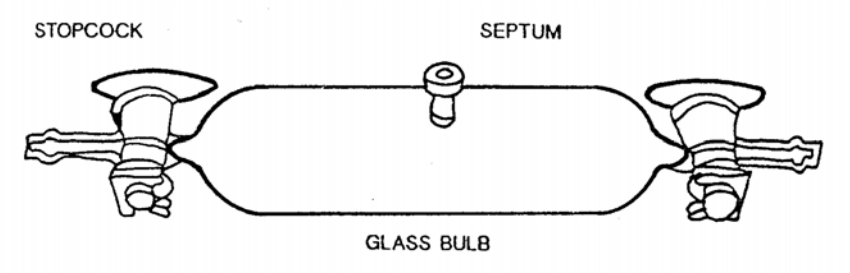


FIGURE 8

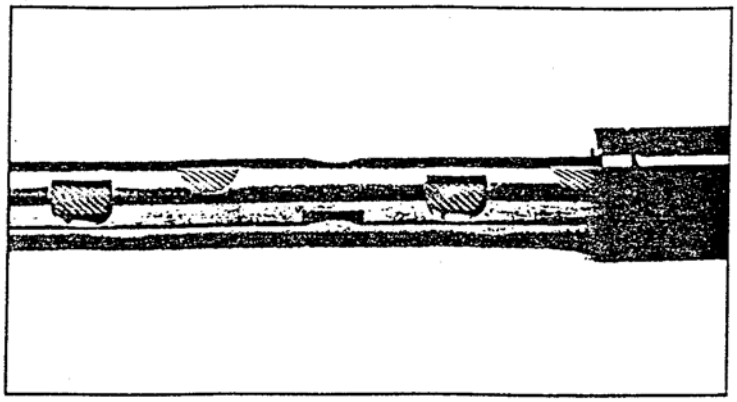
SOIL GAS SAMPLE CONTAINER



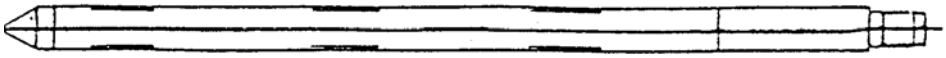
Note: Tedlar bags are also used for collection of soil gas samples; however, they are not shown on this figure.

FIGURE 9

GROUNDWATER SAMPLING TOOLS



SCREEN POINT SAMPLER IN OPEN POSITION



MILL-SLOTTED WELL POINT

FIGURE 10

PIEZOMETER INSTALLATION

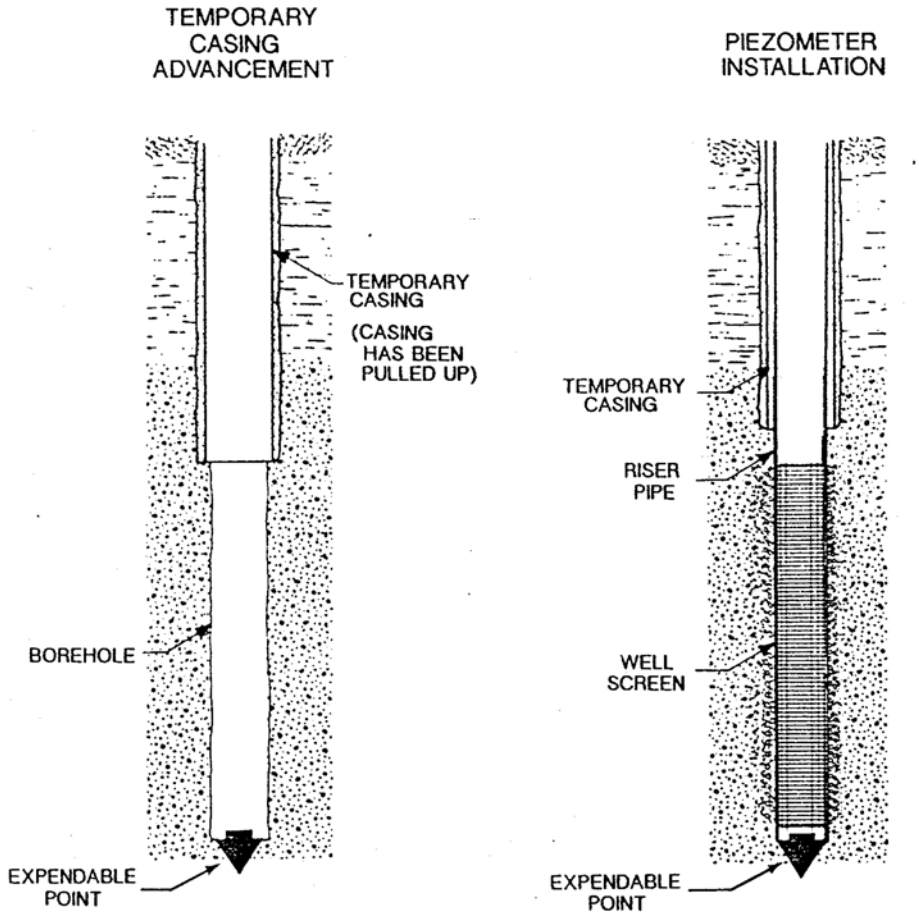
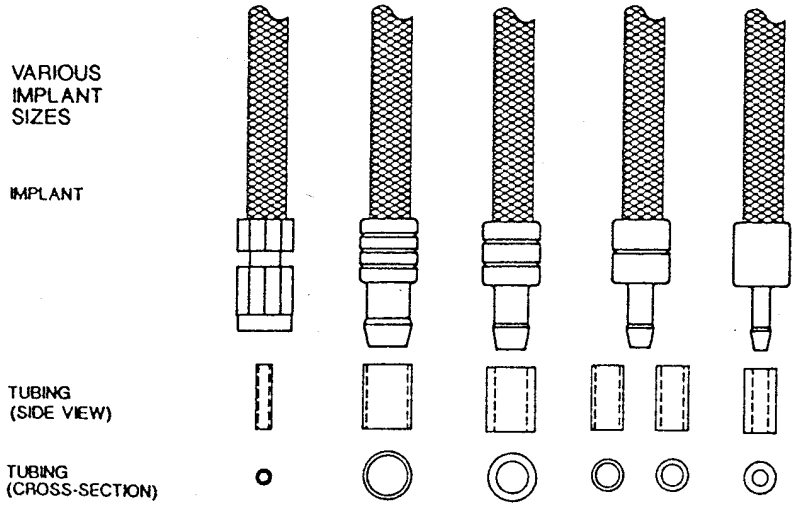
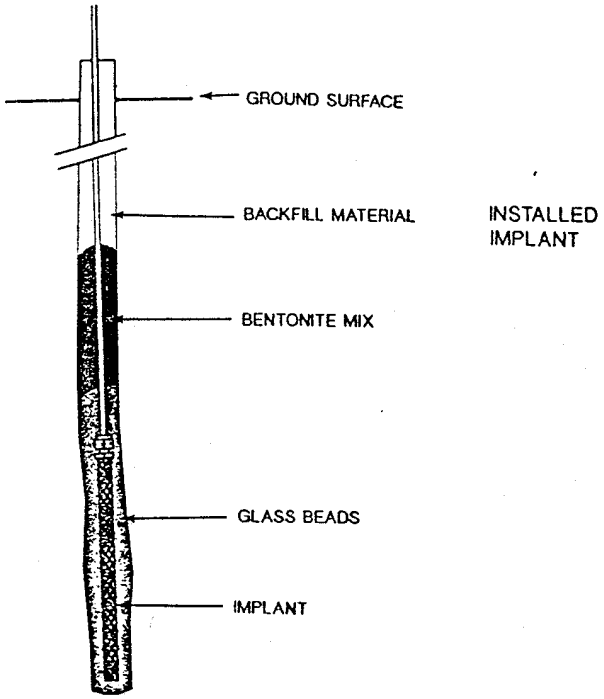


FIGURE 11

VAPOR SAMPLING IMPLANTS





SOP APPROVAL FORM

TETRA TECH EM INC.

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

FIELD MEASUREMENT OF GROUNDWATER pH, SPECIFIC CONDUCTANCE, AND TEMPERATURE USING THE YSI MODEL 3560

SOP NO. 061

REVISION NO. 1

Last Reviewed: January 2000

Quality Assurance Approved	*February 19, 1993* Date

1.0 BACKGROUND

The YSI Model 3560 water quality monitoring system can be used for determining groundwater pH, specific conductance, and temperature. The system is designed to be used in the field with a pump but can also be used with a bailer. As water is pumped through the system, temperature, temperature-compensated pH, and temperature-compensated specific conductance can be monitored simultaneously. Stable readings of the groundwater running through the sample chamber can be obtained in as little as two minutes. The continuous monitoring of these parameters helps determine when a representative sample of the groundwater has been obtained. The system is designed for simple assembly and disassembly to facilitate frequent calibration and maintenance.

The YSI 3560 consists of a water quality monitor, a temperature probe, a flow-through conductivity cell, a pH electrode assembly, an oxidation-reduction potential electrode assembly, and a sample chamber assembly. The measurement of oxidation-reduction potential is not discussed in this standard operating procedure (SOP).

1.1 PURPOSE

This SOP establishes the requirements and procedures for using the YSI Model 3560 water quality monitoring system for determining groundwater pH, specific conductance, and temperature in the field.

This instrument allows the user to visually monitor three parameters simultaneously by means of three LCD displays. The unit operates on six alkaline "D" cell batteries that will provide a minimum of 1,400 operating hours. An on/off switch controls power to the instrument. A second function switch controls each of the three ranges of specific conductance indicated on the middle display. Temperature is read out constantly in °C on the top display, and temperature-compensated specific conductance, automatically corrected to 25 °C, can be monitored. A third function switch controls the bottom display, which shows temperature-compensated pH in either pH units or millivolts (mV).

1.2 SCOPE

This SOP applies to monitoring temperature, temperature-compensated pH, and temperature-compensated specific conductance simultaneously while using the YSI 3560 water quality monitoring system in the field.

The temperature probe can be used independently as a temperature probe or in conjunction with the specific conductance or pH probe for temperature-compensated readings when attached properly to the water quality monitor. It is usable over a range of -5 °C to 50 °C with an accuracy of ±0.2 °C.

1.3 DEFINITIONS

Flow-Through Conductivity Cell: The flow-through conductivity cell is constructed of polyvinyl chloride. A 3-foot jacketed cable is attached to the cell body. Two electrodes measure specific conductance. The cell response time is 10 seconds for 95 percent reading of specific conductance changes. Accurate measurement can be made with a flow rate up to 1.5 gallons per minute. The conductivity cell constant is K = 5.0 millimhos/cm (mmhos/cm).

ph Electrode Assembly: The pH electrode is a 5.5-inch-long polymer body consisting of a silver/silver chloride reference electrode and a silver working electrode sealed in 4-molar potassium chloride gel. This gel eliminates the need to add filling solution.

Sample Chamber Assembly: The sample chamber assembly is an integral part of the YSI water quality monitoring system. It is designed to be attached to a water pump outlet but can be used as a non-flowing sample chamber. The chamber is designed to provide good mixing of fluid, so residual sample is not a problem. The sample chamber holds approximately 1 liter of sample.

1.4 REFERENCE

YSI, Inc., "YSI Model 3560 Water Quality Monitoring System Instructions, Operator's Manual."

1.5 REQUIREMENTS AND RESOURCES

The following are required to measure groundwater pH, specific conductance, and temperature using this SOP:

- YSI Model 3560 water quality measuring system
- YSI 3167, 3168, and 3169 specific conductance calibration solutions
- Buffer solutions of pH 4, 7, and 10 for pH calibration
- Distilled or deionized water
- Rinse bottle
- 50-milliliter (mL) sample cups or beakers
- Sample tubing and connectors (described in Section 2.2.1)
- Waste container to collect purge water
- Logbook or field data sheets
- Ohmmeter for testing the temperature probe (optional)

2.0 PROCEDURES

The procedures outlined in this SOP apply to using the YSI Model 3560 water quality monitoring system to measure groundwater pH, specific conductance, and temperature in the field. Procedures for testing and calibrating the YSI Model 3560 are presented first, followed by procedures for operating the instrument and making field measurements.

2.1 TESTING AND CALIBRATION PROCEDURES

This section outlines procedures for testing and calibrating the YSI Model 3560 water quality monitoring system. The instrument contains no user serviceable adjustments. If testing and calibration measurements are out of tolerance, the instrument must be serviced or repaired.

2.1.1 Calibrating the pH Electrode

The calibration frequency of the pH electrode depends on the electrode, the pH monitor and the characteristics of the water to which the electrode is exposed. Since normal life of a pH electrode is only 3 to 6 months, it is advisable to calibrate the pH system before sampling at each site. The pH electrode should be tested for background noise and appropriately offset on a daily basis.

Before connecting the pH electrode, zero the electronics with the shorting cap attached to the water quality monitor. Turn on the water quality monitor and set the pH function switch to pH. Next, connect the shorting cap to the pH input jack and set the manual temperature compensation knob to 25 °C. Then adjust the CAL control to indicate 7.00 ± 0.01 on the pH-mV display. Disconnect the shorting cap from the pH input and connect it to the mV input jack. The monitor is now zeroed.

Once it has been established that the electrode offset is functioning properly, a two-point calibration should be performed. Use pH buffers of 7.00 and 4.00 or of 7.00 and 10.00, whichever two are closer to the expected sample value. Proceed as follows to make a two-point calibration.

Rinse the pH electrode and temperature probe with pH 7.00 buffer to remove any contaminants. Connect the pH electrode to the pH input jack and the temperature probe to the TEMP input jack. Pour the pH 7.00 buffer into a 50-mL sample cup, then immerse both sensors into the buffer. Allow the sensors to equilibrate in the buffer until a stable reading is obtained. Read the temperature and manually adjust the pH temperature-compensation knob to the same value. Adjust the CAL control knob for 7.00 ± 0.01 pH units on the display and discard the buffer. Rinse the sensors with deionized or distilled water, followed by a rinse of the next desired buffer (pH 4.00 or 10.00). Fill another disposable 50-mL sample cup with the next buffer for calibration and immerse the sensors. Allow the sensors to equilibrate until a stable reading is obtained. If the temperatures of the two buffers differ by more than ±0.1 °C, the temperature should be allowed to stabilize. Adjust the SLOPE control until the display is within 0.01 pH units of the buffer's stated value. Discard the buffer and rinse the sensors with distilled or deionized water. The pH system is now calibrated and ready for use.

2.1.2 Calibrating the pH Electrode with Temperature Compensation

Follow the pH instructions in Section 2.1.1; however, the calibration procedure should be modified as indicated. Set the pH function switch to pH ATC. Connect the temperature probe to the pH ATC input jack. While the temperature probe can be used in either location, the pH ATC function will not work unless the temperature probe is connected to the pH ATC input. It is recommended that a second temperature probe be used for this operation. Manual temperature compensation is not necessary since temperature compensation is performed automatically in this mode.

2.1.3 Calibrating the Specific Conductance Probe

The designed cell constant of the flow-through conductivity cell is K = 5 mmhos/cm. The stainless steel electrodes provide different accuracies in different ranges. The cell constant can be affected by electrode fouling or mechanical shock. Therefore, it is wise to redetermine the cell constant routinely. When testing the calibration of the system, be sure to check the accuracy of the test against system specifications.

To check the cell constant, YSI 3167, 3168, 3169, or similar specific conductance calibration solutions may be used. The YSI calibration solutions are packaged eight to a box in 1-pint unbreakable plastic bottles designed for field use. The solutions are manufactured to nominal values of 1, 10, or 50 mmhos/cm at 25°C, with a ±1 percent accuracy of the stated value. A chart for uncompensated values at temperatures other than 25 °C is included with each box.

Connect the flow-through conductivity cell and temperature probe to the water quality monitor, and remove them from the sample chamber. Set the conductivity function switch to 2 ATC. Rinse the inside and outside of the cell and the probe with about 1/3 of the contents of the calibration solution bottle. Place both sensors into the remaining solution in the bottle, and allow them to come to temperature equilibrium. Make sure that the flow-through conductivity cell body is immersed so that the solution level is at least half way up the knurled portion of the cell. Read the displayed value and determine if the cell/instrument is within specified accuracy. The displayed value is corrected to 25 °C automatically and should be 1.000 ± 0.070 mmhos/cm. If the value is within specification, the measured error can be used to improve the accuracy of the system by providing a correction factor for further readings. This is done as follows:

$$\text{Corrected Sample Value} = \frac{\text{Calibration Value}}{\text{Displayed Value}} \times \text{Sample Value}$$

Calibration Value = 1.000 mmhos/cm

Displayed Value = 0.978 mmhos/cm

Sample Value = 0.634 mmhos/cm

0.648 mmhos/cm = [(1.000 mmhos/cm)/(0.978 mmhos/cm)] x 0.634 mmhos/cm

Discard the calibration solution once the accuracy of the system has been determined. It has been contaminated and should not be reused. If system accuracy is out of specification, see Warranty and Shipping Information for repair instructions.

2.1.4 Testing the Temperature Probe (Optional)

The temperature probe is assembled with a thermistor and may be tested using an ohmmeter. With the sheath of the probe submerged in a 0.0 °C ± 1 °C ice bath, thermistor resistance can be compared to the following values:

Across pins A and B = 94.98 K ± 482 ohms

Across pins B and C = 15.59 K ± 103 ohms

Across pins A and C = 114.6 K ± 585 ohms

Across pins B and D = 0 K ± 1 ohms

If any measurement is out of tolerance, the temperature probe should be repaired or replaced.

2.2 OPERATING PROCEDURES

Operation of the YSI 3560 is discussed below, including hooking up the pump and measuring groundwater temperature, specific conductance (with and without automatic temperature compensation), and pH (with and without automatic temperature compensation).

2.2.1 Hooking up the Pump

The YSI 3560 water quality monitoring system may be connected to the pump outlet at any time during the purging-pumping process as long as the flow rate does not exceed 1.5 gallons per minute. The system is normally connected prior to starting the pump so that constant parameter monitoring may be achieved and the point for logging the representative sample values can be determined. Because of sample chamber construction, it is very important that a 1.5-gallon-per-minute sample flow not be exceeded; otherwise, leakage may occur. Small hose clamps or rubber bands may be used, as appropriate, to tighten seals and avoid leakage that sometimes may occur after properly hooking up the pump.

The outlet from the pump must first be prepared for the sample chamber input. Inlet and outlet lines for the sample chamber assembly are cut to the length desired from the 10-foot-long plastic tubing supplied. Insert a tube-hose stem adapter into each end of the inlet tubing. This section connects the pump outlet to the sample chamber inlet. Insert a third tube-hose stem adapter into one end of the outlet tubing. This goes from the sample chamber to a waste container.

Next, the sample chamber assembly is connected to a 1/2-inch or 3/8-inch outer diameter (OD) pump outlet by using the appropriate straight union connector supplied. For a 1/2-inch-OD pump outlet, use the straight-union connector with two 1/2-inch-ID ports. For a 3/8-inch-OD pump outlet, use the straight-union connector that has one 3/8-inch-ID port and one 1/2-inch-ID port. Hand-tighten the appropriate port of the straight union connector at the pump outlet. Insert one end of the previously constructed sample chamber inlet tubing into the opposite port of the straight-union connector at the pump outlet and hand-tighten it.

Insert the other end of the constructed inlet tubing into an elbow until it stops. Then insert the elbow into the top of the flow-through conductivity cell and push down until it stops. Two internal O-rings in the cell serve as water seals.

The constructed end of the outlet tubing with the inserted tube-hose stem adapter is then pushed into another elbow until it stops. Then the elbow is inserted into the outlet port of the sensor mounting plate of the sample chamber and pushed down until it stops. There is a double O-ring seal here too.

Install the sensors that will be used into the sensor mounting plate in their respective ports. The sensor ports not in use must have plugs (provided with the YSI 3560 system) installed to close off the sample chamber. The input jacks are marked for proper placement of each connector. The temperature, conductivity, pH, automatic temperature-compensation probe inputs, and the recorder output have male connectors. The pH electrode comes with a connector that has a very low water integrity and so its “boot” should be installed over its connector. With the sensors attached to the water quality monitor, place all the cables from the sample chamber into the black cable harness provided with the YSI 3560 system. The harness is slotted for easy cable installation. The system is now ready for operation.

With the system connected to the pump, begin pumping according to the pump manufacturer’s instructions. Turn on the water quality monitor. Before recording any values, make sure the sample chamber is full, that all air is voided, and that all of the displayed values are stable.

2.2.2 Measuring pH

To measure pH, connect the pH electrode to the water quality monitor, and set the pH function switch to pH. Install the electrode into its port in the sample chamber assembly. Though the instrument and electrode have been calibrated at one temperature, they can be used at other temperatures as long as the manual temperature knob is reset to the new sample temperature before final pH values are determined. Be sure to reset the dial to the temperature indicated by the top display. Though pH is temperature dependent, it is not customarily corrected to 25 °C, as specific conductance often is; pH changes with temperature at the rate of 0.355 percent/1 °C from the calibration point.

When measuring pH with no electrode connected to the mV input, the shorting cap attached to the water quality monitor should be on the mV input jack.

2.2.3 Measuring Automatically Temperature-Compensated pH

To measure automatically temperature-compensated pH, a temperature probe and the pH electrode must be connected to the water quality monitor. As long as the pH ATC mode is being used, the temperature probe must remain connected to the pH ATC input jack or else the pH display will show an underrange negative value, or an overrange value greater than 14.00; both values are outside of the pH range of 0.00 to 14.00 and cannot be adjusted into the measurable pH range.

Install the electrode into the sample chamber assembly in its appropriate port, and the temperature probe into the pH ATC port. Though the instrument and sensors have been calibrated at one temperature, they can be used at other temperatures, since temperature changes from the calibration point will be automatically corrected to the new value. When measuring pH with no electrode connected to the mV input, the shorting cap attached to the water quality monitor should be on the mV input jack.

2.2.4 Measuring Specific Conductance

To measure specific conductance, connect the flow-through conductivity cell to the water quality measurement. Set the conductivity function switch to 2 and observe the displayed value after the reading is stable. The display reads out in mmhos/cm. If no cell or a dry cell is attached to the water quality monitor, the display will read 000 (±002) with the appropriate decimal point.

If the overrange signal (1.___) is displayed, the specific conductance of the water being tested is greater than 1.999 mmhos/cm. Reset the function switch to 20. If the overrange signal is still displayed, reset to 100. If the overrange signal is still displayed, the specific conductance is greater than 100.0 mmhos/cm and the water quality monitor cannot be used for specific conductance determination.

2.2.5 Measuring Automatically Temperature-Compensated Specific Conductance

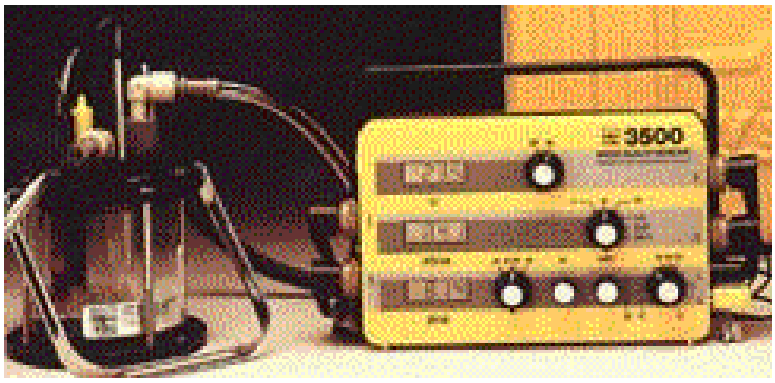
To measure automatically temperature-compensated specific conductance, connect the temperature probe and the flow-through conductivity cell to the water quality monitor, and set the conductivity function switch to the correct automatic temperature-compensated specific conductance range. Readings are automatically compensated by 2 percent/1 °C to 25 °C. The temperature probe must be located in the sample being tested for the automatic compensation to work correctly. If no temperature probe is connected to the monitor, the display will show the overrange signal (1.___).

2.2.6 Measuring Temperature

To measure temperature, connect the temperature probe to the water quality monitor. Temperature is measured in °C and is shown continuously on the top display. With no probe attached, the water quality monitor display will read -34.0 ± 0.2 °C.

FIGURE 1

THE YSI 3560 WATER QUALITY MONITORING SYSTEM



SOP APPROVAL FORM

TETRA TECH EM INC.

ENVIRONMENTAL STANDARD OPERATING PROCEDURE

FIELD MEASUREMENT OF WATER TURBIDITY

SOP NO. 088

REVISION NO. 1

Last Reviewed: November 1999

	May 20, 1993
Quality Assurance Approved	Date

1.0 BACKGROUND

Turbidity is the appearance of opaqueness or cloudiness in a liquid resulting from the presence of suspended solid matter. The measurement of turbidity offers an indirect way to evaluate the concentration of suspended solid matter. Tetra Tech EM Inc. uses a LaMotte Company Model 2008 Turbidity Meter or equivalent to measure the turbidity of aqueous samples. Typically, turbidity measurements help evaluate the effectiveness of monitoring well development procedures or well purging procedures prior to sampling.

1.1 PURPOSE

This standard operating procedure (SOP) establishes the requirements and procedures for obtaining turbidity measurements in the field.

1.2 SCOPE

This SOP applies only to use of the LaMotte Company Model 2008 Turbidity Meter. The model 2008 operator's manual should be consulted for a more detailed description of the instrument. Equivalent instrumentation may be used if the Model 2008 is not available.

1.3 DEFINITIONS

Nephelometry: The measurement of the amount of light scattered at right angles when a beam of light is passed through a water sample. The measurement is reported in nephelometric turbidity units (NTUs).

1.4 REFERENCES

LaMotte Company. "Model 2008 Turbidity Meter Operator's Manual."

LaMotte Company. "LaMotte 2008 Turbidity Meter Trouble Shooting Guide." On-Line Address: http://lamotte.com/web-site/sideframe/techtips/general/2008met.htm

1.5 REQUIREMENTS AND RESOURCES

The equipment required to obtain turbidity measurements in the field are as follows:

- LaMotte Company Model 2008 Turbidity Meter or equivalent with standard solutions
- One 40-mL volatile organics analysis (VOA) clear glass sample vial
- Lint-free absorbent wipes

2.0 PROCEDURE

The following sections describe both calibration and operation of the LaMotte Company Model 2008 Turbidity Meter (Figure 1). Specifications for the Model 2008 are summarized in Table 1.

2.1 CALIBRATION

The LaMotte Company Model 2008 Turbidity Meter is actually calibrated at the factory; however, two standard solutions are supplied with the instrument to check the calibration of the meter in the field. To check the calibrations the standard solution closest to the anticipated sample reading is placed in the meter. The standardize control (Figure 1) is then used to adjust the meter so the display reads the known value of the standard selected. Standardizing the meter is typically completed before a series of measurements to assure the accuracy of the readings.

2.2 OPERATION

The instrument operation procedures are as follows:

1. Pour a small amount of sample into the 40-mL VOA sample vial to rinse the vial, and then discard the rinse liquid. Fill the sample vial to its neck, taking care to pour the sample gently down the side to avoid creating air bubbles.

2. Cap the sample vial and, while holding the sample vial by the cap only, wipe the outside surface of the vial with a clean, lint-free, absorbent wipe until the sample vial is dry and smudge free. Handling the sample vial only by its cap will avoid problems from

fingerprints. Set the sample vial aside on a clean surface that will not contaminate or scratch the bottom of the sample vial.

3. Select the appropriate range on the meter (0-20 NTU or 0-200 NTU).

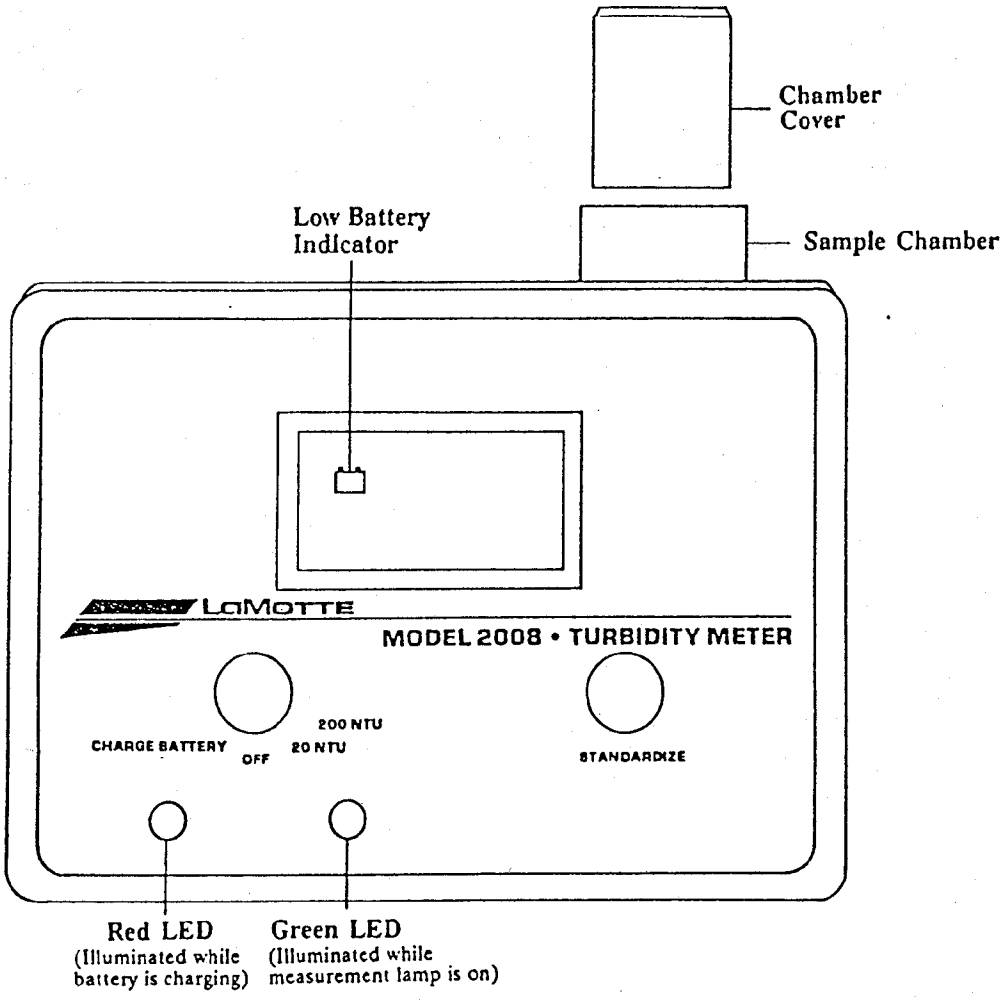
4. Insert the sample vial into the sample chamber. Make sure the sample vial is seated on the bottom and the chamber is capped. The reading should stabilize within 15 seconds. Record the reading in the logbook and withdraw the sample vial.

5. Decontaminate the vial in accordance with SOP No. 002, "General Equipment Decontamination," between samples.

When the batteries in the turbidity meter are low, the indicator light will come on. Initially the instrument, though, will continue to function and provide accurate readings. At the end of the useful charge, readings will appear to drift. The batteries must be recharged at this point, or they may not recharge properly. The instrument can be operated while being recharged.

FIGURE 1

LAMOTTE COMPANY MODEL 2008 TURBIDITY METER



Reproduced from LaMotte Company, Chestertown, Maryland.

TABLE 1

SPECIFICATIONS FOR THE MODEL 2008 TURBIDITY METER

METER

Range:	0-19.99 and 0-199.9 NTU Full Scale
Measurement Accuracy:	±2% of reading or 0.05 NTU, whichever is greater.
Display:	0.5" Liquid Crystal Display
Warm Up Time (to specified accuracy):	less than 15 seconds

PHOTOMETRIC DATA

Photodetector:	Silicon photodiode, centered at 90E to the incident light path.
Lamp:	Tungsten, lens-end long life, operated at a color temperature of 2230EK. Distance traversed by incident light and scattered light within the sample tube is 2.5 cm.
Lamp Life:	Approximately 10,000 hours

CONTROL PANEL

Range Selector:	4-position: Charge only/Off/0-20 NTU/0-200 NTU
Standardize:	For standardizing instrument with AMCO™ standards.

POWER REQUIREMENTS

Operates from internal Ni-Cad rechargeable batteries (not user replaceable)

D.C. Operation:	Requires 9V, 500 ma (nominal) source - operation is possible on any D.C. source between 9 & 16 volts capable of supplying at least 300 ma.
A.C. Operation:	Is possible via A.C. adapter (120 VAC input, 9V, 500 ma output)

METER HOUSING

Material:	ABS
Dimensions:	7 1/2"L x 5 3/8"H x 2 3/4"W
Weight:	2.4 lbs.

OPTIONAL CARRYING CASE

Material:	High Density Polyethylene Case
Dimensions:	10"L x 13 1/2"W x 6 1/8"H
Weight:	8 lbs.

Reproduced from LaMotte, Chestertown, Maryland.

APPENDIX B
WELL DEVELOPMENT FORMS

APPENDIX B-1
EXISTING WELLS THAT WERE REDEVELOPED

Site 1

Well Development forms were not available for the following existing monitoring wells located at Site 1 during report development:

Well ID	Installation Date
BAT-1-H	9/18/1997
BAT-1-I	9/18/1997
MW-11L	6/25/1990
MW-51U	11/19/1991
PZ-1-6	12/5/1991
PZ-1-8	12/5/1991
PZ-1-9	12/5/1991

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. BW-1-1

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 10/18/2004
Date(s) of Development: 9/6/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 3.4-13.4
Total Length of Well Casing: 13.40
Measured Total Depth (TOC): Initial 13.31; Final 13.35
Initial Depth to Water (TOC): 8.96 Date: 9/6/2007 Time: 10:37
Stabilized Depth to Water (TOC): 8.96 Date: 9/6/2007 Time: 11:53

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 4.35 Ft. of water
x 0.163 Gallons/Foot
= 0.71 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 2.13 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
28	1 gpm	11:30	20.2	8.11	65.3	36	Pump at 11 feet. Cloudy
31	1 gpm	11:33	20.5	8.10	65.1	13	Clear
32	1 gpm	11:34	20.5	8.10	65.0	9	Clear
33	1 gpm	11:35	20.5	8.09	65.6	9	Clear
34	1 gpm	11:36	19.8	8.09	65.7	8	Clear
35	1 gpm	11:37	19.8	8.08	65.7	5	Clear
36	1 gpm	11:38	20.0	8.08	65.5	6	Clear
38	1 gpm	11:40	20.0	8.07	64.9	1	Clear
39	1 gpm	11:41	19.9	8.07	65.0	1	Clear
40	1 gpm	11:42	19.9	8.07	64.8	1	Clear

Development Completed at 40 Gallons Discharged. Date: 9/6/2007 Time: 11:42
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. BW-1-2

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation 10/18/2004
Date(s) of Development 9/6/2007
Personnel/Company J. Vaughn/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 4.2-14.2
Total Length of Well Casing 14.20
Measured Total Depth (TOC) Initial 14.31
Final 14.35
Initial Depth to Water (TOC) 7.49 Date 9/6/2007 Time 09:15
Stabilized Depth to Water (TOC) 7.49 Date 9/6/2007 Time 10:34

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 6.82 Ft. of water
x 0.163 Gallons/Foot
= 1.11 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.33 Gallons
Actual Purge Volume: 45 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTu
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
36	1 gpm	10:15	21.2	7.83	52.4	23	Pump at 11 feet. Clear.
37	1 gpm	10:16	21.0	7.91	52.6	13	Clear
38	1 gpm	10:17	21.7	7.93	52.4	10	Clear
39	1 gpm	10:18	20.9	7.94	53.0	5	Clear
40	1 gpm	10:19	21.0	7.94	52.8	5	Clear
41	1 gpm	10:20	20.8	7.95	53.5	2	Clear
42	1 gpm	10:21	20.6	7.94	53.4	2	Clear
43	1 gpm	10:22	20.9	7.94	53.6	1	Clear
44	1 gpm	10:23	20.5	7.94	53.0	1	Clear
45	1 gpm	10:24	20.9	7.94	52.8	1	Clear

Development Completed at 45 Gallons Discharged. Date: 9/6/2007 Time: 10:25
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. BW-1-3

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 10/18/2004
Date(s) of Development: 9/6/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 4-14
Total Length of Well Casing: 14
Measured Total Depth (TOC): Initial 14.14; Final 14.15
Initial Depth to Water (TOC): 6.44 Date 9/6/2007 Time 07:39
Stabilized Depth to Water (TOC): 6.47 Date 9/6/2007 Time 09:12

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.70 Ft. of water
x 0.163 Gallons/Foot
= 1.26 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.77 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
30	1 gpm	08:35	18.17	6.62	48.6	135	Pump at 11 feet. Cloudy.
33	1 gpm	08:38	19.9	6.95	49.3	104	Cloudy
35	1 gpm	08:40	20.3	7.12	49.3	58	Cloudy
37	1 gpm	08:42	20.4	7.21	49.1	41	Cloudy
39	1 gpm	08:44	20.3	7.24	49.3	21	Cloudy
41	1 gpm	08:46	20.4	7.28	49.1	11	Clear
42	1 gpm	08:47	20.5	7.30	48.9	13	Clear
44	1 gpm	08:49	20.4	7.31	49.1	6	Clear
45	1 gpm	08:50	20.5	7.33	48.8	3	Clear
47	1 gpm	08:52	20.4	7.35	48.9	4	Clear
48	1 gpm	08:53	20.4	7.36	49.1	1	Clear
49	1 gpm	08:54	20.4	7.36	49.1	1	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. BW-1-3

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
50	1 gpm	08:55	20.5	7.36	48.9	1	Clear

Development Completed at 50 Gallons Discharged. Date: 9/6/2007 Time: 08:56

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-11U

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 6/26/1990
Date(s) of Development: 9/5/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.06; Final 15.26
Initial Depth to Water (TOC) 6.94 Date 9/5/2007 Time 09:50
Stabilized Depth to Water (TOC) 6.97 Date 9/5/2007 Time 12.05

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.12 Ft. of water
x 0.163 Gallons/Foot
= 1.32 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.97 Gallons
Actual Purge Volume: 35 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTu
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
24	1 gpm	11:23	21.1	7.44	63.2	Unknown	Pump at 11 ft. Water clear. Turbidity meter fluctuating
26	1 gpm	11:25	20.8	7.53	63.8	Unknown	Clear
29	1 gpm	11:28	20.6	7.59	64.1	Unknown	Clear
31	1 gpm	11:30	20.5	7.68	63.7	8	Clear
32	1 gpm	11:31	20.6	7.71	63.6	7	Clear
33	1 gpm	11:32	20.5	7.74	63.4	7	Clear
35	1 gpm	11:34	20.5	7.76	63.6	7	Clear

Development Completed at 35 Gallons Discharged. Date: 9/5/2007 Time: 11:35
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-14 (Site 1)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/26/2007
Personnel/Company: Lauren Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 14.8 ft; Final ft
Initial Depth to Water (TOC): 9.17 ft Date 9/26/2007 Time 0940
Stabilized Depth to Water (TOC): 9.57 ft Date 9/26/2007 Time 1055

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 5.63 Ft. of water
x 0.163 Gallons/Foot
= 0.92 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 2.75 Gallons
Actual Purge Volume: 25 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 13 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
21	1 gpm	1036	18.4	8.58	28.7	6	Pump at 13ft, Clear, no odor, no color
22	1 gpm	1037	18.4	8.56	28.6	6	Same as above
23	1 gpm	1038	17.9	8.57	28.7	5	Same as above
24	1 gpm	1039	18.4	8.57	28.9	4	Same as above
25	1 gpm	1040	18.4	8.57	28.7	5	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-14 (Site 1)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
25 gal.	1 gpm	1040	18.4	8.57	28.7	5	Pump at 13ft, Clear, no odor, no color

Development Completed at 25 Gallons Discharged. Date: 9/26/2007 Time: 1040
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-15L (Site 1)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/22/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 14-19
Total Length of Well Casing: 19
Measured Total Depth (TOC): Initial 19.42 ft; Final 19.44 ft
Initial Depth to Water (TOC): 8.11 ft Date 9/22/2007 Time 0803
Stabilized Depth to Water (TOC): 8.29 ft Date 9/22/2007 Time 0919

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.31 Ft. of water
x 0.163 Gallons/Foot
= 1.84 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.52 Gallons
Actual Purge Volume: 35 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
25	1 gpm	0859	18.9	7.04	42.8	42	Cloudy
27	1 gpm	0901	18.5	7.42	43.8	9	Clear
28	1 gpm	0902	18.2	7.56	44.2	4	Clear
29	1 gpm	0903	18.4	7.66	44.2	3	Clear
31	1 gpm	0905	18.6	7.73	44.2	1	Clear
32	1 gpm	0906	18.7	7.79	44.4	2	Clear
33	1 gpm	0907	18.6	7.82	44.4	1	Clear
35	1 gpm	0909	18.4	7.83	44.5	1	Clear

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-15-L (Site 1)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
35 gal.	1 gpm	0909	18.4	7.83	44.5	1 NTU	Clear

Development Completed at 35 Gallons Discharged. Date: 9/22/2007 Time: 0909

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-16L (Site 1)

Project: Well Development
Project No.: I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/22/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 20-25
Total Length of Well Casing: 25
Measured Total Depth (TOC): Initial 24.22 ft; Final 24.40 ft
Initial Depth to Water (TOC): 8.44 ft Date 9/22/2007 Time 0940
Stabilized Depth to Water (TOC): 8.65 ft Date 9/22/2007 Time 1112

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 15.78 Ft. of water
x 0.163 Gallons/Foot
= 2.57 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.71 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 23 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
33	1 gpm	1043	17.8	8.02	58.4	42	Slightly cloudy
35	1 gpm	1045	17.8	8.01	58.4	42	Slightly cloudy
37	1 gpm	1047	17.7	7.99	58.4	25	Mostly clear
39	1 gpm	1049	17.7	7.98	58.5	19	Clear
41	1 gpm	1051	17.8	7.98	58.4	15	Clear
43	1 gpm	1053	17.9	7.97	58.2	15	Clear
45	1 gpm	1056	17.8	7.97	58.4	17	Clear
48	1 gpm	1059	17.7	7.97	58.4	17	Clear
50	1 gpm	1101	17.6	7.97	58.5	14	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-16L (Site 1)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
50 gal.	1 gpm	1101	17.6	7.97	58.5	14 NTU	Clear

Development Completed at 50 Gallons Discharged. Date: 9/22/2007 Time: 1101

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-16U (Site 1)

Project Well Development
Project No. 14302.300.04.10
Date(s) of Installation _____
Date(s) of Development 9/22/2007
Personnel/Company Richard Knapp/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 10-15
Total Length of Well Casing 15
Measured Total Depth (TOC) Initial 13.40 ft
Final 15.10 ft
Initial Depth to Water (TOC) 8.41 ft Date 9/22/2007 Time 0947
Stabilized Depth to Water (TOC) 8.55 ft Date 9/22/2007 Time 1148

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 4.99 Ft. of water
x 0.163 Gallons/Foot
= 0.81 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 2.43 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 13 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
31	1 gpm	1131	19.1	7.96	45.5	2	Clear
32	1 gpm	1132	19.0	7.90	45.1	1	Clear
34	1 gpm	1134	19.3	7.85	45.6	1	Clear
35	1 gpm	1135	19.4	7.81	45.7	1	Clear
37	1 gpm	1137	19.0	7.79	45.8	1	Clear
39	1 gpm	1139	19.1	7.78	45.8	1	Clear
40	1 gpm	1140	19.1	7.77	45.9	1	Clear

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-16LU (Site 1)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
40 gal.	1 gpm	1140	19.1	7.77	45.9	1 NTU	Clear

Development Completed at 40 Gallons Discharged. Date: 9/22/2007 Time: 1140

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-17 (Site 1)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/22/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 14.61 ft; Final 15.35 ft
Initial Depth to Water (TOC): 6.14 ft Date 9/22/2007 Time 1209
Stabilized Depth to Water (TOC): 6.15 ft Date 9/22/2007 Time 1612

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.47 Ft. of water
x 0.163 Gallons/Foot
= 1.38 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.14 Gallons
Actual Purge Volume: 12 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 0.2 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 0.2 gpm @ 8 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
7	0.2 gpm	1424	20.6	7.96	54.8	62	Cloudy
7.6	0.2 gpm	1427	19.6	7.84	54.9	95	Cloudy
8.3	0.2 gpm	1431	19.7	7.78	54.9	101	Cloudy
8.9	0.15 gpm	1435	20.2	7.68	55.6	68	Slightly cloudy
9.5	0.2 gpm	1456	19.9	7.86	55.0	53	Slightly cloudy
10.1	0.2 gpm	1459	20.2	7.75	54.8	37	Clear
10.7	0.2 gpm	1502	19.8	7.70	54.5	23	Clear
11.3	0.2 gpm	1505	19.3	7.69	55.3	18	Clear
11.7	0.2 gpm	1507	19.9	7.65	55.1	14	Clear
12	0.15 gpm	1509	19.7	7.64	55.0	12	Cler

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-~~11~~ 17 (Site 1)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60 gal.	1 gpm	0901	18.6	7.36	67.8	1	Pump at 20ft, Clear, no odor, no color

Development Completed at 60 Gallons Discharged. Date: 9/26/2007 Time: 0901
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-50L

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 6/18/1991
Date(s) of Development: 9/5/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 11.8-21.8
Total Length of Well Casing: 21.8
Measured Total Depth (TOC): Initial 21.52; Final 21.54
Initial Depth to Water (TOC): 6.27 Date: 9/5/2007 Time: 11:57
Stabilized Depth to Water (TOC): 6.33 Date: 9/5/2007 Time: 13:13

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 15.25 Ft. of water
x 0.163 Gallons/Foot
= 2.49 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.46 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
31	1 gpm	13:14	19.1	8.02	61.7	17	Pump at 20 ft bgs. Clear
32	1 gpm	13:15	18.7	8.01	62.2	17	Clear
34	1 gpm	13:16	18.7	8.01	61.9	15	Clear
35	1 gpm	13:17	18.5	8.01	61.8	9	Clear
36	1 gpm	13:18	18.4	8.01	62.0	10	Clear
37	1 gpm	13:19	18.3	8.01	62.1	10	Clear
38	1 gpm	13:20	18.3	8.00	61.5	8	Clear
39	1 gpm	13:21	18.3	8.01	61.2	8	Clear
40	1 gpm	13:22	18.1	8.01	61.0	7	Clear

Development Completed at 40 Gallons Discharged. Date: 9/5/2007 Time: 13:25
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-51L (Site 1)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 9/2262007
Personnel/Company Lauren Mancuso/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 16-26
Total Length of Well Casing 15
Measured Total Depth (TOC) Initial 26.88 ft
Final 26.88 ft
Initial Depth to Water (TOC) 9.38 ft Date 9/26/2007 Time 0724
Stabilized Depth to Water (TOC) 9.43 ft Date 9/26/2007 Time 0914

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 17.5 Ft. of water
x 0.163 Gallons/Foot
= 2.85 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 8.56 Gallons
Actual Purge Volume: 60 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 20 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
56	1 gpm	0857	17.8	6.92	68.7	1	Pump at 20ft, Clear, no odor, no color
57	1 gpm	0858	18.3	7.13	68.5	0	Same as above
58	1 gpm	0859	18.1	7.22	67.9	0	Same as above
59	1 gpm	0900	18.5	7.33	68.0	0	Same as above
60	1 gpm	0901	18.6	7.36	67.8	1	Same as above

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-50U

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 6/19/1991
Date(s) of Development: 9/5/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 6-16
Total Length of Well Casing: 21.8
Measured Total Depth (TOC): Initial 14.93; Final 15.17
Initial Depth to Water (TOC) 6.25 Date 9/5/2007 Time 13:34
Stabilized Depth to Water (TOC) 6.30 Date 9/5/2007 Time 14:50

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.68 Ft. of water
x 0.163 Gallons/Foot
= 1.41 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.24 Gallons
Actual Purge Volume: 39 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 10 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
30	1 gpm	14:26	19.4	8.30	60.7	15	Pump at 10 ft. Clear.
31	1 gpm	14:27	18.6	8.23	60.8	11	Clear
32	1 gpm	14:28	18.1	8.18	60.5	9	Clear
33	1 gpm	14:29	18.5	8.16	60.5	7	Clear
34	1 gpm	14:30	18.6	8.13	60.3	7	Clear
35	1 gpm	14:31	18.3	8.11	60.6	6	Clear
36	1 gpm	14:32	18.1	8.10	60.8	5	Clear
37	1 gpm	14:33	18.5	8.09	60.7	6	Clear
38	1 gpm	14:34	18.1	8.08	60.5	6	Clear
39	1 gpm	14:35	18.6	8.07	60.6	6	Clear

Development Completed at 39 Gallons Discharged. Date: 9/5/2007 Time: 14:36
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-68

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/15/1996
Date(s) of Development: 9/5/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 4.0-14
Total Length of Well Casing: 17
Measured Total Depth (TOC): Initial 16.12; Final 16.22
Initial Depth to Water (TOC): 4.94 Date: 9/5/2007 Time: 14:55
Stabilized Depth to Water (TOC): 4.97 Date: 9/5/2007 Time: 16:14

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.27 Ft. of water
x 0.163 Gallons/Foot
= 1.84 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.51 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 10 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
34	1 gpm	16:00	22.0	8.40	58.2	3	Clear
36	1 gpm	16:02	20.8	8.29	57.5	5	Clear
37	1 gpm	16:03	19.0	8.23	57.9	6	Clear
38	1 gpm	16:04	19.6	8.20	57.7	4	Clear
39	1 gpm	16:05	20.4	8.17	57.3	4	Clear
40	1 gpm	16:06	20.2	8.15	57.1	4	Clear

Development Completed at 40 Gallons Discharged. Date: 9/5/2007 Time: 16:08
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-69

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/15/1996
Date(s) of Development: 9/5/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 22
Measured Total Depth (TOC): Initial 22.40; Final 22.40
Initial Depth to Water (TOC): 7.57 Date 9/5/2007 Time 16:19
Stabilized Depth to Water (TOC): 7.61 Date 9/5/2007 Time 18:30

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 14.83 Ft. of water
x 0.163 Gallons/Foot
= 2.42 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.25 Gallons
Actual Purge Volume: 55 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 10 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
27	1 gpm	17:48	22.0	8.59	39.1	Did not measure	Pump at 15 feet. Turbidity variable. Cloudy.
30	1 gpm	17:51	20.3	8.35	38.9	263	Cloudy
33	1 gpm	17:53	19.8	8.25	39.7	128	Cloudy
35	1 gpm	17:55	20.0	8.17	39.3	53	Cloudy
37	1 gpm	17:57	20.1	8.11	39.4	26	Clear
39	1 gpm	17:59	19.9	8.09	39.3	28	Clear
41	1 gpm	18:01	19.7	8.07	39.3	24	Clear
42	1 gpm	18:02	20.0	8.06	39.2	21	Clear
43	1 gpm	18:03	19.2	8.05	39.3	20	Clear
45	1 gpm	18:05	19.5	8.03	39.4	15	Clear
47	1 gpm	18:07	19.9	8.00	39.4	13	Clear
48	1 gpm	18:08	19.8	8.00	39.4	17	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-69

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
50	1 gpm	18:10	20.5	7.97	39.6	13	Clear
51	1 gpm	18:11	19.7	7.97	39.5	12	Clear
52	1 gpm	18:12	19.8	7.96	39.6	11	Clear
53	1 gpm	18:13	19.8	7.95	39.3	9	Clear
54	1 gpm	18:14	19.8	7.95	39.7	9	Clear
55	1 gpm	18:15	19.8	7.94	39.5	9	Clear

Development Completed at 55 Gallons Discharged. Date: 9/5/2007 Time: 18:17

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-70 (Site 1)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/22/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 22
Measured Total Depth (TOC): Initial 22.12 ft; Final 22.21 ft
Initial Depth to Water (TOC): 6.21 ft Date 9/22/2007 Time 1533
Stabilized Depth to Water (TOC): 6.26 ft Date 9/22/2007 Time 1728

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 15.91 Ft. of water
x 0.163 Gallons/Foot
= 2.59 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.77 Gallons
Actual Purge Volume: 65 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 15 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
51	1 gpm	1658	19.7	7.47	45.9	18	Clear
53	1 gpm	1700	19.7	7.45	45.6	20	Clear
54	1 gpm	1701	19.4	7.45	45.7	9	Clear
57	1 gpm	1704	19.4	7.41	45.3	7	Clear
60	1 gpm	1707	19.4	7.35	45.2	3	Clear
63	1 gpm	1710	19.5	7.30	45.1	1	Clear
65	1 gpm	1712	19.6	7.29	45.1	1	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-70 (Site 1)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
65 gal.	1 gpm	1712	19.6	7.29	45.1	1 NTU	Clear

Development Completed at 65 Gallons Discharged. Date: 9/22/2007 Time: 1712

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-71 (Site 1)

Project: Well Development
Project No.: I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/22/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 22
Measured Total Depth (TOC): Initial 22.45 ft; Final 22.51 ft
Initial Depth to Water (TOC): 8.26 ft Date 9/23/2007 Time 0724
Stabilized Depth to Water (TOC): 8.41 ft Date 9/23/2007 Time 0928

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

PURGE VOLUME CALCULATION

Casing Volume: 14.19 Ft. of water
x 0.163 Gallons/Foot
= 2.31 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.93 Gallons
Actual Purge Volume: 90 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 15 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
77	1 gpm	0906	19.3	7.32	42.0	7	Clear
80	1 gpm	0909	19.4	7.41	41.5	4	Clear
82	1 gpm	0911	19.4	7.48	41.9	1	Clear
84	1 gpm	0913	19.5	7.53	41.6	1	Clear
87	1 gpm	0916	19.6	7.57	42.0	1	Clear
90	1 gpm	0919	19.7	7.61	42.0	1	Clear

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-71 (Site 1)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
90 gal.	1 gpm	0919	19.7	7.61	42.0	1 NTU	Clear

Development Completed at 90 Gallons Discharged. Date: 9/23/2007 Time: 0919

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

UST-R Site 1 (395)

Well Development forms were not available for the following existing monitoring wells located at UST-R Site 1 (395) during report development:

Well ID	Installation Date
395B	12/8/1994
395C	12/7/1994
395F	3/22/1996

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. 395G

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/26/1996
Date(s) of Development: 9/11/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 15-20
Total Length of Well Casing: 22
Measured Total Depth (TOC): Initial 21.46; Final 22.94
Initial Depth to Water (TOC) 6.88 Date 9/11/2007 Time 14:33
Stabilized Depth to Water (TOC) 6.92 Date 9/11/2007 Time 16:34

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
_X_ Surge Block	2-in diameter surge tool
_X_ Bailing	2-in stainless steel bailer
_X_ Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 14.58 Ft. of water
x 0.163 Gallons/Foot
= 2.38 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.14 Gallons
Actual Purge Volume: 70 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 @ 15 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
56	1 gpm	16:05	22.0	8.98	13.3	106	Silty. Yellowish.
63	1 gpm	16:12	20.8	9.16	13.2	16	Yellow tint
65	1 gpm	16:14	20.6	9.16	13.3	9	Yellow tint
66	1 gpm	16:15	20.7	9.16	13.3	8	Yellow tint
67	1 gpm	16:16	20.5	9.16	13.3	7	Clear
68	1 gpm	16:17	20.6	9.16	13.3	7	Clear
70	1 gpm	16:19	20.4	9.15	13.4	7	Clear

Development Completed at 70 Gallons Discharged. Date: 9/11/2007 Time: 16:20
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. 395 H (UST-R Site 1)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/25/2007
Personnel/Company: L.Mancuso//Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): _____
Total Length of Well Casing: _____
Measured Total Depth (TOC) Initial: 15.98 ft
Final: 16.08 ft
Initial Depth to Water (TOC): 8.34 ft Date: 9/25/2007 Time: 1435
Stabilized Depth to Water (TOC): 8.35 ft Date: 9/25/2007 Time: 1549

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.64 Ft. of water
x 0.163 Gallons/Foot
= 1.25 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.74 Gallons
Actual Purge Volume: _____ Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 11 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
30	1 gpm	1526	23.1	9.3	11.0	91	Pump at 11 ft bTOC, cloudy gray/tan, no odor
32	1 gpm	1528	22.3	8.87	11.2	26	Pump at 11 ft, clear, no color or odor
34	1 gpm	1530	22.4	8.73	11.3	16	Same as above
35	1 gpm	1531	22.3	8.65	11.2	12	Same as above
36	1 gpm	1532	22.0	8.60	10.8	9	Same as above
38	1 gpm	1534	22.1	8.56	11.1	9	Same as above
40	1 gpm	1536	21.2	8.53	11.2	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. 395 H (UST-R Site 1)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
40	1 gpm	1536	21.2	8.35	11.2	6	Pump at 11 ft bTOC, clear, no odor or color

Development Completed at 40 Gallons Discharged. Date: 9/25/2007 Time: 1536

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Sites 2/4

Well Development forms were not available for the following existing monitoring wells located at Sites 2/4 during report development:

Well ID	Installation Date
AVGAS	1/1/1991
GTI-1	5/23/1995
GTI-10	5/23/1995
GTI-11	5/24/1995
GTI-12	5/24/1995
GTI-13	5/24/1995
GTI-14	5/18/1995
GTI-15	5/18/1995
GTI-17	5/18/1995
GTI-18	5/24/1995
GTI-19	5/17/1995
GTI-2	5/19/1995
GTI-20	5/17/1995
GTI-21	5/25/1995
GTI-22	5/25/1995
GTI-23	5/17/1995
GTI-24	5/17/1995
GTI-25	5/17/1995
GTI-26	5/25/1995
GTI-28	5/26/1995

GTI-29	5/25/1995
GTI-3	5/19/1995
GTI-30	5/25/1995
GTI-33	6/1/1995
GTI-34	6/1/1995
GTI-36	6/1/1995
GTI-37	6/2/1995
GTI-4	5/23/1995
GTI-5	5/19/1995
GTI-6	5/19/1995
GTI-7	5/23/1995
GTI-8	5/23/1995
GTI-9	5/18/1995
KMW	UNKNOWN
MW-13	7/20/1990
MW-59	11/23/1990
MW-5U	6/19/1990
MW-62	11/24/1991
OBS-1	6/3/1993
OBS-2	6/2/1993
VT-1	6/2/1990
VT-2	6/2/1993
VT-3	6/3/1993
VT-4	6/3/1993

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. EW-15 (Site 2)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/20/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC) Initial: ft
Final: ft
Initial Depth to Water (TOC): ft Date: 9/20/2007 Time: _____
Stabilized Depth to Water (TOC): ft Date: 9/20/2007 Time: _____

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: _____ Ft. of water
x 0.163 Gallons/Foot
= _____ Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: _____ Gallons
Actual Purge Volume: _____ Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ _____ Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ _____ °C
pH 7.0 = NA @ _____ °C
pH 10.0 = NA @ _____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
	1 gpm						Pump at ft bTOC, cloudy
	1 gpm						Slightly cloudy
	1 gpm						Same as above
	1 gpm						Same as above
	1 gpm						Pump at ft bTOC, Clear
	1 gpm						Clear
	1 gpm						Clear
	1gpm						Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. EW-15 (Site 2)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
gal.	1 gpm						Pump at ft bTOC, clear

Development Completed at _____ Gallons Discharged. Date: 9/20/2007 Time: _____

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. EW-16 (Site 4)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/24/2007
Personnel/Company: L. Mancuso/Tetra Tech

T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC) Initial: 11.85 ft (14.4 after breaking sand block)
Final: 14.4 ft
Initial Depth to Water (TOC): 7.60 ft Date: 9/24/2007 Time: 1550
Stabilized Depth to Water (TOC): 7.89 ft Date: 9/24/2007 Time: 1730

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 6.8 Ft. of water
x 0.163 Gallons/Foot
= 1.12 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.33 Gallons
Actual Purge Volume: 30 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: .5 gpm @ 14.4 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
26.5	.5 gpm	1707	19.3	9.62	8.50	21	Pump at 14.4 ft bTOC, no odor, clear
27.5	.5 gpm	1709	19.4	9.22	8.44	12	Clear
28	.5 gpm	1710	19.5	9.05	8.20	10	Clear
28.5	.5 gpm	1711	19.0	8.91	8.14	9	Clear
29	.5 gpm	1712	19.1	8.81	8.20	9	Clear
30	.5 gpm	1714	19.1	8.82	8.17	10	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. EW-16 (Site 4)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
30 gal.	.5 gpm	1714	19.1	8.82	8.17	10	Pump at 14.4 ft bTOC, no odor, clear

Development Completed at 30 Gallons Discharged. Date: 9/24/2007 Time: 1714

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. EW-20 (Site 2)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/20/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC) Initial: ft
Final: ft
Initial Depth to Water (TOC): ft Date: 9/20/2007 Time: _____
Stabilized Depth to Water (TOC): ft Date: 9/20/2007 Time: _____

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	_____
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	_____

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: _____ Ft. of water
x 0.163 Gallons/Foot
= _____ Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: _____ Gallons
Actual Purge Volume: _____ Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ _____ Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ _____ °C
pH 7.0 = NA @ _____ °C
pH 10.0 = NA @ _____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
	1 gpm						Pump at ft bTOC, cloudy
	1 gpm						Slightly cloudy
	1 gpm						Same as above
	1 gpm						Same as above
	1 gpm						Pump at ft bTOC, Clear
	1 gpm						Clear
	1 gpm						Clear
	1gpm						Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. EW-20 (Site 2)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
gal.	1 gpm						Pump at ft bTOC, clear

Development Completed at _____ Gallons Discharged. Date: 9/20/2007 Time: _____

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. EW-22 (Site 2)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/20/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 4-14
Total Length of Well Casing: 14
Measured Total Depth (TOC) Initial: ft
Final: ft
Initial Depth to Water (TOC): ft Date: 9/20/2007 Time: _____
Stabilized Depth to Water (TOC): ft Date: 9/20/2007 Time: _____

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	_____
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	_____

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: _____ Ft. of water
x 0.163 Gallons/Foot
= _____ Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: _____ Gallons
Actual Purge Volume: _____ Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ _____ Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ _____ °C
pH 7.0 = NA @ _____ °C
pH 10.0 = NA @ _____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
	1 gpm						Pump at ft bTOC, cloudy
	1 gpm						Slightly cloudy
	1 gpm						Same as above
	1 gpm						Same as above
	1 gpm						Pump at ft bTOC, Clear
	1 gpm						Clear
	1 gpm						Clear
	1gpm						Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. EW-22 (Site 2)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
gal.	1 gpm						Pump at ft bTOC, clear

Development Completed at _____ Gallons Discharged. Date: 9/20/2007 Time: _____

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. GTI-31 (Site 4)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/25/2007
Personnel/Company: L.Mancuso//Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 16
Measured Total Depth (TOC) Initial: 14.86 ft
Final: 15.06 ft
Initial Depth to Water (TOC): 7.29 ft Date: 9/25/2007 Time: 0932
Stabilized Depth to Water (TOC): 7.36 ft Date: 9/25/2007 Time: 1108

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.57 Ft. of water
x 0.65 Gallons/Foot
= 4.9 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 14.76 Gallons
Actual Purge Volume: 60 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 11 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
55	1 gpm	1049	19.9	8.3	12.0	10	Pump at 11 ft bTOC, clear, no odor or color
56	1 gpm	1051	19.9	8.28	12.0	8	Same as above
57	1 gpm	1052	20.1	8.27	12.0	6	Same as above
58	1 gpm	1054	19.6	8.26	12.0	4	Same as above
60	1 gpm	1056	20.1	8.27	11.9	7	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. GTI-31 (Site 4)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60 gal.	1 gpm	1056	20.1		14.1	7	Pump at 11 ft bTOC, clear, no odor or color

Development Completed at 60 Gallons Discharged. Date: 9/25/2007 Time: 1056
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW- 1(Site 2)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 9/20/2007
Personnel/Company L. Mancuso/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 5-15
Total Length of Well Casing 15
Measured Total Depth (TOC) Initial ft
Final ft
Initial Depth to Water (TOC) ft Date 9/20/2007 Time _____
Stabilized Depth to Water (TOC) ft Date 9/20/2007 Time _____

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
_X_ Surge Block	2-in diameter surge tool
_X_ Bailing	2-in stainless steel bailer
_X_ Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: _____ Ft. of water
x 0.163 Gallons/Foot
= _____ Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: _____ Gallons
Actual Purge Volume: _____ Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ _____ Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ _____ °C
pH 7.0 = NA @ _____ °C
pH 10.0 = NA @ _____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
	1 gpm						Pump at ft bTOC, cloudy
	1 gpm						Slightly cloudy
	1 gpm						Same as above
	1 gpm						Same as above
	1 gpm						Pump at ft bTOC, Clear
	1 gpm						Clear
	1 gpm						Clear
	1gpm						Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-1 (Site 2)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
gal.	1 gpm						Pump at ft bTOC, clear

Development Completed at _____ Gallons Discharged. Date: 9/20/2007 Time: _____

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-2 (Site 4)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/24/2007
Personnel/Company: R. Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15.1
Measured Total Depth (TOC): Initial 15.14 ft; Final 15.23 ft
Initial Depth to Water (TOC) 6.94 ft Date 9/24/2007 Time 1128
Stabilized Depth to Water (TOC) 7.19 ft Date 9/24/2007 Time 1255

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.20 Ft. of water
x 0.163 Gallons/Foot
= 1.34 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.02 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 12 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
39	1 gpm	1231	19.0	9.08	26.8	43	Pump at 12 ft bTOC
42	1 gpm	1234	18.9	9.07	26.7	20	
44	1 gpm	1236	19.0	9.06	26.8	12	
46	1 gpm	1238	18.8	9.05	26.6	10	
48	1 gpm	1240	18.7	9.05	26.5	8	
50	1 gpm	1242	18.9	9.05	26.7	7	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-2 (Site 4)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
50 gal.	1 gpm	1242	18.9	9.05	26.7	7	Pump at 12 ft bTOC, clear

Development Completed at 50 Gallons Discharged. Date: 9/24/2007 Time: 1242

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-4 (Site 2)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/21/2007
Personnel/Company: Lauren Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 4-14
Total Length of Well Casing: 10
Measured Total Depth (TOC): Initial 13.89 ft; Final 14.02 ft
Initial Depth to Water (TOC) 7.51 ft Date 9/21/2007 Time 1010
Stabilized Depth to Water (TOC) 7.54 ft Date 9/21/2007 Time 1322

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 6.38 Ft. of water
x 0.163 Gallons/Foot
= 1.04 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.12 Gallons
Actual Purge Volume: 30 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 11 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
20	1 gpm	1301	21.6	8.12	2.03	10	Pump at 11ft bTOC, clear, no odor or color
21	1 gpm	1302	20.7	7.67	1.99	6	Same as above
24	1 gpm	1305	20.1	7.40	1.95	10	Same as above
26	1 gpm	1307	20.5	7.33	1.93	5	Same as above
29	1 gpm	1310	20.1	7.31	1.87	6	Same as above
30	1 gpm	1311	20.2	7.21	1.93	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-~~10~~ 4 (Site 2)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
30 gal	1 gpm	1311	20.2	7.21	1.93	6	Pump at 11ft bTOC, clear, no odor or color

Development Completed at 35 Gallons Discharged. Date: 9/21/2007 Time: 1322

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-5L (Site 2/4)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 10/9/2007
Personnel/Company: B. O'Brien/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 16.0-21.0
Total Length of Well Casing: 21.0
Measured Total Depth (TOC): Initial 21.05 ft; Final 21.04 ft
Initial Depth to Water (TOC) 7.83 ft Date 10/9/2007 Time 1447
Stabilized Depth to Water (TOC) 7.97 ft Date 10/9/2007 Time 1610

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 13.22 Ft. of water
x 0.163 Gallons/Foot
= 2.155 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.465 Gallons
Actual Purge Volume: 55 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
48	1 gpm	1551	19.5	9.12	13.6	11	Pump at 18 ft bTOC, clear
51	1 gpm	1554	18.7	9.22	13.2	5	Same as above
53	1 gpm	1556	18.5	9.25	13.3	3	Same as above
55	1 gpm	1558	18.4	9.26	13.3	3	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-5L (Site 2/4)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
55 gal.	1 gpm	1558	18.4	9.26	13.3	3	Pump at 18 ft bTOC, clear

Development Completed at 55 Gallons Discharged. Date: 10/9/2007 Time: 1600

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. O'Brien, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-6U (Site 2)

Project: Well Development
Project No.: I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/21/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.03 ft; Final 15.20 ft
Initial Depth to Water (TOC): 6.42 ft Date 9/21/2007 Time 1436
Stabilized Depth to Water (TOC): 6.48 ft Date 9/21/2007 Time 1541

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.61 Ft. of water
x 0.163 Gallons/Foot
= 1.40 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.21 Gallons
Actual Purge Volume: 35 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 10 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
25	1 gpm	1521	19.1	8.42	4.86	55	Slightly cloudy
27	1 gpm	1523	18.9	8.49	6.09	17	Clear
29	1 gpm	1525	18.7	8.53	6.17	9	Clear
30	1 gpm	1526	18.6	8.53	6.17	7	Clear
32	1 gpm	1528	18.7	8.53	6.18	11	Clear
33	1 gpm	1529	18.9	8.53	6.20	9	Clear
35	1 gpm	1531	18.8	8.54	6.22	8	Clear

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-6U (Site 2)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
35 gal.	1 gpm	1531	18.8	8.54	6.22	8 NTU	Clear

Development Completed at 35 Gallons Discharged. Date: 9/21/2007 Time: 1531

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-7 (Site 2)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/24/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5.5-15.5
Total Length of Well Casing: 15.5
Measured Total Depth (TOC): Initial 14.32 ft; Final 15.85 ft
Initial Depth to Water (TOC) 7.86 ft Date 9/24/2007 Time 0731
Stabilized Depth to Water (TOC) 7.89 ft Date 9/24/2007 Time 0857

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 6.46 Ft. of water
x 0.163 Gallons/Foot
= 1.05 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.15 Gallons
Actual Purge Volume: 45 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 11 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
35	1 gpm	0837	17.6	6.77	4.93	5	Clear
37	1 gpm	0839	17.5	6.82	4.90	5	Clear
39	1 gpm	0841	17.6	6.89	4.94	5	Clear
40	1 gpm	0842	17.6	6.93	4.86	5	Clear
42	1 gpm	0844	17.7	6.98	4.88	5	Clear
43	1 gpm	0845	17.7	7.01	4.84	4	Clear
45	1 gpm	0847	17.6	7.03	4.85	4	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-7 (Site 2)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
45 gal.	1 gpm	0847	17.6	7.03	4.85	4 NTU	Clear

Development Completed at 45 Gallons Discharged. Date: 9/24/2007 Time: 0847

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-9 (Site 2)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 9/24/2007
Personnel/Company Lauren Mancuso/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 5-15
Total Length of Well Casing 15
Measured Total Depth (TOC) Initial 15.15 ft
Final 15.26 z ft
Initial Depth to Water (TOC) 9.05 ft Date 9/25/2007 Time 1440
Stabilized Depth to Water (TOC) 9.12 ft Date 9/25/2007 Time 1726

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
_X_ Surge Block	2-in diameter surge tool
_X_ Bailing	2-in stainless steel bailer
_X_ Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 6.1 Ft. of water
x 0.163 Gallons/Foot
= 0.99 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 2.98 Gallons
Actual Purge Volume: 15 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 15 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
13.5	.5 gpm	1701	16.6	9.3	6.6	8	Pump at 15ft bTOC, clear, no odor or color
14	.5 gpm	1702	16.5	9.27	6.69	6	Same as above
14.5	.5 gpm	1703	16.7	9.24	6.59	6	Same as above
15	.5 gpm	1704	16.8	9.23	6.58	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-7 (Site 2)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
15 gal.	.5 gpm	1704	16.8	9.23	6.58	6	Pump at 15ft bTOC, clear, no odor or color

Development Completed at 15 Gallons Discharged. Date: 9/25/2007 Time: 1704

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-10 (Site 2)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/21/2007
Personnel/Company: Lauren Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 10
Measured Total Depth (TOC): Initial 14.53 ft; Final 15.25 ft
Initial Depth to Water (TOC): 8.17 ft Date 9/21/2007 Time 0848
Stabilized Depth to Water (TOC): 8.25 ft Date 9/21/2007 Time 1139

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 6.36 Ft. of water
x 0.163 Gallons/Foot
= 1.04 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.11 Gallons
Actual Purge Volume: 35 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 15 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
30	1 gpm	1058	19.1	8.74	12.0	12	Pump at 12ft bTOC, clear, no odor or color
31	1 gpm	1059	19.1	8.86	11.3	8	Same as above
32	1 gpm	1100	19.1	8.97	11.2	7	Same as above
33	1 gpm	1101	18.9	8.99	11.3	4	Same as above
34	1 gpm	1102	18.8	9.04	11.3	4	Same as above
35	1 gpm	1103	18.9	9.09	11.4	4	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-10 (Site 2)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
35 gal	1 gpm	1103	18.9	9.09	11.4	4	Pump at 12ft bTOC, clear, no odor or color

Development Completed at 35 Gallons Discharged. Date: 9/21/2007 Time: 1103

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-60 (Site 4)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/24/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15.14
Measured Total Depth (TOC) Initial: 15.39 ft
Final: 15.48 ft
Initial Depth to Water (TOC): 6.75 ft Date: 9/24/2007 Time: 1323
Stabilized Depth to Water (TOC): 7.25 ft Date: 9/24/2007 Time: 1545

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.64 Ft. of water
x 0.163 Gallons/Foot
= 1.4 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.22 Gallons
Actual Purge Volume: 38 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 14 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
28	1 gpm	1505	18.8	9.22	23.0	15	Pump at 14 ft bTOC, slight sulfur odor, clear
30	1 gpm	1507	18.8	9.21	23.0	13	Clear
32	1 gpm	1509	18.7	9.20	23.0	12	Clear
33	1 gpm	1510	18.5	9.20	22.9	12	Clear
35	1 gpm	1512	18.5	9.19	23.0	9	Clear
36	1 gpm	1513	18.4	9.19	22.7	10	Clear
38	1 gpm	1515	18.4	9.18	22.9	10	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-60 (Site 4)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
38 gal.	1 gpm	1515	18.4	9.18	22.9	10	Pump at 14 ft bTOC, slight sulfur odor, clear

Development Completed at 38 Gallons Discharged. Date: 9/24/2007 Time: 1515

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-61 (Site 2)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/24/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5.5-15.5
Total Length of Well Casing: 15.5
Measured Total Depth (TOC): Initial 14.32 ft; Final 15.85 ft
Initial Depth to Water (TOC) 7.86 ft Date 9/24/2007 Time 0731
Stabilized Depth to Water (TOC) 7.89 ft Date 9/24/2007 Time 0857

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.9 Ft. of water
x 0.163 Gallons/Foot
= 1.29 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.87 Gallons
Actual Purge Volume: 30 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 12 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
20	1 gpm	1055	17.0	9.57	6.18	9	Clear
22	1 gpm	1057	16.8	9.60	6.23	7	Clear
24	1 gpm	1059	17.0	9.61	6.22	7	Clear
26	1 gpm	1101	16.9	9.64	6.25	7	Clear
28	1 gpm	1103	17.1	9.65	6.28	6	Clear
30	1 gpm	1105	17.1	9.64	6.26	7	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-7 (61) (Site 2)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
30 gal.	1 gpm	1105	17.1	9.64	6.26	7 NTU	Clear

Development Completed at 30 Gallons Discharged. Date: 9/24/2007 Time: 1105

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 3

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-39L

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/14/1991
Date(s) of Development: 9/12/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 19.5
Measured Total Depth (TOC) Initial: 21.05
Final: 21.50
Initial Depth to Water (TOC): 7.42 Date: 9/12/2007 Time: 11:56
Stabilized Depth to Water (TOC): 7.79 Date: 9/12/2007 Time: 13:39

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 13.63 Ft. of water
x 0.163 Gallons/Foot
= 2.22 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.66 Gallons
Actual Purge Volume: 55 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 @ 18 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
42	1 gpm	13:05	20.0	8.67	39.1	34	Cloudy
44	1 gpm	13:07	19.9	8.67	39.2	27	Cloudy
46	1 gpm	13:09	20.0	8.67	39.5	24	Cloudy
48	1 gpm	13:11	19.9	8.68	39.9	21	Cloudy
50	1 gpm	13:13	20.0	8.69	39.8	17	Cloudy
51	1 gpm	13:14	19.9	8.70	39.8	14	Cloudy
53	1 gpm	13:16	19.8	8.69	39.8	11	Clear
54	1 gpm	13:17	19.6	8.69	39.9	10	Clear
55	1 gpm	13:18	19.6	8.69	39.7	10	Clear

Development Completed at 55 Gallons Discharged. Date: 9/12/2007 Time: 13:18
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-39U

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/14/1991
Date(s) of Development: 9/12/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.13; Final 15.20
Initial Depth to Water (TOC) 7.59 Date 9/12/2007 Time 13:40
Stabilized Depth to Water (TOC) 7.88 Date 9/12/2007 Time 14:48

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.54 Ft. of water
x 0.163 Gallons/Foot
= 1.23 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.69 Gallons
Actual Purge Volume: 22 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
12	1 gpm	14:22	23.2	8.36	20.2	17	Yellow tint
17	1 gpm	14:27	22.5	8.85	20.6	9	Clear
19	1 gpm	14:29	22.8	8.86	20.3	7	Clear
20	1 gpm	14:30	22.2	8.88	20.4	4	Clear
21	1 gpm	14:31	22.6	8.89	20.8	4	Clear
22	1 gpm	14:32	22.0	8.90	20.8	4	Clear

Development Completed at 22 Gallons Discharged. Date: 9/12/2007 Time: 14:33
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-41L (Site 3)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 10/9/2007
Personnel/Company B. O'Brien/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 20.5-25.5
Total Length of Well Casing 25.5
Measured Total Depth (TOC) Initial 25.32 ft
Final 25.58 ft
Initial Depth to Water (TOC) 6.6 ft Date 10/9/2007 Time 0945
Stabilized Depth to Water (TOC) 7.06 ft Date 10/9/2007 Time 1105

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 18.72 Ft. of water
x 0.163 Gallons/Foot
= 3.051 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 9.154 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 21 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
35	1 gpm	1039	18.9	7.62	50.0	10	Pump at 21 ft bTOC, clear
38	1 gpm	1042	18.8	7.83	50.4	9	Same as above
41	1 gpm	1045	18.7	7.97	50.7	8	Same as above
44	1 gpm	1048	18.6	8.04	50.6	8	Same as above
47	1 gpm	1051	18.5	8.09	50.5	5	Same as above
50	1 gpm	1054	18.6	8.12	50.7	5	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-41L (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
50 gal.	1 gpm	1054	18.6	8.12	50.7	10	Pump at 21 ft bTOC, clear

Development Completed at 50 Gallons Discharged. Date: 10/9/2007 Time: 1056

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. O'Brien, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-42L (Site 3)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/18/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 20.5-25.5
Total Length of Well Casing: 25.5
Measured Total Depth (TOC) Initial: 25.3ft
Final: 25.5 ft
Initial Depth to Water (TOC): 9.78 ft Date: 9/18/2007 Time: 1226
Stabilized Depth to Water (TOC): 9.78 ft Date: 9/18/2007 Time: 1330

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 15.52 Ft. of water
x 0.163 Gallons/Foot
= 2.53 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.59 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 22 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
35	1 gpm	1315	19.8	8.32	45.4	97	Pump at 22 ft bTOC, unclear cloudy
39	1 gpm	1319	19.6	8.27	45.3	73	Same as above
41	1 gpm	1321	19.2	8.25	45.6	47	Same as above, less cloudy
42	1 gpm	1322	19.4	8.25	45.2	22	Same as above
44	1 gpm	1324	19.3	8.25	45.2	19	Same as above
46	1 gpm	1326	19.2	8.23	45.6	20	Same as above
48	1 gpm	1328	19.1	8.24	46.0	10	Pump at 22 ft bTOC, clear
49	1 gpm	1329	19.1	8.25	45.9	10	Same as above
50	1 gpm	1330	19.1	8.24	45.3	10	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-42L (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
50 gal.	1 gpm	1330	19.1	8.24	45.3	10	Pump at 22 ft bTOC, clear

Development Completed at 50 Gallons Discharged. Date: 9/18/2007 Time: 1330

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-43L (Site 3)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/18/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 23-28
Total Length of Well Casing: 28
Measured Total Depth (TOC) Initial: 27.61ft
Final: 27.89 ft
Initial Depth to Water (TOC): 10.59 Date: 9/18/2007 Time: 0828
Stabilized Depth to Water (TOC): 10.58 Date: 9/18/2007 Time: 1039

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	_____
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	_____

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 17.31 Ft. of water
x 0.163 Gallons/Foot
= 2.82 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 8.46 Gallons
Actual Purge Volume: 80 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 26 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp °C	pH	Specific Conductance** (mS/cm)	Turbidity NTU	Clarity, Odor, PID Readings, Other:
67	1 gpm	1023	18.1	7.5	48.2	46	Pump at 26 ft bTOC, slightly unclear
71	1 gpm	1027	18.4	7.62	47.9	13	Pump at 26 ft bTOC, clear
72	1 gpm	1028	18.6	7.65	48.0	9	Same as above
74	1 gpm	1030	18.7	7.68	47.9	5	Same as above
76	1 gpm	1032	18.6	7.69	47.9	5	Same as above
78	1 gpm	1034	18.6	7.70	47.9	5	Same as above
80	1 gpm	1036	18.6	7.70	47.9	5	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-43L (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp °C	pH	Specific Conductance** (mS/cm)	Turbidity (NTU) or D.O.	Clarity, Odor, PID Readings, Other:
80 gal.	1 gpm	1036	18.6	7.70	47.9	5	Pump at 26 ft bTOC, clear

Development Completed at 80 Gallons Discharged. Date: 9/18/2007 Time: 1036

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-43U (Site 3)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/18/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 7-17ft
Total Length of Well Casing: 17
Measured Total Depth (TOC) Initial: 16.57 ft
Final: 17 ft
Initial Depth to Water (TOC): 10.47 Date: 9/18/2007 Time: 1052
Stabilized Depth to Water (TOC): 10.78 Date: 9/18/2007 Time: 1210

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 6.1 Ft. of water
x 0.163 Gallons/Foot
= 0.99 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 2.98 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 14 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp °C	pH	Specific Conductance** mS/cm	Turbidity NTU	Clarity, Odor, PID Readings, Other:
30	1 gpm	1150	19.8	8.10	23.7	87	Pump at 14 ft bTOC, unclear
32	1 gpm	1152	19.9	8.18	23.9	85	Same as above
36	1 gpm	1156	19.7	8.23	24.2	16	Pump at 14 ft bTOC, slightly cloudy
37	1 gpm	1157	19.7	8.24	24.3	10	Pump at 14 ft bTOC, clear
38	1 gpm	1158	19.6	8.25	24.3	6	Same as above
39	1 gpm	1159	19.6	8.25	24.3	6	Same as above
40	1 gpm	1200	19.6	8.25	24.3	6	Pump at 14 ft bTOC, clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-43L (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
40 gal.	1 gpm	1200	19.6	8.25	24.2	6	Pump at 14 ft bTOC, clear

Development Completed at 40 Gallons Discharged. Date: 9/18/2007 Time: 1200

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-44L (Site 3)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/18/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 21.5-26.5
Total Length of Well Casing: 26.5
Measured Total Depth (TOC) Initial: 26.3 ft
Final: 26.48 ft
Initial Depth to Water (TOC): 7.08 ft Date: 9/18/2007 Time: 1518
Stabilized Depth to Water (TOC): 7.38 Date: 9/18/2007 Time: 1711

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 19.22 Ft. of water
x 0.163 Gallons/Foot
= 3.13 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 9.40 Gallons
Actual Purge Volume: _____ Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 23 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
47	1 gpm	1642	19.4	8.49	50.1	29	Pump at 23 ft bTOC, slightly cloudy
51	1 gpm	1646	19.5	8.34	50.3	22	Same as above
52	1 gpm	1647	19.4	8.29	49.5	12	Pump at 23 ft bTOC, clear
54	1 gpm	1649	19.4	8.24	49.9	12	Same as above
56	1 gpm	1651	19.4	8.1	5.7	10	Same as above
59	1 gpm	1654	19.2	8.16	49.5	10	Same as above
60	1 gpm	1655	19.1	8.14	50.3	10	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-44L (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
60 gal.	1 gpm	1655	19.1	8.14	50.3	10	Pump at 23 ft bTOC, clear

Development Completed at 60 Gallons Discharged. Date: 9/18/2007 Time: 1655

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-44U (Site 3)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/18/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC) Initial: 15.0 ft
Final: 15.0 ft
Initial Depth to Water (TOC): 7.24 ft Date: 9/18/2007 Time: 1355
Stabilized Depth to Water (TOC): 7.32 ft Date: 9/18/2007 Time: 1516

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.76 Ft. of water
x 0.163 Gallons/Foot
= 1.26 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.79 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 11 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
30	1 gpm	1501	20.5	8.91	26.3	33	Pump at 11 ft bTOC, cloudy
32	1 gpm	1503	20.6	8.82	26.3	22	Slightly cloudy
33	1 gpm	1504	20.0	8.80	26.4	17	Same as above
35	1 gpm	1506	19.9	8.70	26.3	18	Same as above
37	1 gpm	1508	19.9	8.68	26.5	11	Pump at 11 ft bTOC, Clear
38	1 gpm	1509	20.0	8.65	26.4	10	Clear
39	1 gpm	1510	19.8	8.63	26.7	10	Clear
40	1gpm	1511	19.7	8.63	26.6	10	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-44U (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
40 gal.	1 gpm	1511	19.7	8.63	26.6	10	Pump at 11 ft bTOC, clear

Development Completed at 40 Gallons Discharged. Date: 9/18/2007 Time: 1511

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 6

Well Development forms were not available for the following existing monitoring wells located at Site 6 during report development:

Well ID	Installation Date
BAT-6-H	9/26/1997
MW-45	3/17/1991

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW- 45 (Site 6)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 9/19/2007
Personnel/Company L. Mancuso/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 5-15
Total Length of Well Casing 15
Measured Total Depth (TOC) Initial 15.28 ft
Final 15.3 ft
Initial Depth to Water (TOC) 11.75 ft Date 9/19/2007 Time 1311
Stabilized Depth to Water (TOC) 11.96 ft Date 9/19/2007 Time 1416

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 3.53 Ft. of water
x 0.163 Gallons/Foot
= 0.58 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 1.73 Gallons
Actual Purge Volume: 12 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 15 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity NTU	Clarity, Odor, PID Readings, Other:
7	1 gpm	1402	18.0	9.15	18.6	6	Pump at 15 ft bTOC, clear, no odor or color
9	1 gpm	1404	17.8	9.08	18.0	6	Same as above
10	1 gpm	1405	17.6	9.05	18.6	6	Same as above
11	1 gpm	1406	17.6	9.05	18.5	6	Same as above
12	1 gpm	1407	17.6	9.05	18.8	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-45 (Site 6)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
12 gal.	1 gpm	1407	17.6	9.05	18.8	6	Pump at 15 ft bTOC, clear, no odor or color

Development Completed at 12 Gallons Discharged. Date: 9/19/2007 Time: 1407

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW- 48 (Site 6)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 9/19/2007
Personnel/Company L. Mancuso/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 4.5-14.5
Total Length of Well Casing 14.5
Measured Total Depth (TOC) Initial 14.48 ft
Final 14. 49 ft
Initial Depth to Water (TOC) 4.55 ft Date 9/19/2007 Time 1038
Stabilized Depth to Water (TOC) 4.61 ft Date 9/19/2007 Time 1156

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.93 Ft. of water
x 0.163 Gallons/Foot
= 1.62 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.86 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 11 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ _____
pH 7.0 = NA @ _____ °C
pH 10.0 = NA @ _____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
39	1 gpm	1135	16.8	9.19	56.9	13	Pump at 11 ft bTOC, slightly cloudy
41	1 gpm	1137	16.5	9.17	56.8	17	Same as above
42	1 gpm	1138	16.7	9.16	57.0	13	Pump at 11 ft bTOC, Clear
44	1 gpm	1140	16.6	9.15	56.9	10	Same as above
45	1 gpm	1141	16.5	9.14	56.8	10	Same as above
46	1 gpm	1142	16.4	9.14	57.1	8	Same as above
47	1 gpm	1143	16.7	9.13	57.1	6	Same as above
48	1gpm	1144	16.5	9.13	57.0	5	Same as above
49	1gpm	1145	16.4	9.13	57.1	5	Same as above
50	1gpm	1146	16.7	9.12	57.2	5	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-44~~U~~8 (Site 3)6

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
50 gal.	1 gpm	1146	16.7	9.12	57.2	5	Pump at 11 ft bTOC, clear

Development Completed at 50 Gallons Discharged. Date: 9/19/2007 Time: 1146

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-49 (Site 6)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/20/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 6-16
Total Length of Well Casing: 16
Measured Total Depth (TOC) Initial: 16.26 ft
Final: 16.3 ft
Initial Depth to Water (TOC): 7.86 ft Date: 9/20/2007 Time: 1349
Stabilized Depth to Water (TOC): 7.86 ft Date: 9/20/2007 Time: 1530

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.4 Ft. of water
x 0.163 Gallons/Foot
= 1.37 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.11 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 11 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
24	1 gpm	1448	19.3	9.09	59.7	14	Pump at 11 ft bTOC, clear, no petroleum odor, yellow tint
26	1 gpm	1450	19.4	9.13	60.1	11	Same as above
27	1 gpm	1451	19.5	9.16	60.2	12	Same as above
29	1 gpm	1453	19.3	9.18	59.8	12	Same as above
30	1 gpm	1454	19.4	9.20	60.2	12	Same as above
32	1 gpm	1456	19.3	9.22	60.1	10	Same as above
35	1 gpm	1459	19.5	9.23	59.8	9	Same as above
36	1gpm	1500	19.5	9.23	60.6	6	Same as above
38	1 gpm	1502	19.7	9.23	60.0	5	Same as above
40	1gpm	1504	19.3	9.24	60.2	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-49 (Site 6)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
40 gal.	1 gpm	1504	19.3	9.24	60.2	6	Pump at ft bTOC, clear

Development Completed at 40 Gallons Discharged. Date: 9/20/2007 Time: 1504

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW- 56 (Site 6)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 9/19/2007
Personnel/Company L. Mancuso/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 5-10 ft
Total Length of Well Casing 10 ft
Measured Total Depth (TOC) Initial 9.96 ft
Final 9.96 ft
Initial Depth to Water (TOC) 6.73 ft Date 9/19/2007 Time 1632
Stabilized Depth to Water (TOC) 6.92 ft Date 9/19/2007 Time 1728

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	_____
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	_____

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 3.23 Ft. of water
x 0.163 Gallons/Foot
= 0.53 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 1.58 Gallons
Actual Purge Volume: 18 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 9.96 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
13	1 gpm	1709	18.0	9.01	54.5	14	Pump at 9.96 ft bTOC, clear, no odor, slight yellow tint
15	1 gpm	1711	17.6	9.05	54.4	10	Same as above
16	1 gpm	1712	17.9	9.05	54.5	7	Same as above
17	1 gpm	1713	17.8	9.05	54.6	7	Same as above
18	1 gpm	1714	17.4	9.06	54.7	7	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-56 (Site6)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
18 gal.	1 gpm	1714	17.4	9.06	54.7	7	Pump at 9.96 ft bTOC, clear, no odor, slight yellow tint

Development Completed at 18 Gallons Discharged. Date: 9/19/2007 Time: 1714

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW- 58 (Site 6)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 9/19/2007
Personnel/Company L. Mancuso/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 5-10
Total Length of Well Casing 10
Measured Total Depth (TOC) Initial 10.02 ft
Final 10.05 ft
Initial Depth to Water (TOC) 7.35 ft Date 9/19/2007 Time 0910
Stabilized Depth to Water (TOC) 7.40 ft Date 9/19/2007 Time 1022

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	_____
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	_____

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 2.67 Ft. of water
x 0.163 Gallons/Foot
= 0.44 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 1.31 Gallons
Actual Purge Volume: 20 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 9.5 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C	pH	Specific Conductance** (ms/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
5	1 gpm	0956	19.4	9.19	51.9	34	Pump at 9.5 ft bTOC, cloudy
8	1 gpm	0959	19.5	9.16	52.1	24	Slightly cloudy
9	1 gpm	1000	19.6	9.14	50.8	19	Same as above
10	1 gpm	1001	19.3	9.14	51.2	12	Pump at 9.5 ft bTOC, clear, yellow tint, hint of petroleum product odor, no sheen visible
12	1 gpm	1003	19.4	9.14	50.9	8	Same as above
13	1 gpm	1004	19.6	9.14	50.7	9	Same as above
15	1 gpm	1006	19.6	9.14	50.6	8	Same as above
16	1gpm	1007	19.3	9.14	50.9	8	Same as above
18	1 gpm	1009	19.6	9.14	51.	3	Same as above
19	1 gpm	1010	19.6	9.14	50.8	3	Same as above
20	1 gpm	1011	19.6	9.15	50.7	3	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __MW-58 (Site 6)____

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (ms/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
20 gal.	1 gpm	1011	19.6	9.15	50.7	3	Pump at ft bTOC, clear

Development Completed at ____20_____ Gallons Discharged. Date: ___9/19/2007_____ Time: ___1011_____

Criteria: __> 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear_____ Personnel: ____L. Mancuso, T. Garver_____

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 14

Well Development forms were not available for the following existing monitoring wells located at Site 14 during report development:

Well ID	Installation Date
BAT-14-F	9/23/1997
CW-14-1-1	10/18/2004
CW-14-1-2	10/19/2004
CW-14-1-3	10/20/2004
CW-14-1-4	10/21/2004
CW-14-1-5	10/20/2004
GTI-14-2	5/31/1995
MW-18U	3/7/1991
P3-MW-01	5/16/2002
P3-MW-02	5/17/2002
P3-MW-03	5/17/2002
P3-MW-04	5/16/2002
P3-MW-05	5/17/2002
P3-MW-06	5/16/2002
P3-MW-07	5/16/2002
P3-MW-08	5/16/2002
P3-MW-09	5/17/2002
P3-MW-10	5/17/2002
P3-MW-11	6/6/2002
P3-MW-12	6/6/2002

P3-MW-13	6/6/2002
P3-MW-14	6/6/2002
P4-BS-01	11/2002
P4-BS-02	11/2002
P4-BS-03	11/2002
P4-BS-04	11/2002
P4-BS-05	11/2002
P4-BS-06	11/2002
P4-BS-07	11/2002
P4-BS-08	11/2002
P4-BS-09	11/2002
P4-BS-10	11/2002
P4-MW-01	6/5/2002
P4-MW-02	5/20/2002
P4-MW-03	5/21/2002
P4-MW-04	6/4/2002
P4-MW-05	5/21/2002
P4-MW-06	5/20/2002
P4-MW-07	5/21/2002
P4-MW-08	5/21/2002
P4-MW-09	5/21/2002

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-18-L (Site 14)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/23/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 16-21
Total Length of Well Casing: 21
Measured Total Depth (TOC): Initial 21.58 ft; Final 21.62 ft
Initial Depth to Water (TOC): 7.99 ft Date 9/23/2007 Time 1500
Stabilized Depth to Water (TOC): 8.04 ft Date 9/23/2007 Time 1631

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 13.59 Ft. of water
x 0.163 Gallons/Foot
= 2.21 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.63 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
42	1 gpm	1613	18.3	8.10	61.9	6	Clear
44	1 gpm	1615	18.3	8.03	62.4	1	Clear
45	1 gpm	1616	18.3	7.99	62.3	1	Clear
47	1 gpm	1618	18.4	7.95	62.1	2	Clear
49	1 gpm	1620	18.3	7.92	62.3	2	Clear
50	1 gpm	1621	18.3	7.90	62.0	1	Clear

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-18L (Site 14)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
50 gal.	1 gpm	1621	18.3	7.90	62.0	1 NTU	Clear

Development Completed at 50 Gallons Discharged. Date: 9/23/2007 Time: 1621
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-19 (Site 14)

Project: Well Development
Project No.: I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/23/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.23 ft; Final 15.24 ft
Initial Depth to Water (TOC): 7.67 ft Date 9/23/2007 Time 1645
Stabilized Depth to Water (TOC): 7.74 ft Date 9/23/2007 Time 1808

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.56 Ft. of water
x 0.163 Gallons/Foot
= 1.23 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.69 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 8 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
42	1 gpm	1749	19.4	7.79	38.5	1	Clear, yellow color, sl sweet odor
44	1 gpm	1751	19.7	7.69	38.5	3	Clear, yellow color, sl sweet odor
46	1 gpm	1753	19.7	7.62	38.4	2	Clear, yellow color, sl sweet odor
48	1 gpm	1755	19.6	7.57	38.3	3	Clear, yellow color, sl sweet odor
50	1 gpm	1757	20.6	7.54	38.0	3	Clear, yellow color, sl sweet odor

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-19 (Site 14)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
50 gal.	1 gpm	1757	20.6	7.54	38.0	3 NTU	Clear, yellow color, sl sweet odor

Development Completed at 50 Gallons Discharged. Date: 9/23/2007 Time: 1757
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-22 (Site 14)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/23/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.21 ft; Final 15.38 ft
Initial Depth to Water (TOC) 7.38 ft Date 9/23/2007 Time 1310
Stabilized Depth to Water (TOC) 7.51 ft Date 9/23/2007 Time 1448

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	_____
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	_____

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.83 Ft. of water
x 0.163 Gallons/Foot
= 1.28 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.83 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 8 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
42	1 gpm	1430	18.9	7.98	48.4	8	Clear
44	1 gpm	1432	18.9	8.00	48.1	4	Clear
46	1 gpm	1434	19.2	7.99	48.4	2	Clear
48	1 gpm	1436	19.1	7.99	48.5	1	Clear
50	1 gpm	1438	19.3	7.99	38.4	3	Clear

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-22 (Site 14)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
50 gal.	1 gpm	1438	19.3	7.99	38.4	3 NTU	Clear

Development Completed at 50 Gallons Discharged. Date: 9/23/2007 Time: 1438
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-23

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/8/1991
Date(s) of Development: 9/7/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.17; Final 15.27
Initial Depth to Water (TOC): 8.12 Date: 9/7/2007 Time: 08:18
Stabilized Depth to Water (TOC): 8.17 Date: 9/7/2007 Time: 09:27

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.05 Ft. of water
x 0.163 Gallons/Foot
= 1.15 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.45 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y **N** Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
33	1 gpm	09:06	17.5	5.98	48.3	15	clear
35	1 gpm	09:08	18.3	6.94	48.3	7	clear
36	1 gpm	09:09	18.3	7.26	48.8	4	clear
37	1 gpm	09:10	18.4	4.46	48.4	2	clear
38	1 gpm	09:11	18.0	7.58	48.7	1	clear
39	1 gpm	09:12	17.7	7.68	48.9	1	clear
40	1 gpm	09:13	18.5	7.76	48.0	1	clear

Development Completed at 40 Gallons Discharged. Date: 9/7/2007 Time: 09:14
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-24

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/8/1991
Date(s) of Development: 9/6/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 14.67; Final 15.19
Initial Depth to Water (TOC) 6.78 Date 9/6/2007 Time 14:38
Stabilized Depth to Water (TOC) 6.97 Date 9/6/2007 Time 15:59

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.89 Ft. of water
x 0.163 Gallons/Foot
= 1.29 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.89 Gallons
Actual Purge Volume: 30 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y **N** Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
24	1 gpm	15:41	21.7	8.72	52.2	6	Pump at 11 feet. Clear.
27	1 gpm	15:42	21.4	8.64	52.1	3	Clear
28	1 gpm	15:43	20.8	8.62	53.0	1	Clear
29	1 gpm	15:44	21.1	8.60	53.3	1	Clear
30	1 gpm	15:45	21.4	8.56	51.6	1	Clear

Development Completed at 30 Gallons Discharged. Date: 9/6/2007 Time: 15:50
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-27

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: 3/9/1991
Date(s) of Development: 9/11/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.14; Final 15.19
Initial Depth to Water (TOC) 4.54 Date 9/11/2007 Time 10.27
Stabilized Depth to Water (TOC) 4.56 Date 9/11/2007 Time 11:46

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 10.60 Ft. of water
x 0.163 Gallons/Foot
= 1.73 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.19 Gallons
Actual Purge Volume: 45 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 10 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
32	1 gpm	11:25	21.0	7.95	48.2	33	Cloudy
34	1 gpm	11:27	20.8	7.95	48.5	14	Cloudy
35	1 gpm	11:28	21.1	7.95	48.2	13	Cloudy
37	1 gpm	11:30	20.9	7.95	48.0	14	Cloudy
38	1 gpm	11:31	20.7	7.95	48.0	9	Clear
39	1 gpm	11:32	21.1	7.96	48.1	7	Clear
40	1 gpm	11:33	21.0	7.96	47.7	9	Clear
41	1 gpm	11:34	20.4	7.95	47.9	9	Clear
42	1 gpm	11:35	20.5	7.95	47.9	6	Clear
43	1 gpm	11:36	20.9	7.95	48.0	4	Clear
44	1 gpm	11:37	20.6	7.95	48.1	4	Clear
45	1 gpm	11:38	20.8	7.96	47.8	4	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-27

Development Completed at 45 Gallons Discharged. Date: 9/11/2007 Time: 11:38
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-54 (Site 14)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/26/2007
Personnel/Company: L Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15.35
Measured Total Depth (TOC): Initial 15.42 ft; Final 15.45 ft
Initial Depth to Water (TOC): 7.06 ft Date 9/26/2007 Time 1348
Stabilized Depth to Water (TOC): 7.10 ft Date 9/26/2007 Time 1515

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.36 Ft. of water
x 0.163 Gallons/Foot
= 1.36 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.08 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 11 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
45	1 gpm	1458	21.8	8.42	34.0	5	Pump at 11 ft, no color, slight odor of decaying organic matter
46	1 gpm	1459	21.9	8.35	33.6	3	Same as above
47	1 gpm	1500	21.6	8.31	34.3	2	Same as above
48	1 gpm	1501	21.4	8.26	34.1	5	Same as above
49	1 gpm	1502	21.3	8.24	34.0	2	Same as above
50	1 gpm	1503	21.3	8.21	34.1	3	Same as above

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-~~76~~ 54 (Site 14)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
50 gal.	1 gpm	1503	21.3	8.21	34.1	3	Pump at 11 ft, no color, slight odor of decaying organic matter

Development Completed at 50 Gallons Discharged. Date: 9/26/2007 Time: 1503

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-55

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 11/21/1991
Date(s) of Development: 9/7/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.28; Final 15.31
Initial Depth to Water (TOC) 8.33 Date 9/7/2007 Time 09:29
Stabilized Depth to Water (TOC) 8.37 Date 9/7/2007 Time 11:11

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
_X_ Surge Block	2-in diameter surge tool
_X_ Bailing	2-in stainless steel bailer
_X_ Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 6.95 Ft. of water
x 0.163 Gallons/Foot
= 1.13 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.40 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
26	1 gpm	10:44	21.1	8.21	50.4	49	Cloudy
28	1 gpm	10:46	21.2	8.22	50.4	27	Cloudy
29	1 gpm	10:47	20.6	8.24	50.3	20	Clear
30	1 gpm	10:48	20.2	8.25	50.5	12	Clear
31	1 gpm	10:49	19.9	8.26	50.3	8	Clear
33	1 gpm	10:51	20.1	8.27	50.1	7	Clear
34	1 gpm	10:52	19.6	8.28	50.7	6	Clear
35	1 gpm	10:53	19.3	8.29	50.9	6	Clear
36	1 gpm	10:54	19.7	8.30	50.3	9	Clear
37	1 gpm	10:55	19.5	8.31	51.4	12	Clear
38	1 gpm	10:56	19.7	8.31	50.6	9	Clear
39	1 gpm	10:57	19.3	8.31	50.8	9	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-55

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
40	1 gpm	10:58	19.9	8.32	50.6	9	Clear

Development Completed at 40 Gallons Discharged. Date: 9/7/2007 Time: 10:58

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-73 (Site 14)

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 10/10/2007
Personnel/Company: B. O'Brien/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5.0-20.0
Total Length of Well Casing: 22.35
Measured Total Depth (TOC): Initial 22.60 ft; Final 22.60 ft
Initial Depth to Water (TOC): 6.30 ft Date 10/10/2007 Time 1241
Stabilized Depth to Water (TOC): 6.35 ft Date 10/10/2007 Time 1417

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 16.30 Ft. of water
x 0.163 Gallons/Foot
= 2.66 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.98 Gallons
Actual Purge Volume: 60 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 15 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
56	1 gpm	1404	19.2	8.30	47.7	11	Pump at 15 ft bTOC, clear
58	1 gpm	1406	19.4	8.29	47.9	8	Same as above
60	1 gpm	1408	19.4	8.29	47.9	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-73 (Site 14)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
60 gal.	1 gpm	1408	19.4	8.29	47.9	6	Pump at 15 ft bTOC, clear

Development Completed at 60 Gallons Discharged. Date: 10/10/2007 Time: 1410

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. O'Brien, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-75

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/13/1996
Date(s) of Development: 9/9/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 22
Measured Total Depth (TOC) Initial: 21.62
Final: 21.82
Initial Depth to Water (TOC): 6.91 Date: 9/9/2007 Time: 07:18
Stabilized Depth to Water (TOC): 6.95 Date: 9/9/2007 Time: 08:34

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 14.71 Ft. of water
x 0.163 Gallons/Foot
= 2.40 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.20 Gallons
Actual Purge Volume: 45 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 @ 15 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
39	1 gpm	08:20	19.0	6.49	33.4	24	Tint
41	1 gpm	08:22	19.6	7.34	33.9	15	Tint
42	1 gpm	08:23	19.0	7.54	33.9	11	Clear
44	1 gpm	08:25	18.5	7.73	34.0	11	Clear
45	1 gpm	08:26	19.1	7.85	34.0	11	Clear

Development Completed at 45 Gallons Discharged. Date: 9/9/2007 Time: 08:26
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-76 (Site 14)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/23/2007
Personnel/Company: Richard Knapp/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 22
Measured Total Depth (TOC): Initial 22.22 ft; Final 22.28 ft
Initial Depth to Water (TOC): 7.09 ft Date 9/23/2007 Time 1109
Stabilized Depth to Water (TOC): 7.11 ft Date 9/23/2007 Time 1251

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 15.13 Ft. of water
x 0.163 Gallons/Foot
= 2.47 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.41 Gallons
Actual Purge Volume: 70 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 12 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
53	1 gpm	1224	19.0	7.54	38.7	74	Slightly cloudy
55	1 gpm	1226	19.6	7.49	38.5	62	Slightly cloudy
57	1 gpm	1228	19.4	7.45	38.5	48	Mostly Clear
59	1 gpm	1230	19.9	7.43	38.5	35	Mostly Clear
62	1 gpm	1233	20.1	7.41	38.3	26	Clear
65	1 gpm	1236	20.0	7.42	38.2	18	Clear
68	1 gpm	1239	19.8	7.40	38.3	13	Clear
70	1 gpm	1241	19.9	7.40	38.0	10	Clear

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-76 (Site 14)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
70 gal.	1 gpm	1241	19.9	7.40	38.0	10 NTU	Clear

Development Completed at 70 Gallons Discharged. Date: 9/23/2007 Time: 1241
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 16

Well Development forms were not available for the following existing monitoring wells located at Site 16 during report development:

Well ID	Installation Date
DPZ-1	Apr-04
DPZ-2	Apr-04
DPZ-3	Apr-04
BAT-16-Q	9/23/1997
MW-25L	3/9/1991
MW-25U	3/8/1991
MW-65	11/25/1991
MW-65A	4/8/2004
PZ-16-11	12/7/1991
RW-16-1	4/8/2004
SPZ-1	Apr-04
SPZ-2	Apr-04
SPZ-3	Apr-04

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-16-2 (Site 16)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 10/11/2007
Personnel/Company: B. O'Brien/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5.0-15.0
Total Length of Well Casing: 20.0
Measured Total Depth (TOC): Initial 17.96 ft; Final 20.19 ft
Initial Depth to Water (TOC) 6.30 ft Date 10/11/2007 Time 1153
Stabilized Depth to Water (TOC) 6.33 ft Date 10/11/2007 Time 1355

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.66 Ft. of water
x 0.163 Gallons/Foot
= 1.901 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.702 Gallons
Actual Purge Volume: 85 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
74	1 gpm	1334	19.6	7.70	74.7	79	Pump at 18 ft bTOC, cloudy
77	1 gpm	1337	19.4	7.91	75.1	96	Same as above
80	1 gpm	1340	19.3	7.97	75.1	26	Same as above
83	1 gpm	1343	19.3	8.02	74.9	12	Pump at 189 ft bTOC, clear
85	1 gpm	1345	19.3	8.03	74.9	8	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-16-2 (Site 16)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
85 gal.	1 gpm	1345	19.3	8.03	74.9	8	Pump at 18 ft bTOC, clear

Development Completed at 85 Gallons Discharged. Date: 10/11/2007 Time: 1347

Criteria: > 3 casing volumes purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. O'Brien, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-16-3

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 4/8/2004
Date(s) of Development: 9/7/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 19
Measured Total Depth (TOC): Initial 19.79; Final 20.09
Initial Depth to Water (TOC) 4.74 Date 9/7/2007 Time 15:30
Stabilized Depth to Water (TOC) 4.97 Date 9/7/2007 Time 17:38

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 15.05 Ft. of water
x 0.163 Gallons/Foot
= 2.45 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.35 Gallons
Actual Purge Volume: 65 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
37	1 gpm	16:53	21.7	9.10	59.8	174	Cloudy
39	1 gpm	16:55	21.1	8.98	59.9	103	Cloudy
41	1 gpm	16:57	20.9	8.94	61.0	81	Cloudy
43	1 gpm	16:59	20.8	8.90	61.0	55	Cloudy
45	1 gpm	17:01	20.5	8.87	61.3	33	Cloudy
48	1 gpm	17:04	20.1	8.85	60.3	19	Cloudy
50	1 gpm	17:06	20.3	8.85	60.1	24	Cloudy
51	1 gpm	17:07	19.6	8.83	59.5	20	Slight yellow tinge
52	1 gpm	17:08	20.1	8.83	61.1	21	Slight yellow tinge
54	1 gpm	17:10	20.0	8.83	61.3	27	Slight yellow tinge
56	1 gpm	17:12	20.3	8.82	61.2	20	Slight yellow tinge
58	1 gpm	17:14	19.7	8.82	61.3	19	Slight yellow tinge

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-16-3

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
60	1 gpm	17:16	19.5	8.86	61.6	16	Slight yellow tinge
62	1 gpm	17:18	20.2	8.82	61.5	14	Clear
64	1 gpm	17:20	19.7	8.81	61.8	13	Clear
65	1 gpm	17:21	19.6	8.81	61.7	14	Clear

Development Completed at 65 Gallons Discharged. Date: 9/7/2007 Time: 17:21

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-16-4

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 8/4/2004
Date(s) of Development: 9/7/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5.5-15
Total Length of Well Casing: 20
Measured Total Depth (TOC): Initial 18.62; Final 20.06
Initial Depth to Water (TOC) 4.52 Date 9/7/2007 Time 11:40
Stabilized Depth to Water (TOC) 4.98 Date 9/7/2007 Time 15:23

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 14.1 Ft. of water
x 0.163 Gallons/Foot
= 2.30 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.90 Gallons
Actual Purge Volume: 45 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
34	1 gpm	15:03	23.3	8.56	68.9	39	Cloudy
36	1 gpm	15:05	22.5	8.53	68.6	26	Cloudy
37	1 gpm	15:06	21.2	8.51	68.4	16	Cloudy
40	1 gpm	15:09	20.9	8.50	68.3	10	Clear
42	1 gpm	15:11	21.2	8.51	68.3	8	Clear
43	1 gpm	15:12	20.8	8.50	68.6	6	Clear
44	1 gpm	15:13	20.9	8.51	68.5	6	Clear
45	1 gpm	15:14	20.5	8.50	68.6	6	Clear

Development Completed at 45 Gallons Discharged. Date: 9/7/2007 Time: 15:17
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-26

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/9/1991
Date(s) of Development: 9/9/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.10; Final 15.15
Initial Depth to Water (TOC) 6.34 Date 9/9/2007 Time 08:42
Stabilized Depth to Water (TOC) 6.37 Date 9/9/2007 Time 09:52

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.76 Ft. of water
x 0.163 Gallons/Foot
= 1.42 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.28 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
33	1 gpm	09:34	21.4	8.56	28.7	36	Cloudy
34	1 gpm	09:35	21.6	8.38	29.4	22	Yellow tint
35	1 gpm	09:36	21.1	8.25	29.0	12	Clear
36	1 gpm	09:37	21.1	8.18	29.5	7	Clear
37	1 gpm	09:38	21.4	8.15	28.9	6	Clear
39	1 gpm	09:40	21.4	8.12	28.9	6	Clear
40	1 gpm	09:41	21.2	8.12	29.0	6	Clear

Development Completed at 40 Gallons Discharged. Date: 9/9/2007 Time: 09:41
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-28 (Site 16)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/26/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15.15
Measured Total Depth (TOC) Initial: 15.21 ft
Final: 15.24 ft
Initial Depth to Water (TOC): 7.00 ft Date: 9/26/2007 Time: 1520
Stabilized Depth to Water (TOC): 7.49 ft Date: 9/26/2007 Time: 1646

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.21 Ft. of water
x 0.163 Gallons/Foot
= 1.34 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.01 Gallons
Actual Purge Volume: _____ Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 15 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
22	1 gpm	1624	19.1	8.57	47.4	7	Pump at 15ft, clear, no color, no odor
23	1 gpm	1625	18.5	8.54	47.9	3	Same as above
24	1 gpm	1626	18.4	8.52	47.5	3	Same as above
25	1 gpm	1627	18.3	8.50	47.5	1	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-28 (Site 16)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
25 gal.	1 gpm	1627	18.3	8.50	47.5	1	Pump at 15ft, clear, no color, no odor

Development Completed at 25 Gallons Discharged. Date: 9/26/2007 Time: 1627

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-29L

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/10/1991
Date(s) of Development: 9/11/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 14.5-19.5
Total Length of Well Casing: 19.5
Measured Total Depth (TOC): Initial 19.45; Final 19.48
Initial Depth to Water (TOC) 6.55 Date 9/11/2007 Time 07:30
Stabilized Depth to Water (TOC) 6.76 Date 9/11/2007 Time 08:43

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.90 Ft. of water
x 0.163 Gallons/Foot
= 2.10 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.30 Gallons
Actual Purge Volume: 35 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 @ 18 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
31	1 gpm	08:30	15.4	8.15	47.7	12	Cloudy
33	1 gpm	08:32	15.4	8.22	48.1	5	Clear
34	1 gpm	08:33	15.3	8.26	48.2	5	Clear
35	1 gpm	08:34	15.4	8.30	47.7	5	Clear

Development Completed at 35 Gallons Discharged. Date: 9/11/2007 Time: 08:34
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-29U

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/10/1991
Date(s) of Development: 9/11/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.16; Final 15.16
Initial Depth to Water (TOC) 6.45 Date 9/11/2007 Time 08:45
Stabilized Depth to Water (TOC) 6.67 Date 9/11/2007 Time 10.17

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.71 Ft. of water
x 0.163 Gallons/Foot
= 1.42 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.26 Gallons
Actual Purge Volume: 60 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
39	1 gpm	09:39	17.0	9.24	7.68	11	Clear
41	1 gpm	09:41	17.2	9.20	7.56	7	Clear
42	1 gpm	09:42	17.1	9.19	7.54	7	Clear
43	1 gpm	09:43	17.1	9.19	7.57	6	Clear
44	1 gpm	09:44	17.0	9.20	7.59	6	Clear
47	1 gpm	09:47	17.0	9.22	7.55	8	Clear. Bailed water from MW-29L because Sp. Cond. In MW-29U seems low. Sp. Cond. In MW-29L = 20.0.
51	1 gpm	09:51	17.1	9.32	7.74	5	Clear
55	1 gpm	09:53	17.3	9.27	7.60	7	Clear
57	1 gpm	09:55	17.2	9.24	7.61	3	Clear
59	1 gpm	09:56	17.0	9.24	7.65	3	Clear
60	1 gpm	09:57	17.0	9.24	7.62	3	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-29U

Development Completed at 60 Gallons Discharged. Date: 9/11/2007 Time: 09:57
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-30

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: 3/10/1991
Date(s) of Development: 9/12/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 12.72; Final 15.20
Initial Depth to Water (TOC) 5.98 Date 9/12/2007 Time 07:28
Stabilized Depth to Water (TOC) 6.46 Date 9/12/2007 Time 09:31

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 6.74 Ft. of water
x 0.163 Gallons/Foot
= 1.10 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.30 Gallons
Actual Purge Volume: 20 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 @ 13 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
15	1 gpm	08:56	17.2	9.07	38.6	44	Cloudy
16	1 gpm	08:59	17.2	7.60	38.8	35	Cloudy
17	1 gpm	09:01	17.3	7.85	38.5	27	Cloudy
17	1 gpm	09:03	17.3	8.02	38.5	21	Cloudy
18	1 gpm	09:05	17.5	8.15	38.4	18	Yellow tint
18	1 gpm	09:07	17.5	8.23	38.4	14	Yellow tint
19	1 gpm	09:09	17.4	8.30	38.4	12	Clear
19	1 gpm	09:11	17.4	8.35	38.4	11	Clear
20	1 gpm	09:13	17.3	8.40	38.5	12	Clear

Development Completed at 20 Gallons Discharged. Date: 9/12/2007 Time: 09:15
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-63

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 11/24/1991
Date(s) of Development: 9/9/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 3-23
Total Length of Well Casing: 23
Measured Total Depth (TOC): Initial 22.66; Final 22.66
Initial Depth to Water (TOC) 5.94 Date 9/9/2007 Time 13:53
Stabilized Depth to Water (TOC) 6.02 Date 9/9/2007 Time 15:09

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 16.72 Ft. of water
x 0.163 Gallons/Foot
= 2.73 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 8.28 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 15 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
32	1 gpm	14:43	20.8	8.42	55.5	54	Cloudy
35	1 gpm	14:46	20.5	8.39	55.5	21	Cloudy
37	1 gpm	14:48	20.4	8.39	55.7	14	Cloudy
38	1 gpm	14:49	20.4	8.38	55.5	8	Clear
39	1 gpm	14:50	20.2	8.37	55.3	9	Clear
41	1 gpm	14:52	20.2	8.37	55.5	11	Clear
43	1 gpm	14:54	20.5	8.36	55.6	7	Clear
44	1 gpm	14:55	20.1	8.36	56.2	6	Clear
45	1 gpm	14:57	20.0	8.35	55.7	6	Clear
47	1 gpm	14:58	20.0	8.36	55.6	4	Clear
48	1 gpm	14:59	20.0	8.35	55.7	6	Clear
49	1 gpm	15:00	20.0	8.35	55.5	6	Clear

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-63

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
50	1 gpm	15:01	20.2	8.35	55.5	6	Clear

Development Completed at 50 Gallons Discharged. Date: 9/9/2007 Time: 15:01
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-74

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/19/1996
Date(s) of Development: 9/9/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 22
Measured Total Depth (TOC): Initial 21.81; Final 21.82
Initial Depth to Water (TOC) 4.46 Date 9/9/2007 Time 15:18
Stabilized Depth to Water (TOC) 4.51 Date 9/9/2007 Time 17:05

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 17.35 Ft. of water
x 0.163 Gallons/Foot
= 2.83 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 8.49 Gallons
Actual Purge Volume: 60 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 15 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
47	1 gpm	16:35	20.0	8.75	53.6	48	Cloudy
49	1 gpm	16:37	19.2	8.73	53.4	29	Cloudy
50	1 gpm	16:38	19.1	8.71	53.4	21	Cloudy
52	1 gpm	16:40	18.9	8.70	53.7	16	Cloudy
53	1 gpm	16:41	18.4	8.67	54.0	14	Cloudy
54	1 gpm	16:42	18.5	8.68	53.7	11	Clear
55	1 gpm	16:43	18.6	8.68	53.9	10	Clear
56	1 gpm	16:44	18.7	8.67	54.2	9	Clear

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57	1 gpm	16:45	18.6	8.66	54.2	8	Clear
59	1 gpm	16:47	18.5	8.66	54.5	8	Clear
60	1 gpm	16:48	18.7	8.65	54.3	8	Clear

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-74

Development Completed at 60 Gallons Discharged. Date: 9/9/2007 Time: 16:49
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-77

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/16/1996
Date(s) of Development: 9/10/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 17
Measured Total Depth (TOC) Initial: 16.21
Final: 16.95
Initial Depth to Water (TOC): 5.11 Date: 9/10/2007 Time: 10:18
Stabilized Depth to Water (TOC): 5.12 Date: 9/10/2007 Time: 11:40

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.10 Ft. of water
x 0.163 Gallons/Foot
= 1.81 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.43 Gallons
Actual Purge Volume: 40 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 @ 12 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
30	1 gpm	11:15	19.6	7.96	64.8	12	Clear
33	1 gpm	11:18	19.4	7.98	64.6	22	Clear
35	1 gpm	11:20	19.1	7.97	64.7	11	Clear
37	1 gpm	11:22	19.1	7.97	64.5	10	Clear
39	1 gpm	11:24	19.1	7.98	64.5	10	Clear
40	1 gpm	11:25	19.1	7.98	64.6	10	Clear

Development Completed at 40 Gallons Discharged. Date: 9/10/2007 Time: 11:26
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: L. Mancuso, J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-78

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: 3/14/1996
Date(s) of Development: 9/9/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 22
Measured Total Depth (TOC) Initial: 21.65
Final: 21.65
Initial Depth to Water (TOC): 5.41 Date: 9/9/2007 Time: 10:00
Stabilized Depth to Water (TOC): 5.71 Date: 9/9/2007 Time: 13:36

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 16.24 Ft. of water
x 0.163 Gallons/Foot
= 2.65 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.94 Gallons
Actual Purge Volume: 15 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 0.2 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 @ 20 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
12	0.2 gpm	11:14	18.6	8.47	75.6	22	Cloudy
12	0.2 gpm	11:17	17.8	8.55	73.9	40	Cloudy
12	0.2 gpm	11:18	17.7	8.59	74.1	41	Cloudy
13	0.2 gpm	11:20	16.9	8.62	74.9	27	Cloudy
13	0.2 gpm	11:23	16.6	8.61	75.5	18	Cloudy
13	0.2 gpm	11:25	16.9	8.60	75.8	9	Clear
14	0.2 gpm	11:26	17.0	8.60	75.8	6	Clear
14	0.2 gpm	11:28	17.4	8.61	75.6	5	Clear
15	0.2 gpm	11:30	16.9	8.59	74.5	5	Clear

Development Completed at 15 Gallons Discharged. Date: 9/9/2007 Time: 11:31
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-79

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/14/1996
Date(s) of Development: 9/9/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 22
Measured Total Depth (TOC): Initial 22.44; Final 22.44
Initial Depth to Water (TOC) 6.15 Date 9/9/2007 Time 11:50
Stabilized Depth to Water (TOC) 6.34 Date 9/9/2007 Time 13:32

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 16.29 Ft. of water
x 0.163 Gallons/Foot
= 2.66 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.98 Gallons
Actual Purge Volume: 60 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 15 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
38	1 gpm	12:58	20.8	9.35	26.6	17	Cloudy
40	1 gpm	13:00	19.9	9.05	27.4	18	Cloudy
41	1 gpm	13:01	19.5	8.93	28.2	18	Cloudy
42	1 gpm	13:02	19.3	8.84	28.7	17	Cloudy
43	1 gpm	13:04	19.0	8.76	29.6	14	Cloudy
45	1 gpm	13:06	19.0	8.72	30.0	16	Cloudy
47	1 gpm	13:08	19.0	8.66	30.3	17	Cloudy
49	1 gpm	13:10	18.5	8.63	31.1	15	Cloudy
51	1 gpm	13:12	18.9	8.61	30.9	14	Cloudy
53	1 gpm	13:14	18.6	8.59	31.0	12	Clear
55	1 gpm	13:16	18.9	8.57	31.4	10	Clear
57	1 gpm	13:18	18.7	8.56	31.5	9	Clear

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-79

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
58	1 gpm	13:19	18.9	8.56	31.5	8	Clear
59	1 gpm	13:20	18.7	8.55	31.6	8	Clear
60	1 gpm	13:21	18.7	8.55	31.6	8	Clear

Development Completed at 60 Gallons Discharged. Date: 9/9/2007 Time: 13:21
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 18

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW- 32 (Site 18)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/26/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC) Initial: 14.48 ft
Final: 14.89 ft
Initial Depth to Water (TOC): 6.17 ft Date: 9/26/2007 Time: 1055
Stabilized Depth to Water (TOC): 6.27 ft Date: 9/26/2007 Time: 1322

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.31 Ft. of water
x 0.163 Gallons/Foot
= 1.35 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.06 Gallons
Actual Purge Volume: 60 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 11 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
56	1 gpm	1259	18.0	8.32	34.1	8	Pump at 11 ft bTOC, clear, no odor, no color
57	1 gpm	1300	18.1	8.31	34.3	6	Same as above
58	1 gpm	1301	18.2	8.31	34.2	5	Same as above
59	1 gpm	1302	18.2	8.30	34.2	2	Same as above
60	1 gpm	1303	18.1	8.30	34.3	2	Same as above

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW32 (Site 18)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60 gal.	1 gpm	1303	18.1	8.30	34.3	2	Pump at 11 ft bTOC, clear, no odor, no color

Development Completed at 60 Gallons Discharged. Date: 9/26/2007 Time: 1303
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 20

Well Development forms were not available for the following existing monitoring wells located at Site 20 during report development:

Well ID	Installation Date
BA20-MW01	1/30/2007
BA20-MW02	1/31/2007
BA20-MW03	1/29/2007
BA20-MW04	1/30/2007
BA20-MW05	1/31/2007

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-33L (Site 20)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 10/10/2007
Personnel/Company: B. O'Brien/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 22.0-27.0
Total Length of Well Casing: 27.0
Measured Total Depth (TOC): Initial 27.12 ft; Final 27.28 ft
Initial Depth to Water (TOC) 5.86 ft Date 10/10/2007 Time 0827
Stabilized Depth to Water (TOC) 6.58 ft Date 10/10/2007 Time 1027

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 21.26 Ft. of water
x 0.163 Gallons/Foot
= 3.47 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 10.40 Gallons
Actual Purge Volume: 70 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 23 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
40	1 gpm	0940	15.4	6.90	47.5	53	Pump at 23 ft bTOC, cloudy
45	1 gpm	0945	15.9	7.32	48.1	25	Same as above
50	1 gpm	0950	16.1	7.52	48.2	26	Same as above
53	1 gpm	0953	16.1	7.59	48.4	23	Same as above
56	1 gpm	0956	16.1	7.62	48.4	20	Pump at 23 ft bTOC, clear
59	1 gpm	0959	16.2	7.65	48.7	NA	Same as above
62	1 gpm	1002	16.2	7.68	48.3	25	Same as above
64	1 gpm	1004	16.1	7.69	48.4	18	Same as above
66	1 gpm	1006	15.9	7.71	48.4	14	Same as above
68	1 gpm	1008	15.9	7.72	48.6	16	Same as above
70	1 gpm	1010	15.9	7.72	48.5	15	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-33L (Site 20)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
70 gal.	1 gpm	1010	15.9	7.72	48.5	15	Pump at 23 ft bTOC, clear

Development Completed at 70 Gallons Discharged. Date: 10/10/2007 Time: 1012

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. O'Brien, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

NA: Reading was not collected

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-33U (Site 20)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 10/10/2007
Personnel/Company: B. O'Brien/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5.0-15.0
Total Length of Well Casing: 15.0
Measured Total Depth (TOC): Initial 14.90 ft; Final 15.35 ft
Initial Depth to Water (TOC) 5.90 ft Date 10/10/2007 Time 1036
Stabilized Depth to Water (TOC) 6.12 ft Date 10/10/2007 Time 1157

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.00 Ft. of water
x 0.163 Gallons/Foot
= 1.47 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.41 Gallons
Actual Purge Volume: 55 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 11 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
46	1 gpm	1140	19.2	7.55	33.9	23	Pump at 11 ft bTOC, clear
49	1 gpm	1143	19.2	7.64	33.1	8	Same as above
52	1 gpm	1146	19.1	7.68	33.1	6	Same as above
55	1 gpm	1149	19.1	7.70	33.1	8	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-33U (Site 20)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
55 gal.	1 gpm	1149	19.1	7.70	33.1	8	Pump at 11 ft bTOC, clear

Development Completed at 55 Gallons Discharged. Date: 10/10/2007 Time: 1151

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. O'Brien, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-36

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/12/1991
Date(s) of Development: 9/10/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-15
Total Length of Well Casing: 15
Measured Total Depth (TOC): Initial 15.15; Final 15.24
Initial Depth to Water (TOC) 7.85 Date 9/10/2007 Time 16:15
Stabilized Depth to Water (TOC) 7.94 Date 9/10/2007 Time 17:38

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.30 Ft. of water
x 0.163 Gallons/Foot
= 1.19 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.57 Gallons
Actual Purge Volume: 50 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 @ 11 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
37	1 gpm	17:15	18.3	7.87	53.5	44	Cloudy
39	1 gpm	17:17	18.0	7.87	53.6	32	Cloudy
41	1 gpm	17:19	18.3	7.87	53.7	24	Cloudy
42	1 gpm	17:20	18.0	7.87	53.5	19	Cloudy
44	1 gpm	17:22	17.9	7.87	53.7	18	Cloudy
45	1 gpm	17:23	18.1	7.87	53.9	15	Cloudy
47	1 gpm	17:25	18.0	7.87	53.8	11	Clear
49	1 gpm	17:27	17.7	7.87	54.0	11	Clear
50	1 gpm	17:28	18.2	7.87	53.8	11	Clear

Development Completed at 50 Gallons Discharged. Date: 9/10/2007 Time: 17:28
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 21

Well Development forms were not available for the following existing monitoring wells located at Site 21 during report development:

Well ID	Installation Date
BA21-MW01	2/6/2007
BA21-MW02	2/6/2007
BA21-MW03	2/6/2007
BA21-MW04	2/1/2007
BA21-MW05	2/5/2007

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-12-L (Site 21)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/20/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 74-84
Total Length of Well Casing: 84.26 (measured)
Measured Total Depth (TOC) Initial: 84.26 ft
Final: 84.30 ft
Initial Depth to Water (TOC): 3.05 ft Date: 9/19/2007 Time: 0745
Stabilized Depth to Water (TOC): 3.43 ft Date: 9/19/2007 Time: 1146

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 82.95 Ft. of water
x 0.163 Gallons/Foot
= 13.52 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 40.6 Gallons
Actual Purge Volume: 160 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 80 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
132	1 gpm	1032	17.4	8.30	1.27	38	Pump at 80 ft bTOC, yellowish gray color, slightly cloudy, sulfur odor
135	1 gpm	1035	17.2	8.42	1.26	42	Same as above
139	1 gpm	1039	17.3	8.41	1.26	26	Same as above
141	1 gpm	1041	17.3	8.46	1.28	60	Same as above
144	1 gpm	1044	17.3	8.40	1.27	14	Pump at 80 ft bTOC, yellowish gray color, sul clear, fur odor
147	1 gpm	1047	17.3	8.45	1.28	12	Same as above
150	1 gpm	1050	17.4	8.43	1.28	15	Same as above
152	1gpm	1052	17.5	8.41	1.28	13	Same as above
154		1054	17.4	8.45	1.28	19	Same as above
158		1058	17.4	8.45	1.28	19	Same as above
160		1100	17.4	8.37	1.29	20	Same as above

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-12-L (Site 21)

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
160 gal.	1 gpm	110	17.4	8.37	1.29	20	Pump at 80 ft bTOC, clear, yellowish gray color, sulfur odor.

Development Completed at 160 Gallons Discharged. Date: 9/20/2007 Time: 110

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Mancuso, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-94 (Site 21)

Project: Well Development
Project No.: 14302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 9/19/2007
Personnel/Company: L. Mancuso/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 4-19
Total Length of Well Casing: 21.72
Measured Total Depth (TOC) Initial: 21.11ft
Final: 21.72 ft
Initial Depth to Water (TOC): 7.91 ft Date: 9/19/2007 Time: 1430
Stabilized Depth to Water (TOC): 8.85 ft Date: 9/19/2007 Time: 1550

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 13.2 Ft. of water
x 0.163 Gallons/Foot
= 2.15 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.45 Gallons
Actual Purge Volume: 30 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 20 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp °C	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
22	1 gpm	1531	16.9	9.43	10.0	39	Pump at 20 ft bTOC, cloudy, tan, no odor
25	1 gpm	1534	16.8	9.30	10.0	14	Pump at 20 ft bTOC, clear, no odor or color
26	1 gpm	1536	16.6	9.24	10.2	11	Same as above
27	1 gpm	1537	16.5	9.21	10.4	9	Same as above
28	1 gpm	1538	16.7	9.19	10.4	8	Same as above
29	1 gpm	1539	16.4	9.17	10.5	8	Same as above
30	1 gpm	1540	16.5	9.16	10.6	8	Same as above

Site 22

Well Development forms were not available for the following existing monitoring wells located at Site 22 during report development:

Well ID	Installation Date
BA22-MW01	2/5/2007
BA22-MW02	2/1/2007
BA22-MW03	2/1/2007
BA22-MW04	2/5/2007

Hot Pit

Well Development forms were not available for the following existing Hot Pit monitoring wells during report development:

Well ID	Installation Date
BA-HP3-MW1	unknown
BA-HP3-MW2	unknown
BA-HP3-MW3	unknown

Basewide (Sentinel) Wells

Well Development forms were not available for the following existing Basewide (Sentinel) monitoring wells during report development:

Well ID	Installation Date
MW-81	3/20/1996
MW-84	3/21/1996
MW-86	3/21/1996

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-82

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/21/1996
Date(s) of Development: 9/11/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 22
Measured Total Depth (TOC) Initial: 21.65
Final: 21.79
Initial Depth to Water (TOC): 5.42 Date: 9/11/2007 Time: 12:11
Stabilized Depth to Water (TOC): 5.47 Date: 9/11/2007 Time: 13:37

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 16.23 Ft. of water
x 0.163 Gallons/Foot
= 2.65 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.95 Gallons
Actual Purge Volume: 55 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 15 Ft. (Below Grd.)
Immiscible Phases Present: Y **N** Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
40	1 gpm	13:12	21.9	9.26	6.04	50	Cloudy
42	1 gpm	13:14	21.1	9.31	5.84	40	Cloudy
44	1 gpm	13:16	20.2	9.33	6.03	25	Cloudy
45	1 gpm	13:17	19.7	9.34	6.02	25	Cloudy
47	1 gpm	13:19	19.6	9.34	6.09	19	Cloudy
49	1 gpm	13:21	19.5	9.34	6.09	11	Clear
50	1 gpm	13:22	19.6	9.35	6.10	12	Clear
51	1 gpm	13:23	19.2	9.34	6.16	14	Clear

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53	1 gpm	13:25	19.5	9.33	6.16	9	Clear
54	1 gpm	13:26	18.9	9.34	6.12	9	Clear
55	1 gpm	13:27	19.2	9.35	6.07	9	Clear

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-82

Development Completed at 55 Gallons Discharged. Date: 9/11/2007 Time: 13:27
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-83

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: 3/22/1996
Date(s) of Development: 9/11/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 6-21
Total Length of Well Casing: 22
Measured Total Depth (TOC): Initial 22.62; Final 22.63
Initial Depth to Water (TOC) 5.31 Date 9/11/2007 Time 16:42
Stabilized Depth to Water (TOC) 5.31 Date 9/11/2007 Time 17:50

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 17.31 Ft. of water
x 0.163 Gallons/Foot
= 2.82 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 8.46 Gallons
Actual Purge Volume: 45 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 @ 15 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA
Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
42	1 gpm	17:37	20.9	8.83	0.558	12	Clear
43	1 gpm	17:38	20.9	8.25	0.555	7	Clear
44	1 gpm	17:39	20.2	8.02	0.557	7	Clear
45	1 gpm	17:40	20.1	7.90	0.552	7	Clear

Development Completed at 45 Gallons Discharged. Date: 9/11/2007 Time: 17:40
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: J. Vaughn, T. Garver

* Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-85

Project: Well Development
Project No. 14302.300.04.10
Date(s) of Installation: 3/19/1996
Date(s) of Development: 9/10/2007
Personnel/Company: J. Vaughn/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5-20
Total Length of Well Casing: 22
Measured Total Depth (TOC): Initial 21.6; Final 21.61
Initial Depth to Water (TOC) 6.55 Date 9/10/2007 Time 12:00
Stabilized Depth to Water (TOC) 6.60 Date 9/10/2007 Time 13:43

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 15.05 Ft. of water
x 0.163 Gallons/Foot
= 2.45 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 7.36 Gallons
Actual Purge Volume: 60 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 @ 15 Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 µmhos/cm @ ____ °C
Turbidity Meter: Water Checker U-10 0 NTU
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
50	1 gpm	13:15	18.2	8.05	56.4	46	Cloudy
56	1 gpm	13:21	17.7	8.04	57.1	12	Clear
58	1 gpm	13:23	17.4	8.04	55.3	10	Clear
59	1 gpm	13:24	17.4	8.04	56.6	10	Clear
60	1 gpm	13:25	17.5	8.04	56.7	10	Clear

Development Completed at 60 Gallons Discharged. Date: 9/10/2007 Time: 13:26
Criteria: > 3 well vol. purged. Parameters stabilized to w/in 10%. Visibly clear. Personnel: L. Mancuso, J. Vaughn, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

APPENDIX B-2
NEW WELLS

Site 1

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT01 - MW01

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/12/2007
Personnel/Company: L. Niell/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18 bgs
Total Length of Well Casing: 19.6
Measured Total Depth (TOC): Initial 20.05 ft; Final 21.00 ft
Initial Depth to Water (TOC): 8.02 ft Date 11/12/2007 Time 0805
Stabilized Depth to Water (TOC): 8.07 ft Date 11/12/2007 Time 1014

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.03 Ft. of water
x 0.163 Gallons/Foot
= 1.961 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.883 Gallons
Actual Purge Volume: 109 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.5 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.25 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
90	1.25 gpm	0952	19.2	6.79	42.5	65	Pumped at 19 ft bTOC, clear, no odor
93.75	1.25 gpm	0955	19.0	6.94	42.2	24	Same as above
97.5	1.25 gpm	0958	19.3	6.97	42.3	16	Same as above
101.25	1.25 gpm	1001	19.4	7.01	42.6	10	Same as above
105	1.25 gpm	1004	19.3	7.06	42.2	8	Same as above
108.75	1.25 gpm	1007	19.4	7.07	42.6	5	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT01 – MW 01

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
108.75	1.25 gpm	1007	19.4	7.07	42.6	5	Pumped at 19 ft bTOC, clear, no odor

Development Completed at 109 Gallons Discharged. Date: 11/12/2007 Time: 1007

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

UST-R Site 1 (395)

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT395 – MW 01

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/12/2007
Personnel/Company: L. Niell/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18
Total Length of Well Casing: 18
Measured Total Depth (TOC) Initial: 17.44 ft
Final: 17.45 ft
Initial Depth to Water (TOC): 7.85 ft Date: 11/12/2007 Time: 1040
Stabilized Depth to Water (TOC): 7.85 ft Date: 11/12/2007 Time: 1210

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.59 Ft. of water
x 0.163 Gallons/Foot
= 1.563 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.690 Gallons
Actual Purge Volume: 75 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.5 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.25 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60	1.25 gpm	1152	19.8	8.23	14.2	16	Pumped at 17ft bTOC, clear, no odor
63.75	1.25 gpm	1155	20.6	8.40	14.8	11	Same as above
67.5	1.25 gpm	1158	20.9	8.49	14.8	9	Same as above
70	1.25 gpm	1200	21.0	8.52	15.0	8	Same as above
72.5	1.25 gpm	1202	21.3	8.54	15.1	7	Same as above
75	1.25 gpm	1204	21.4	8.55	15.3	8	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __TT395 – MW 01____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
75	1.25 gpm	1204	21.4	8.55	15.3	8	Pumped at 17ft bTOC, clear, no odor

Development Completed at _____75 Gallons Discharged. Date: 11/12/2007 Time: 1204

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT395 – MW 02

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/15/2007
Personnel/Company: B. Strand/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18
Total Length of Well Casing: 18
Measured Total Depth (TOC) Initial: 17.74 ft
Final: 17.73 ft
Initial Depth to Water (TOC): 7.95 ft Date: 11/15/2007 Time: 0950
Stabilized Depth to Water (TOC): 8.25 ft Date: 11/15/2007 Time: 1240

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.79 Ft. of water
x 0.163 Gallons/Foot
= 1.596 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.787 Gallons
Actual Purge Volume: 119 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.00 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
75	1.00 gpm	1138	21.7	8.23	20.8	32	Pumped at 17ft bTOC, cloudy, no odor
78	1.00 gpm	1141	21.7	8.81	20.9	29	Same as above
83	1.00 gpm	1144	21.7	8.89	21.1	24	Same as above
88	1.00 gpm	1149	21.8	8.92	21.1	24	Same as above
93	1.00 gpm	1154	22.0	8.94	21.2	20	Same as above
98	1.00 gpm	1159	22.0	8.96	21.2	20	Same as above
103	1.00 gpm	1204	22.0	8.96	21.4	17	Same as above
108	1.00 gpm	1209	22.1	8.96	21.6	15	Same as above
113	1.00 gpm	1214	22.0	8.97	21.6	11	Same as above
116	1.00 gpm	1217	22.0	8.97	21.2	15	Same as above
119	1.00 gpm	1220	22.1	8.96	21.2	9	Pumped at 17ft bTOC, clear, no odor

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __TT395 – MW 02____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
119	1.00 gpm	1220	21.1	8.96	21.2	9	Pumped at 17ft bTOC, clear, no odor

Development Completed at 119 Gallons Discharged. Date: 11/15/2007 Time: 1220

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. Strand, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT395 – MW 03

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/14/2007
Personnel/Company L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 4-19 bgs
Total Length of Well Casing 21.6
Measured Total Depth (TOC) Initial 17.75 ft
Final 17.76 ft
Initial Depth to Water (TOC) 7.28 ft Date 11/14/2007 Time 0730
Stabilized Depth to Water (TOC) 8.33 ft Date 11/14/2007 Time 1020

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 10.47 Ft. of water
x 0.163 Gallons/Foot
= 1.707 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.120 Gallons
Actual Purge Volume: 120 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 0.75 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
111	0.75 gpm	0959	20.9	8.85	18.6	33	Pumped at 17 bTOC, clear, no odor
113.25	0.75 gpm	1002	21.5	8.86	18.9	160	Same as above
115.5	0.75 gpm	1005	21.4	8.87	18.8	38	Same as above
117.75	0.75 gpm	1008	21.6	8.88	18.7	13	Same as above
120	0.75 gpm	1011	21.5	8.89	18.7	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT3952 – MW 03

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
120	0.75 gpm	1011	21.5	8.89	18.7	6	Pumped at 17ft bTOC, clear, no odor

Development Completed at 120 Gallons Discharged. Date: 11/14/2007 Time: 1011

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT395 – MW 04

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/15/2007
Personnel/Company: B. Strand/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18
Total Length of Well Casing: 15
Measured Total Depth (TOC) Initial: 17.78 ft
Final: 17.80 ft
Initial Depth to Water (TOC): 7.89 ft Date: 11/15/2007 Time: 0740
Stabilized Depth to Water (TOC): 8.07 ft Date: 11/15/2007 Time: 1008

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.89 Ft. of water
x 0.163 Gallons/Foot
= 1.612 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.836 Gallons
Actual Purge Volume: 90 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1.25 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1.25 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
80	1.25 gpm	O929	20.1	8.61	22.2	28	Pumped at 17ft bTOC, cloudy, no odor
83.75	1.25 gpm	0932	2.7	8.74	22.3	17	Same as above
87.5	1.25 gpm	0935	20.8	8.81	22.3	10	Same as above
90	1.25 gpm	0937	20.9	8.85	22.2	8	Pumped at 17ft bTOC, clear, no odor

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT395 – MW 04

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
90	1.25 gpm	0937	20.9	8.85	22.2	8	Pumped at 17ft bTOC, clear, no odor

Development Completed at 90 Gallons Discharged. Date: 11/15/2007 Time: 0937

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. Strand, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

UST-R Site 2 (800 Complex)

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT806-MW01

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/10/2007
Personnel/Company: S. Carroll/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18
Total Length of Well Casing: 18
Measured Total Depth (TOC) Initial: 19.89 ft
Final: 19.91 ft
Initial Depth to Water (TOC): 8.70 ft Date: 11/10/2007 Time: 1349
Stabilized Depth to Water (TOC): 9.23 ft Date: 11/10/2007 Time: 1616

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.19 Ft. of water
x 0.163 Gallons/Foot
= 1.824 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.472 Gallons
Actual Purge Volume: 61.5 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 0.75/0.50 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 0.75/0.50 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
40	0.75 gpm	1502	18.4	7.78	67.1	61	Pumped at 18 ft bTOC, clear, no odor
42.25	0.75 gpm	1505	18.6	7.81	67.5	26	Same as above
45.25	0.75 gpm	1509	18.5	7.83	68.0	15	Same as above
47.50	0.75 gpm	1512	18.6	7.83	68.1	15	Same as above
50.50	0.75 gpm	1516	18.6	7.83	68.0	15	Same as above
53.50	0.75 gpm	1520	18.7	7.84	67.8	22	Same as above
55.50	0.50 gpm	1526	18.6	7.87	68.2	12	Same as above
58.50	0.50 gpm	1530	18.5	7.87	68.5	5	Same as above
60.5	0.50 gpm	1534	18.5	7.86	68.3	5	Same as above
61.5	0.50 gpm	1536	18.6	7.86	68.0	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT806-MW01

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
61.5 gal.	0.50 gpm	1536	18.6	7.86	68.0	6	Pumped at 18 ft bTOC, clear, no odor

Development Completed at 61.5 Gallons Discharged. Date: 11/10/2007 Time: 1536

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: S. Carroll, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT806-MW02

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/17/2007
Personnel/Company B.Strand/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18 bgs
Total Length of Well Casing 15 ft
Measured Total Depth (TOC) Initial 20.18 ft
Final 20.20 ft
Initial Depth to Water (TOC) 7.97 ft Date 11/17/2007 Time 0715
Stabilized Depth to Water (TOC) 8.16 ft Date 11/17/2007 Time 0910

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.21 Ft. of water
x 0.163 Gallons/Foot
= 1.978 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.934 Gallons
Actual Purge Volume: 96.25 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.25 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.25 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
85	1.25 gpm	0845	16.0	7.04	63.7	15	Pumped at 18 ft bTOC, cloudy, no odor
88.75	1.25 gpm	0848	16.2	7.16	63	8	Same as above
92.5	1.25 gpm	0851	16.2	7.22	61.8	4	Same as above
96.25	1.25 gpm	0854	16.2	7.27	62.6	3	Pumped at 18 ft bTOC, clear, no odor

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT806-MW02

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
96.25 gal.	1.25 gpm	0854	16.2	7.27	62.6	3	Pumped at 18 ft bTOC, clear, no odor

Development Completed at 96.25 Gallons Discharged. Date: 11/17/2007 Time: 0854

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. Strand, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT806-MW03

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/16/2007
Personnel/Company B. Strand/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 4-19 bgs
Total Length of Well Casing 15 ft
Measured Total Depth (TOC) Initial 20.25 ft
Final 20.20 ft
Initial Depth to Water (TOC) 8.03 ft Date 11/16/2007 Time 1425
Stabilized Depth to Water (TOC) 8.26 ft Date 11/16/2007 Time 1635

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.22 Ft. of water
x 0.163 Gallons/Foot
= 1.979 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.939 Gallons
Actual Purge Volume: 110 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.5 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.25 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
87.5	1.25 gpm	1600	16.5	7.68	67.1	30	Pumped at 18 ft bTOC, cloudy, no odor
91.25	1.25 gpm	1603	16.5	7.69	67.0	30	Same as above
97.50	1.25 gpm	1608	16.5	7.71	66.8	25	Same as above
103.75	1.25 gpm	1613	16.5	7.72	66.9	17	Same as above
107.5	1.25 gpm	1616	16.5	7.72	66.9	11	Same as above
110	1.25 gpm	1618	16.5	7.72	67.0	8	Pumped at 18 ft bTOC, clear, no odor

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT806-MW03

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
110	1.25 gpm	1618	16.5	7.72	67.0	8	Pumped at 18 ft bTOC, clear, no odor

Development Completed at 110 Gallons Discharged. Date: 11/16/2007 Time: 1618

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. Strand, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

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Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT02 – MW 01

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/14/2007
Personnel/Company: L. Niell/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18 bgs
Total Length of Well Casing: 19.8
Measured Total Depth (TOC): Initial 19.99 ft; Final 20.03 ft
Initial Depth to Water (TOC): 10.03ft Date 11/14/2007 Time 1029
Stabilized Depth to Water (TOC): 10.15 ft Date 11/14/2007 Time 1200

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.96 Ft. of water
x 0.163 Gallons/Foot
= 1.623 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.870 Gallons
Actual Purge Volume: 84 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.00 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
75	1.00 gpm	1143	17.4	9.69	9.6	13	Pumped at 19 bTOC, clear, no odor
78	1.00 gpm	1146	17.31	9.54	9.6	3	Same as above
81	1.00 gpm	1149	17.31	9.48	9.5	3	Same as above
84	1.00 gpm	1152	17.31	9.45	9.5	3	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __TT02 – MW 01____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
84	1.00 gpm	1152	17.31	9.45	9.5	3	Pumped at 19ft bTOC, clear, no odor

Development Completed at _____84 Gallons Discharged. Date: __11/14/2007____ Time: ___1152_____
Criteria: __> 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear_____Personnel: ____L.Niell, T. Garver_____

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT02 – MW 02

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/14/2007
Personnel/Company L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18 bgs
Total Length of Well Casing 19.9
Measured Total Depth (TOC) Initial 20.23 ft
Final 20.23 ft
Initial Depth to Water (TOC) 9.10ft Date 11/14/2007 Time 1209
Stabilized Depth to Water (TOC) 9.35 ft Date 11/14/2007 Time 1358

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	_____
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	_____

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.13 Ft. of water
x 0.163 Gallons/Foot
= 1.814 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.443 Gallons
Actual Purge Volume: 70 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 0.5 -1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 0.5 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60	0.5 gpm	1421	18.5	8.48	6.94	339	Pumped at 19 bTOC, clear, no odor
62.5	0.5 gpm	1426	18.7	8.53	6.95	135	Same as above
65	0.5 gpm	1431	18.6	8.57	6.98	49	Same as above
66.5	0.5 gpm	1434	18.7	8.54	7.11	30	Same as above
68	0.5 gpm	1437	18.6	8.54	7.09	16	Same as above
69.5	0.5 gpm	1440	18.9	8.54	7.08	8	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __TT02 – MW 02____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
69.5	0.5 gpm	1440	18.9	8.54	7.08	8	Pumped at 19ft bTOC, clear, slight petroleum odor, slight sheen present in bailed water, pumped well dry 2x, slow to recharge

Development Completed at _____70 Gallons Discharged. Date: __11/14/2007____ Time: ___1440_____
Criteria: __> 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear_____Personnel: ____L.Niell, T. Garver_____

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT02 – MW 03

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/13/2007
Personnel/Company L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 4-19 bgs
Total Length of Well Casing 20.8
Measured Total Depth (TOC) Initial 20.33 ft
Final 20.34 ft
Initial Depth to Water (TOC) 10.81 ft Date 11/13/2007 Time 0805
Stabilized Depth to Water (TOC) 11.23 ft Date 11/13/2007 Time 0948

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.52 Ft. of water
x 0.163 Gallons/Foot
= 1.552 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.655 Gallons
Actual Purge Volume: 63 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.00 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
50	1.00 gpm	0929	18.6	7.60	9.8	36	Pumped at 19ft bTOC, clear, no odor
53	1.00 gpm	0932	18.7	7.62	9.7	27	Same as above
56	1.00 gpm	0935	18.7	7.64	9.6	15	Same as above
59	1.00 gpm	0938	18.7	7.64	9.8	11	Same as above
61	1.00 gpm	0940	18.9	7.60	9.8	10	Same as above
63	1.00 gpm	0942	18.9	7.61	9.8	7	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT02 – MW 03

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
63	1.00 gpm	0942	18.9	7.61	9.8	7	Pumped at 19ft bTOC, clear, no odor

Development Completed at 63 Gallons Discharged. Date: 11/13/2007 Time: 0942

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TT02-MW04

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/14/08

Date(s) of Development: 3/18/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 4-19

Total Length of Well Casing: 21
Measured Total Depth (TOC) Initial: 22.32 ft
Final: 22.35 ft
Initial Depth to Water (TOC): 12.55 ft Date: 3/18/2008 Time: 1008
Stabilized Depth to Water (TOC): 12.58 ft Date: 3/18/2008 Time: 1125

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.77 Ft. of water
x 0.163 Gallons/Foot
= 1.59 Gallons per Single Casing Volume
Sand Pack Volume: 9.77 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 25.50 Gallons (in borehole)
- 1.59 Gallons of Casing Volume
= 23.91 x 0.3 (Assuming porosity = 30%)
= 7.17 Gallons Within Sand Pack
Single Purge Volume: 8.76 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 26.28 Gallons
Actual Purge Volume: 32 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 20 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
14	1 gpm	1050	16.5	6.35	5.69	250	
17	1 gpm	1053	16.6	6.38	5.67	50	
20	1 gpm	1056	16.5	6.37	5.68	20	Clear
23	1 gpm	1059	16.7	6.38	5.67	10	
26	1 gpm	1102	16.6	6.39	5.66	10	
29	1 gpm	1105	16.5	6.39	5.67	10	
32	1 gpm	1108	16.5	6.38	5.67	10	

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TT02-MW04**

Development Completed at 32 Gallons Discharged. Date: 3/18/08 Time: 1108
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT04-MW01 (Site 4)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/11/2007
Personnel/Company S. Carroll/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3.5-18.5
Total Length of Well Casing 19.9
Measured Total Depth (TOC) Initial 20.09 ft
Final 20.18 ft
Initial Depth to Water (TOC) 10.37 ft Date 11/11/2007 Time 0824
Stabilized Depth to Water (TOC) 10.43 ft Date 11/11/2007 Time 1025

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	_____
_X_ Surge Block	2-in diameter surge tool
_X_ Bailing	2-in stainless steel bailer
_X_ Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	_____

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.72 Ft. of water
x 0.163 Gallons/Foot
= 1.584 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.573 Gallons
Actual Purge Volume: 59.25 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0/0.75 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0/0.75 gpm @ 19__ Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ _____ °C
pH 7.0 = NA @ _____ °C
pH 10.0 = NA @ _____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
40	1.0 gpm	0942	16.7	8.43	15.8	47	Pumped at 19 ft bTOC, clear, no odor
43	1.0 gpm	0945	17.8	8.57	15.9	22	Same as above
46	1.0 gpm	0948	17.7	8.64	16.0	19	Same as above
48	1.0 gpm	0950	17.9	8.67	16.2	14	Same as above
51	1.0 gpm	0953	17.8	8.72	16.1	18	Same as above
55.5	0.75 gpm	0959	17.8	8.73	16.2	11	Same as above
57.75	0.75 gpm	1002	17.9	8.74	16.2	10	Same as above
59.25	0.75 gpm	1004	18.0	8.74	16.3	9	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __MW-01 (Site 4)____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
59.25 gal.	0.75 gpm	1004	18.0	8.74	16.3	9	Pumped at 19 ft bTOC, clear, no odor

Development Completed at _____59.25_ Gallons Discharged. Date: ___11/11/2007_____ Time: ___1004_____
Criteria: __> 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear_____Personnel: ____S. Carroll, T. Garver_____

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT04 – MW 02

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/12/2007
Personnel/Company L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18
Total Length of Well Casing 20.3
Measured Total Depth (TOC) Initial 20.00 ft
Final 20.02 ft
Initial Depth to Water (TOC) 9.17 ft Date 11/12/2007 Time 1227
Stabilized Depth to Water (TOC) 9.51 ft Date 11/12/2007 Time 1357

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	_____
_X_ Surge Block	2-in diameter surge tool
_X_ Bailing	2-in stainless steel bailer
_X_ Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	_____

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 10.83 Ft. of water
x 0.163 Gallons/Foot
= 1.765 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.296 Gallons
Actual Purge Volume: 65 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.5 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.25 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ _____ °C
pH 7.0 = NA @ _____ °C
pH 10.0 = NA @ _____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60	1.25 gpm	1346	18.5	8.75	19.5	6	Pumped at 19ft bTOC, clear, no odor
62.5	1.25 gpm	1348	18.9	8.61	19.4	6	Same as above
65	1.25 gpm	1350	19.0	8.55	19.5	3	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __TT04 – MW 02____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
65	1.25 gpm	1350	19.0	8.55	19.5	3	Pumped at 19ft bTOC, clear, no odor

Development Completed at _____65 Gallons Discharged. Date: 11/12/2007 Time: ___1350_____
Criteria: __> 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear_____Personnel: _____L.Niell, T. Garver_____

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 3

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-01 (Site 3)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 10/13/2007
Personnel/Company L. Izzo/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter unknown
Screened Interval(s) 5-20
Total Length of Well Casing 20
Measured Total Depth (TOC) Initial 22.00 ft
Final 22.26 ft
Initial Depth to Water (TOC) 10.75 ft Date 10/13/2007 Time 0745
Stabilized Depth to Water (TOC) 11.21 ft Date 10/13/2007 Time 1015

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.25 Ft. of water
x 0.163 Gallons/Foot
= 1.833 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.50 Gallons
Actual Purge Volume: 59 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
40	1 gpm	0940	18.0	9.20	28.5	27	Pump at 18 ft bTOC, slightly cloudy
42	1 gpm	0942	18.0	9.24	28.6	20	Same as above
45	1 gpm	0945	18.0	9.30	28.1	14	Pump at 18 ft bTOC, clear
47	1 gpm	0947	18.0	9.33	28.3	12	Same as above
49	1 gpm	0949	18.1	9.34	28.2	18	Same as above
51	1 gpm	0951	18.1	9.37	28.3	15	Same as above
53	1 gpm	0953	18.2	9.38	28.3	11	Same as above
55	1 gpm	0955	18.3	9.40	28.1	9	Same as above
57	1 gpm	0957	18.2	9.40	28.4	9	Same as above
59	1 gpm	0959	18.3	9.41	28.2	4	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-01 (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
59 gal.	1 gpm	0959	18.3	9.41	28.2	4	Pump at 18 ft bTOC, clear

Development Completed at 59 Gallons Discharged. Date: 10/13/2007 Time: 0959

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Izzo, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-02 (Site 3)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 10/12/2007
Personnel/Company: L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5.0-20.0
Total Length of Well Casing: 20.0
Measured Total Depth (TOC) Initial: 19.35 ft
Final: 19.36 ft
Initial Depth to Water (TOC): 12.11 ft Date: 10/12/2007 Time: 1313
Stabilized Depth to Water (TOC): 12.14 ft Date: 10/12/2007 Time: 1445

DEVELOPMENT TECHNIQUE(S) / EQUIPMENT TYPE/CAPACITY

____	Jetting (Airlift)	
X	Surge Block	2-in diameter surge tool
X	Bailing	2-in stainless steel bailer
X	Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____	Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.24 Ft. of water
x 0.163 Gallons/Foot
= 1.18 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.54 Gallons
Actual Purge Volume: 49 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
40	1 gpm	1425	19.7	8.66	10.8	47	Pump at 17 ft bTOC, cloudy
43	1 gpm	1428	19.7	8.65	10.6	15	Pump at 17 ft bTOC, clear
45	1 gpm	1430	19.7	8.63	10.8	12	Same as above
47	1 gpm	1432	19.8	8.62	10.8	7	Same as above
49	1 gpm	1434	19.9	8.60	10.8	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-02 (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
49 gal.	1 gpm	1434	19.9	8.60	10.8	6	Pump at 17 ft bTOC, clear

Development Completed at 49 Gallons Discharged. Date: 10/12/2007 Time: 1434
Criteria: > 3 casing volumes purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Niell, T. Garver

*Instruments calibrated by Gregg Drilling personne
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-03 (Site 3)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 10/12/2007
Personnel/Company: L. Izzo/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 6-16
Total Length of Well Casing: 18
Measured Total Depth (TOC): Initial 17.96 ft; Final 18.10 ft
Initial Depth to Water (TOC) 10.0 ft Date 10/12/2007 Time 1455
Stabilized Depth to Water (TOC) 9.84 ft Date 10/12/2007 Time 1652

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.96 Ft. of water
x 0.163 Gallons/Foot
= 1.297 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.892 Gallons
Actual Purge Volume: 52 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 16.5 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
40	1 gpm	1640	20.0	9.18	16.5	17	Pump at 16.5 ft bTOC, slightly cloudy
42	1 gpm	1642	20.0	9.19	16.5	13	Same as above
44	1 gpm	1644	20.0	9.19	16.5	12	Pump at 16.5 ft bTOC, clear
46	1 gpm	1646	20.1	9.20	16.3	10	Same as above
48	1 gpm	1648	20.1	9.20	16.3	11	Same as above
50	1 gpm	1650	20.1	9.20	16.3	10	Same as above
52	1 gpm	1652	20.0	9.20	16.3	8	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-03 (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.	Clarity, Odor, PID Readings, Other:
52 gal.	1 gpm	1652	20.0	9.20	16.3	8	Pump at 16.5 ft bTOC, clear

Development Completed at 52 Gallons Discharged. Date: 10/12/2007 Time: 1652

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Izzo, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-04 (Site 3)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 10/12/2007
Personnel/Company: L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5.0-20.0
Total Length of Well Casing: 20.0
Measured Total Depth (TOC) Initial: 19.43 ft
Final: 19.48 ft
Initial Depth to Water (TOC): 11.86 ft Date: 10/12/2007 Time: 1000
Stabilized Depth to Water (TOC): 11.90 ft Date: 10/12/2007 Time: 1121

DEVELOPMENT TECHNIQUE(S) / EQUIPMENT TYPE/CAPACITY

____	Jetting (Airlift)	
X	Surge Block	2-in diameter surge tool
X	Bailing	2-in stainless steel bailer
X	Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____	Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.57 Ft. of water
x 0.163 Gallons/Foot
= 1.234 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.702 Gallons
Actual Purge Volume: 45 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
35	1 gpm	1059	19.1	8.32	17.9	58	Pump at 18 ft bTOC, cloudy
38	1 gpm	1102	19.2	8.33	18.2	43	Same as above
41	1 gpm	1105	19.1	8.35	18.2	17	Same as above
43	1 gpm	1107	19.3	8.33	18.3	10	Pump at 18 ft bTOC, clear
45	1 gpm	1109	19.3	8.34	18.5	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-04 (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
45 gal.	1 gpm	1109	19.3	8.31	18.5	6	Pump at 18 ft bTOC, clear

Development Completed at 45 Gallons Discharged. Date: 10/12/2007 Time: 1109

Criteria: > 3 casing volumes purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-05 (Site 3)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 10/12/2007
Personnel/Company: L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5.0-20.0
Total Length of Well Casing: 20.0
Measured Total Depth (TOC) Initial: 19.89 ft
Final: 19.90 ft
Initial Depth to Water (TOC): 11.63 ft Date: 10/12/2007 Time: 1135
Stabilized Depth to Water (TOC): 11.76 ft Date: 10/12/2007 Time: 1305

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.26 Ft. of water
x 0.163 Gallons/Foot
= 1.35 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.05 Gallons
Actual Purge Volume: 48 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
40	1 gpm	1247	19.5	8.86	16.7	17	Pump at 18 ft bTOC, clear
42	1 gpm	1249	19.5	8.70	16.6	9	Same as above
44	1 gpm	1251	19.6	8.63	16.7	8	Same as above
46	1 gpm	1253	19.7	8.59	16.8	6	Same as above
48	1 gpm	1255	19.7	8.56	16.8	7	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-05 (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
48 gal.	1 gpm	1255	19.7	8.56	16.8	7	Pump at 18 ft bTOC, clear

Development Completed at 48 Gallons Discharged. Date: 10/12/2007 Time: 1255

Criteria: > 3 casing volumes purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-06 (Site 3)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 10/12/2007
Personnel/Company: L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: unknown
Screened Interval(s): 5.0-20.0
Total Length of Well Casing: 20.0
Measured Total Depth (TOC) Initial: 19.54 ft
Final: 19.55 ft
Initial Depth to Water (TOC): 11.03 ft Date: 10/12/2007 Time: 0745
Stabilized Depth to Water (TOC): 11.49 ft Date: 10/12/2007 Time: 0940

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 8.51 Ft. of water
x 0.163 Gallons/Foot
= 1.387 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.161 Gallons
Actual Purge Volume: 59 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
40	1 gpm	0912	17.9	7.59	19.7	42	Pump at 18 ft bTOC, cloudy
43	1 gpm	0915	18.4	7.95	19.3	28	Same as above
46	1 gpm	0918	19.0	8.10	19.1	23	Same as above
49	1 gpm	0921	18.9	8.21	19.0	9	Pump at 18 ft bTOC, clear
51	1 gpm	0923	19.1	8.24	19.4	6	Same as above
53	1 gpm	0925	19.2	8.27	19.0	4	Same as above
55	1 gpm	0927	19.3	8.29	19.2	5	Same as above
57	1 gpm	0929	19.3	8.31	19.2	6	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-06 (Site 3)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity	Clarity, Odor, PID Readings, Other:
57 gal.	1 gpm	0929	19.3	8.31	19.2	6	Pump at 18 ft bTOC, clear

Development Completed at 57 Gallons Discharged. Date: 10/12/2007 Time: 0931

Criteria: > 3 casing volumes purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L. Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 6

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT06 - MW 01

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 12/04/2007
Personnel/Company: L. Niell/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18
Total Length of Well Casing: 20.30
Measured Total Depth (TOC) Initial: 20.32 ft
Final: 20.32 ft
Initial Depth to Water (TOC): 7.70 ft Date: 12/04/2007 Time: 1025
Stabilized Depth to Water (TOC): 7.77 ft Date: 12/04/2007 Time: 1210

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.62 Ft. of water
x 0.163 Gallons/Foot
= 2.057 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.171 Gallons
Actual Purge Volume: 64 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.50 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.00 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60	1.00 gpm	1200	16.1	10.78	58.5	8	Pumped at 19ft bTOC, yellowish but clear, no odor
62	1.00 gpm	1202	16.2	10.79	58.4	3	Same as above
64	1.00 gpm	1204	16.2	10.79	58.4	2	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. _TT06 –MW01____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
64	1.00 gpm	1204	16.2	10.79	58.4	2	Pumped at 19ft bTOC, yellowish but clear, no odor

Development Completed at _____64 Gallons Discharged. Date: 12/04/2007 Time: 1210

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT06 – MW 02

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/13/2007
Personnel/Company L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18
Total Length of Well Casing 20.35
Measured Total Depth (TOC) Initial 20.09 ft
Final 20.07ft
Initial Depth to Water (TOC) 9.53 ft Date 11/13/2007 Time 1430
Stabilized Depth to Water (TOC) 9.73 ft Date 11/13/2007 Time 1608

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 10.56 Ft. of water
x 0.163 Gallons/Foot
= 1.721 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.164 Gallons
Actual Purge Volume: 70 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.50 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.25 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
55	1.25 gpm	1546	19.1	8.40	42.9	50	Pumped at 19ft bTOC, yellowish but clear, no odor
58.75	1.25 gpm	1549	18.3	8.59	43.2	16	Same as above
62.5	1.25 gpm	1552	18.2	8.66	43.5	6	Same as above
65	1.25 gpm	1554	18.0	8.68	43.8	5	Same as above
67.5	1.25 gpm	1556	18.0	8.70	44.2	5	Same as above
70	1.25 gpm	1558	18.0	8.71	44.1	3	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __TT06 – MW 02____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
70	1.25 gpm	1558	18.0	8.71	44.1	3	Pumped at 19ft bTOC, yellowish but clear, no odor

Development Completed at ____70___Gallons Discharged. Date: ___11/13/2007____ Time: ___1608_____
Criteria: __> 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear_____Personnel: ____L.Niell, T. Garver_____

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT06 – MW 03

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/13/2007
Personnel/Company: L. Niell/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18
Total Length of Well Casing: 20.4
Measured Total Depth (TOC): Initial 20.07 ft; Final 20.09 ft
Initial Depth to Water (TOC): 8.78 ft Date 11/13/2007 Time 1235
Stabilized Depth to Water (TOC): 8.96 ft Date 11/13/2007 Time 1420

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.29 Ft. of water
x 0.163 Gallons/Foot
= 1.840 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.520 Gallons
Actual Purge Volume: 93 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.50 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.25 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
75	1.25 gpm	1400	18.2	8.51	65.1	164	Pumped at 19ft bTOC, yellowish but clear, no odor
78.75	1.25 gpm	1403	17.9	8.76	65.7	27	Same as above
82.5	1.25 gpm	1406	17.8	8.83	65.8	13	Same as above
86.25	1.25 gpm	1409	17.7	8.86	66.3	9	Same as above
90	1.25 gpm	1412	17.8	8.88	66.1	6	Same as above
92.5	1.25 gpm	1414	17.8	8.89	66.2	5	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-03 (Site 6)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
92.5	1.25 gpm	1414	17.8	8.89	66.2	5	Pumped at 19ft bTOC, yellowish but clear, no odor

Development Completed at 93 Gallons Discharged. Date: 11/13/2007 Time: 1420

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT06 - MW 04)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/13/2007
Personnel/Company L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18
Total Length of Well Casing 19.9
Measured Total Depth (TOC) Initial 20.01 ft
Final 20.02 ft
Initial Depth to Water (TOC) 7.57 ft Date 11/13/2007 Time 1049
Stabilized Depth to Water (TOC) 7.66 ft Date 11/13/2007 Time 1225

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.44 Ft. of water
x 0.163 Gallons/Foot
= 2.028 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.083 Gallons
Actual Purge Volume: 71 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.50 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.25 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60	1.25 gpm	1206	18.4	8.34	77.0	20	Pumped at 19ft bTOC, yellowish but clear, no odor
63.75	1.25 gpm	1209	18.3	8.51	77.0	8	Same as above
66.25	1.25 gpm	1211	18.3	8.56	76.8	5	Same as above
68.75	1.25 gpm	1213	18.4	8.59	76.6	2	Same as above
71.25	1.25 gpm	1215	18.4	5.61	77.1	1	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-04 (Site 6)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
71.25	1.25 gpm	1215	18.4	5.61	77.1	1	Pumped at 19ft bTOC, yellowish but clear, no odor

Development Completed at 71 Gallons Discharged. Date: 11/13/2007 Time: 1225

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT06 - MW 05

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 12/04/2007
Personnel/Company: L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18
Total Length of Well Casing: 19.9
Measured Total Depth (TOC) Initial: 20.31 ft
Final: 20.31 ft
Initial Depth to Water (TOC): 9.20 ft Date: 12/04/2007 Time: 1231
Stabilized Depth to Water (TOC): 9.27 ft Date: 12/04/2007 Time: 1407

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.11 Ft. of water
x 0.163 Gallons/Foot
= 1.811 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.433 Gallons
Actual Purge Volume: 70 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.00 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.00 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
65	1.00 gpm	1354	16.9	10.47	67.0	30	Pumped at 19ft bTOC, yellowish but clear, smells like a musty basement
68	1.00 gpm	1357	17.0	10.56	67.1	3	Same as above
70	1.00 gpm	1359	17.1	10.60	66.9	1	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. _TT06 –MW05____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
70	1.00 gpm	1359	17.1	10.60	66.9	1	Pumped at 19ft bTOC, yellowish but clear, smells like a musty basement

Development Completed at _____70 Gallons Discharged. Date: 12/04/2007 Time: ___1359_____
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 14

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-01 (Site 14)

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/11/2007
Personnel/Company: S. Carroll/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18
Total Length of Well Casing: 20.3
Measured Total Depth (TOC) Initial: 20.04 ft
Final: 20.12 ft
Initial Depth to Water (TOC): 10.48 ft Date: 11/11/2007 Time: 1120
Stabilized Depth to Water (TOC): 11.56 ft Date: 11/11/2007 Time: 1307

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.56 Ft. of water
x 0.163 Gallons/Foot
= 1.558 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.675 Gallons
Actual Purge Volume: 69 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1.0 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60	1.0 gpm	1242	17.5	8.34	43.0	8	Pumped at 19 ft bTOC, clear, no odor
62	1.0 gpm	1244	17.9	8.59	42.4	3	Same as above
65	1.0 gpm	1247	18.2	8.67	42.4	1	Same as above
67	1.0 gpm	1249	18.3	8.70	42.4	0	Same as above
69	1.0 gpm	1251	18.6	8.73	42.5	0	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-01 (Site 14)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
69 gal.	1.0 gpm	1251	18.6	8.73	42.5	0	Pumped at 19 ft bTOC, clear, no odor

Development Completed at 69 Gallons Discharged. Date: 11/11/2007 Time: 1251

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: S. Carroll, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT14 – MW 02

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 12/03/2007
Personnel/Company L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18
Total Length of Well Casing 20.5
Measured Total Depth (TOC) Initial 20.31 ft
Final 20.32 ft
Initial Depth to Water (TOC) 7.95 ft Date 12/03/2007 Time 1230
Stabilized Depth to Water (TOC) 8.05 ft Date 12/03/2007 Time 1618

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.36 Ft. of water
x 0.163 Gallons/Foot
= 2.015 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.045 Gallons
Actual Purge Volume: 161 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
155	1.0 gpm	1604	16.1	7.39	44.66	8	Pumped at 19ft bTOC, clear, no odor
158	1.0 gpm	1607	16.1	7.59	44.83	6	Same as above
161	1.0 gpm	1609	16.1	7.62	44.90	4	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __TT14 – MW 02____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
161	1.0 gpm	1609	16.1	7.62	44.90	4	Pumped at 19ft bTOC, clear, no odor

Development Completed at _____161 Gallons Discharged. Date: ____12/03/2007_____ Time: ___1618_____
Criteria: __> 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear_____Personnel: ____L.Niell, T. Garver_____

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT14 – MW 03

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/12/2007
Personnel/Company L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18
Total Length of Well Casing 20.1
Measured Total Depth (TOC) Initial 20.11 ft
Final 20.11 ft
Initial Depth to Water (TOC) 10.12 ft Date 11/12/2007 Time 1425
Stabilized Depth to Water (TOC) 10.25 ft Date 11/12/2007 Time 1607

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.99 Ft. of water
x 0.163 Gallons/Foot
= 1.628 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.885 Gallons
Actual Purge Volume: 98 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.5 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.25 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
80	1.25 gpm	1553	19.1	7.43	57.7	65	Pumped at 19ft bTOC, clear, slight yellow tinge, foul odor
90	1.25 gpm	1601	19.5	7.37	58.1	14	Same as above
93.75	1.25 gpm	1604	19.6	7.38	58.2	7	Same as above
97.5	1.25 gpm	1607	19.7	7.36	58.1	5	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __TT14 – MW 03____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
97.5	1.26 gpm	1607	19.7	7.36	58.1	5	Pumped at 19ft bTOC, clear, slight yellow tinge, foul odor

Development Completed at _____98 Gallons Discharged. Date: 11/12/2007 Time: 1607

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 16

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Well Development Data Sheet

Boring No.: TT16-MW01 Well No.: TT16-MW01

Project: NAS Fallon Site 16
Project No.: CTO: 050
Date(s) of Installation: 8/13/07
Date(s) of Development: 8/16-17/07
Personnel/Company: RSI Drilling
Type of Rig Used: Power Probe 9630 Pro-D.

Casing Diameter/Type: 2" Sch. 40 PVC
Borehole Diameter: 8"
Screened Interval(s): 4'6" - 19'6"
Total Length of Well Casing: 22'4"
Measured Total Depth (TOC) Initial: Final:

Initial Depth to Water (TOC): 9.04' Date: 8/16/07 Time: 14:50
~~Stabilized~~ Depth to Water (TOC): 9.09' Date: 8/17/07 Time: 07:52

Development Techniques / Equipment Type/Capacity

Techniques	Equipment Type/Capacity
Jetting (Airlift)	
✓ Surge Block	Steel bailer
✓ Bailing	Steel bailer
✓ Pumping	Peristaltic pump
Other	

Purge Volume Calculation

Casing Volume	13.28	Feet of Water
	x 0.163	Gallons per Foot
	= 2.16	Gallons per Single Casing Volume
Sand Pack Volume	13.28	Feet of Saturated Sand Pack
	x 2.61	Gallons per Foot (Borehole Dia.)
	= 34.67	Gallons (in Borehole)
	- 2.16	Gallons of Casing Volume
	= 32.51	x 0.3 (assuming porosity = 30%)
	= 9.75	Gallons within Sand Pack
Single Purge Volume	11.91	Gallons (Casing Volume + Sand Pack Volume + Fluids Added)
Minimum Purge Volume:		Gallons
Actual Purge Volume:	33	Gallons
Volume Measured By:	5 gallon bucket	
Rate of Development:		Gallons per Minute - Hour - Day
Pumping Rate/Depth		@ Variable feet bgs
Immiscible Phases Present:	Yes (No)	Thickness

Fluids Added

Lost Drilling Fluid (gallon): —
Lost Purge Water (gallon): —
Water During Installation (gallon): —
Total Fluids Added (gallon): —
Source of Added Water: —
Groundwater Quality Parameters of Added Water Measured: Yes No
Sample Collected of Added Water: Yes No
Sample Designation of Added Water:

Instrument Calibration

pH Meter: Oakton Model 10
pH 4.0 = 4.17 @ 26.4 °C
pH 7.0 = 7.24 @ 26.6 °C
pH 10.0 = 9.88 @ 26.3 °C
Dissolved Oxygen Meter:

Spec. Conductance Meter: Oakton Model 10
Standard: 1409 µmhos/cm @ 25°C
Reading: 1271 µmhos/cm @ 26.3 °C
Turbidity Meter: Error message. Not functioning
Other:

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific* Conductance	Turbidity of DO	Clarity, Odor, PID Readings, Other		
0 gallons		14:55	19.7°C	7.67	16.41 mS		Silty	No odor	
2 "		15:01	20.4°C	7.82	19.90 mS		"	"	
5 "		15:08	19.4°C	7.75	>1999 µS		"	"	
10 "		15:25	19.2°C	7.76	19.64 mS		"	"	
15 "		15:38	18.9°C	7.69	18.85 mS		"	"	
20 "		15:54	18.8°C	7.69	>1999		Less silty	"	
25 "		16:09	19.2°C	7.73	>1999		"	"	
30 "		07:37	17.8°C	7.75	>1999		Almost clear	"	
33 "		07:46	17.7°C	7.75	>1999		"	"	

Development Completed: ✓ Gallons Discharged 33 Date: 8/17/07 Time: 07:50
Criteria: Stability of pH T, Much clearer Personnel:

* Specific conductance readings are temperature-compensated to 25°C; if not, report temperatures at which reading is obtained.

At 20 gallons, switched from surge and bail to pumping.

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Well Development Data Sheet

Boring No.: TT16-MW02 Well No.: TT16-MW02

Project: NAS Fallon Site 16
Project No.: CTO: 050
Date(s) of Installation: 8/13-14/07
Date(s) of Development: 8/17/07
Personnel/Company: RSI Drilling
Type of Rig Used: Power Probe 9630 Pro-D.

Casing Diameter/Type: 2" Sch. 40 PVC
Borehole Diameter: 8"
Screened Interval(s): 4'8" – 19'8"
Total Length of Well Casing: 22' 11"
Measured Total Depth (TOC) Initial: Final:

Initial Depth to Water, (TOC): 8.30' Date: 8/17/07 Time: 08:02
~~Stabilized~~ Depth to Water (TOC): 8.40' Date: 8/17/07 Time: 17:20

Development Techniques / Equipment Type/Capacity

	Jetting (Airlift)	
✓	Surge Block	Steel bailer
✓	Bailing	Steel bailer
✓	Pumping	Peristaltic pump
	Other	

Fluids Added

Lost Drilling Fluid (gallon): —
Lost Purge Water (gallon): —
Water During Installation (gallon): —
Total Fluids Added (gallon): —
Source of Added Water: —
Groundwater Quality Parameters of Added Water Measured: Yes No
Sample Collected of Added Water: Yes No
Sample Designation of Added Water:

Purge Volume Calculation

Casing Volume	14.61	Feet of Water
	x 0.163	Gallons per Foot
	= 2.38	Gallons per Single Casing Volume
Sand Pack Volume	14.61	Feet of Saturated Sand Pack
	x 2.611	Gallons per Foot (Borehole Dia.)
	= 38.14	Gallons (in Borehole)
	- 2.38	Gallons of Casing Volume
	= 35.76	x 0.3 (assuming porosity = 30%)
	= 10.73	Gallons within Sand Pack
Single Purge Volume	13.11	Gallons (Casing Volume + Sand Pack Volume + Fluids Added)
Minimum Purge Volume:		Gallons
Actual Purge Volume:	50	Gallons
Volume Measured By:	5 gallon bucket	
Rate of Development:		Gallons per Minute - Hour - Day
Pumping Rate/Depth	0.37 gpm	@ Variable feet bgs
Immiscible Phases Present:	Yes (No)	Thickness

Instrument Calibration

pH Meter: Oakton Model 10
pH 4.0 = 4.22 @ 26.1 °C
pH 7.0 = 6.91 @ 25.9 °C
pH 10.0 = 9.97 @ 26.2 °C
Dissolved Oxygen Meter:

Spec. Conductance Meter: Oakton Model 10
Standard: 1409 µmhos/cm @ 25°C
Reading: 1259 µmhos/cm @ 26.1 °C
Turbidity Meter: Error message during calibration.
Other:

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific* Conductance	Turbidity of DO	Clarity, Odor, PID Readings, Other		
7 gallons		08:22	18.0	7.84	>1999 µS		V. silty	No odor	
15 "		08:36	19.2	8.03	"		"	"	
20 "		08:51	18.8	8.01	"		Silty	"	
25 "		09:02	18.5	7.96	"		"	"	
30 "		09:12	18.4	7.96	"		"	"	
35 "		09:23	18.2	7.94	"		P. Silty	"	
40 "		09:31	18.2	7.96	"		"	"	
42.5 "		16:55	20.3	7.95	"		Sl. cloud	"	
44 "		17:02	20.9	8.13	"		"	"	
46 "		17:06	20.7	8.04	"		"	"	
48 "		17:12	20.0	7.94	"		"	"	
50 "		17:18	19.8	7.98	"		"	"	

Development Completed: ✓ Gallons Discharged 50 Date: 8/17/07 Time: 17:20
Criteria: Stabilized pH T, water much clearer. Personnel:
* Specific conductance readings are temperature-compensated to 25°C; if not, report temperatures at which reading is obtained.

At 40 gallons, switch from surge and bail to pumping

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Well Development Data Sheet

Boring No.: TT16-MW03 Well No.: TT16-MW03

Project: NAS Fallon Site 16
Project No.: CTO: 050
Date(s) of Installation: 8/14/07
Date(s) of Development: 8/17/07
Personnel/Company: RSI Drilling
Type of Rig Used: Power Probe 9630 Pro-D.

Casing Diameter/Type: 2" Sch. 40 PVC
Borehole Diameter: 8"
Screened Interval(s): 4' 8" – 19' 8"
Total Length of Well Casing: 22' 7"
Measured Total Depth (TOC) Initial: Final:

Initial Depth to Water (TOC): 8.07' Date: 8/17/07 Time: 09:43
~~Stabilized~~ Depth to Water (TOC): 8.04' Date: 8/17/07 Time: 18:08

Development

Techniques		Equipment Type/Capacity
	Jetting (Airlift)	
✓	Surge Block	Steel bailer
✓	Bailing	Steel bailer
✓	Pumping	Peristaltic pump
	Other	

Purge Volume Calculation

Casing Volume	14.51	Feet of Water
	x 0.163	Gallons per Foot
	=	Gallons per Single Casing Volume
Sand Pack Volume		Feet of Saturated Sand Pack
	x 2.611	Gallons per Foot (Borehole Dia.)
	=	Gallons (in Borehole)
	-	Gallons of Casing Volume
	=	x 0.3 (assuming porosity = 30%)
	=	Gallons within Sand Pack
Single Purge Volume	13.01	Gallons (Casing Volume + Sand Pack Volume + Fluids Added) Pr. d water x 0.897 g/ft.
Minimum Purge Volume:		Gallons
Actual Purge Volume:	50	Gallons
Volume Measured By:	5 gallon bucket	
Rate of Development:		Gallons per Minute - Hour - Day
Pumping Rate/Depth	0.27 gpm @ Variable	feet bgs
Immiscible Phases Present:	Yes (No)	Thickness

Fluids Added

Lost Drilling Fluid (gallon): —
Lost Purge Water (gallon): —
Water During Installation (gallon): —
Total Fluids Added (gallon): —
Source of Added Water: —
Groundwater Quality Parameters of Added Water Measured: Yes No
Sample Collected of Added Water: Yes No
Sample Designation of Added Water:

Instrument Calibration

pH Meter: Oakton Model 10
pH 4.0 = 4.22 @ 26.1 °C
pH 7.0 = 6.91 @ 25.9 °C
pH 10.0 = 9.97 @ 26.2 °C
Dissolved Oxygen Meter: —

Spec. Conductance Meter: Oakton Model 10
Standard: 1409 µmhos/cm @ 25°C
Reading: 1259 µmhos/cm @ 26.1 °C
Turbidity Meter: Error message during calibration.
Other:

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific* Conductance	Turbidity of DO	Clarity, Odor, PID Readings, Other		
5 gallons		10:05	18.9	8.10	>1999 µS		Very silty	Moder	
10 "		10:12	18.2	8.17	"		"	"	
15 "		10:21	17.5	8.05	"		"	"	
20 "		10:30	17.9	8.24	"		"	"	
25 "		10:39	17.6	8.12	"		"	"	
30 "		10:47	17.7	8.10	"		"	"	
35 "		10:56	17.4	8.07	"		Silty	"	
40 "		11:05	17.4	8.02	"		"	"	
44 "		17:42	18.0	7.82	"		Cloudy	"	
47 "		17:54	17.7	7.84	"		"	"	
50 "		18:04	18.0	7.85	"		Sl. Cloudy	"	
							"	"	

Development Completed: ✓ Gallons Discharged 50 Date: 8/17/07 Time: 18:06
Criteria: Stabilized pH, water much clearer. Personnel:
* Specific conductance readings are temperature-compensated to 25°C; if not, report temperatures at which reading is obtained.

At 40 gallons, switched from surge and bail to pumping.

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Well Development Data Sheet

Boring No.: TT16-MW04 Well No.: TT16-MW04

Project: NAS Fallon Site 16
Project No.: CTO: 050
Date(s) of Installation: 8/15/07
Date(s) of Development: 8/17/07
Personnel/Company: RSI Drilling
Type of Rig Used: Power Probe 9630 Pro-D.

Casing Diameter/Type: 2" Sch. 40 PVC
Borehole Diameter: 8"
Screened Interval(s): 4'-19'
Total Length of Well Casing: 22' 1"
Measured Total Depth (TOC) Initial: Final:

Initial Depth to Water (TOC): 9.31' Date: 8/17/07 Time: 11:49
~~Stabilized~~ Depth to Water (TOC): 9.36' Date: 8/17/07 Time: 13:58

Development

Techniques		Equipment Type/Capacity
	Jetting (Airlift)	
✓	Surge Block	Steel bailer
✓	Bailing	Steel bailer
✓	Pumping	Peristaltic pump
	Other	

Purge Volume Calculation

Casing Volume	12.77	Feet of Water
	x 0.163	Gallons per Foot
	=	Gallons per Single Casing Volume
Sand Pack Volume		Feet of Saturated Sand Pack
	x 2.611	Gallons per Foot (Borehole Dia.)
	=	Gallons (in Borehole)
	-	Gallons of Casing Volume
	=	x 0.3 (assuming porosity = 30%)
	=	Gallons within Sand Pack
Single Purge Volume	11.45	Gallons (Casing Volume + Sand Pack Volume + Fluids Added) ft of water x 0.897 g/ft.
Minimum Purge Volume:		Gallons
Actual Purge Volume:	50	Gallons
Volume Measured By:	5 gallon bucket	
Rate of Development:		Gallons per Minute - Hour - Day
Pumping Rate/Depth	0.24 gpm	@ Variable feet bgs
Immiscible Phases Present:	Yes (No)	Thickness

Fluids Added

Lost Drilling Fluid (gallon):	—
Lost Purge Water (gallon):	—
Water During Installation (gallon):	—
Total Fluids Added (gallon):	—
Source of Added Water:	—
Groundwater Quality Parameters of Added Water Measured:	Yes No
Sample Collected of Added Water:	Yes No
Sample Designation of Added Water:	

Instrument Calibration

pH Meter: Oakton Model 10
pH 4.0 = 4.22 @ 26.1 °C
pH 7.0 = 6.91 @ 25.9 °C
pH 10.0 = 9.97 @ 26.2 °C
Dissolved Oxygen Meter: —

Spec. Conductance Meter: Oakton Model 10
Standard: 1409 µmhos/cm @ 25°C
Reading: 1259 µmhos/cm @ 26.1 °C
Turbidity Meter: Error message during calibration.
Other: —

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific* Conductance	Turbidity of DO	Clarity, Odor, PID Readings, Other		
5 gallons		12:08	18.8	8.34	15.35 mS		Very silty	No odor	
10 "		12:15	18.9	8.28	17.67 mS		"	"	
15 "		12:22	18.0	8.14	>1999 µS		"	"	
20 "		12:27	18.1	8.31	17.87 mS		"	"	
25 "		12:35	17.9	8.27	>1999 µS		"	"	
30 "		12:44	17.5	8.18	"		"	"	
35 "		12:54	17.5	8.18	"		Silty	"	
40 "		13:01	17.2	8.08	"		"	"	
44 "		13:32	18.8	8.32	7.78 mS		Clearer	"	
48 "		13:47	18.6	8.44	>1999 µS		"	"	
50 "		13:56	18.6	8.44	13.76 mS		Sl. Cloudy	"	
								"	

Development Completed: ✓ Gallons Discharged 50 Date: 8/17/07 Time: 13:56
Criteria: Stabilized pH, T, water and clarity. Personnel:
* Specific conductance readings are temperature-compensated to 25°C; if not, report temperatures at which reading is obtained.

At 40 gallons, switch from surge and bail to pumping.

Sullivan Tech
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Well Development Data Sheet

Boring No.: TT16-MW05 Well No.: TT16-MW05

Project: NAS Fallon Site 16
Project No.: CTO: 050
Date(s) of Installation: 8/14/07
Date(s) of Development: 8/17/07
Personnel/Company: RSI Drilling
Type of Rig Used: Power Probe 9630 Pro-D.

Casing Diameter/Type: 2" Sch. 40 PVC
Borehole Diameter: 8"
Screened Interval(s): 4'-19'
Total Length of Well Casing: 22' 1"
Measured Total Depth (TOC) Initial:
Final:

Initial Depth to Water (TOC): 9.03' Date: 8/17/07 Time: 14:25
~~Stabilized~~ Depth to Water (TOC): 9.20' Date: 8/17/07 Time: 16:20

Development

Techniques		Equipment Type/Capacity
	Jetting (Airlift)	
✓	Surge Block	Steel bailer
✓	Bailing	Steel bailer
✓	Pumping	Peristaltic pump
	Other	

Purge Volume Calculation

Casing Volume	13.05	Feet of Water
	x 0.163	Gallons per Foot
	=	Gallons per Single Casing Volume
Sand Pack Volume		Feet of Saturated Sand Pack
	x 2.611	Gallons per Foot (Borehole Dia.)
	=	Gallons (in Borehole)
	-	Gallons of Casing Volume
	=	x 0.3 (assuming porosity = 30%)
	=	Gallons within Sand Pack
Single Purge Volume	16.70	Gallons (Casing Volume + Sand Pack Volume + Fluids Added)
Minimum Purge Volume:		Gallons
Actual Purge Volume:	30	Gallons
Volume Measured By:	5 gallon bucket	
Rate of Development:		Gallons per Minute - Hour - Day
Pumping Rate/Depth	0.24 gpm @	Variable feet bgs
Immiscible Phases Present:	Yes (No)	Thickness

Ft of water x 0.897 gal/ft.

Fluids Added

Lost Drilling Fluid (gallon):	—
Lost Purge Water (gallon):	—
Water During Installation (gallon):	5
Total Fluids Added (gallon):	5
Source of Added Water:	Municipal supply.
Groundwater Quality Parameters of Added Water Measured:	Yes (No)
Sample Collected of Added Water:	Yes (No)
Sample Designation of Added Water:	—

Instrument Calibration

pH Meter: Oakton Model 10
pH 4.0 = 4.22 @ 26.1 °C
pH 7.0 = 6.91 @ 25.9 °C
pH 10.0 = 9.97 @ 26.2 °C
Dissolved Oxygen Meter:

Spec. Conductance Meter: Oakton Model 10
Standard: 1409 µmhos/cm @ 25°C
Reading: 1259 µmhos/cm @ 26.1 °C
Turbidity Meter: Error messages during calibration.
Other:

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific* Conductance	Turbidity of DO	Clarity, Odor, PID Readings, Other	
5 gallons		15:00	18.0	7.76	>1999 µS		Silty	No odor
10 gallons		15:09	17.8	7.77	"		"	"
15 "		15:18	17.7	7.75	"		"	"
20 "		15:26	17.7	7.78	"		"	"
24 "		15:57	18.0	7.74	"		Sl. silty	"
26 "		16:06	18.3	8.03	"		Sl. cloudy	"
28 "		16:12	18.5	7.73	"		"	"
30 "		16:18	18.3	7.76	"		"	"

Development Completed: ✓ Gallons Discharged 30 Date: 8/17/07 Time:
Criteria: Stabilized pH, T. Water much clearer. Personnel:
* Specific conductance readings are temperature-compensated to 25 °C; if not, report temperatures at which reading is obtained.

At 20 gallons, end bailing/surge or switch to pumping.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW06

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/9/2007
Personnel/Company S. Carroll/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 5-20
Total Length of Well Casing 22.5
Measured Total Depth (TOC) Initial 22.18 ft
Final 22.16 ft
Initial Depth to Water (TOC) 8.44 ft Date 11/9/2007 Time 0800
Stabilized Depth to Water (TOC) 8.62 ft Date 11/9/2007 Time 10:15

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	_____
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	_____

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 13.74 Ft. of water
x 0.163 Gallons/Foot
= 2.240 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.719 Gallons
Actual Purge Volume: 84 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.5 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.5 gpm @ 20 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60	1.5 gpm	0937	15.7	8.24	53.1	19	Pumped at 20 ft bTOC, clear, no odor
67	1.5 gpm	0942	15.8	8.43	52.7	9	Same as above
72	1.5 gpm	0946	15.8	8.51	52.6	6	Same as above
76.5	1.5 gpm	0949	15.9	8.55	52.1	4	Same as above
79.5	1.5 gpm	0951	15.9	8.57	52.1	3	Same as above
84	1.5 gpm	0954	15.9	8.60	52.1	2	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW28

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
84 gal.	1.5 gpm	0954	15.9	8.60	52.1	2	Pumped at 20 ft bTOC, clear, no odor

Development Completed at 84 Gallons Discharged. Date: 11/9/2007 Time: 0954

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: S. Carroll, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW07

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/9/2007
Personnel/Company S. Carroll/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18
Total Length of Well Casing 20.5
Measured Total Depth (TOC) Initial 20.07 ft
Final 20.15 ft
Initial Depth to Water (TOC) 8.93 ft Date 11/9/2007 Time 10:26
Stabilized Depth to Water (TOC) 9.06 ft Date 11/9/2007 Time 13:00

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.14 Ft. of water
x 0.163 Gallons/Foot
= 1.816 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.448 Gallons
Actual Purge Volume: 36 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
20	1.0 gpm	1143	16.1	8.68	35.6	9	Pumped at 19 ft bTOC, clear, no odor
23	1.0 gpm	1146	16.0	8.71	35.3	7	Same as above
26	1.0 gpm	1149	16.2	8.74	35.2	13	Same as above
28	1.0 gpm	1151	16.2	8.77	35.3	14	Same as above
31	1.0 gpm	1154	16.3	8.78	35.5	7	Same as above
33	1.0 gpm	1156	16.5	8.72	40.1	4	Same as above
36	1.0 gpm	1159	16.5	8.73	39.9	2	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW07

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
36 gal.	1.5 gpm	1159	16.5	8.73	39.9	2	Pumped at 19 ft bTOC, clear, no odor

Development Completed at 36 Gallons Discharged. Date: 11/9/2007 Time: 1159

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: S. Carroll, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW08

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/9/2007
Personnel/Company S. Carroll/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18
Total Length of Well Casing 20.3
Measured Total Depth (TOC) Initial 19.87 ft
Final 19.89 ft
Initial Depth to Water (TOC) 7.50 ft Date 11/9/2007 Time 1432
Stabilized Depth to Water (TOC) 7.68 ft Date 11/9/2007 Time 1623

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.37 Ft. of water
x 0.163 Gallons/Foot
= 2.016 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.048 Gallons
Actual Purge Volume: 69 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60	1.0 gpm	1550	16.7	8.94	29.9	10	Pumped at 18 ft bTOC, clear, no odor
63	1.0 gpm	1553	16.6	8.92	29.9	5	Same as above
65	1.0 gpm	1555	16.4	8.91	29.9	4	Same as above
67	1.0 gpm	1557	16.3	8.90	30.1	3	Same as above
69	1.0 gpm	1559	16.3	8.89	30.3	3	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW08

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
69 gal.	1.0 gpm	1559	16.3	8.89	30.3	3	Pumped at 18 ft bTOC, clear, no odor

Development Completed at 69 Gallons Discharged. Date: 11/9/2007 Time: 1559

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: S. Carroll, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW09

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/9/2007
Personnel/Company S. Carroll/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18
Total Length of Well Casing 19.8
Measured Total Depth (TOC) Initial 20.07 ft
Final 20.06 ft
Initial Depth to Water (TOC) 8.11 ft Date 11/9/2007 Time 1245
Stabilized Depth to Water (TOC) 6.81 ft Date 11/9/2007 Time 1512

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.96 Ft. of water
x 0.163 Gallons/Foot
= 1.949 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.847 Gallons
Actual Purge Volume: 54 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
45	1.0 gpm	1350	17.6	8.43	72.2	31	Pumped at 19 ft bTOC, clear, no odor
48	1.0 gpm	1353	17.5	8.46	72.8	12	Same as above
50	1.0 gpm	1355	17.5	8.47	72.7	8	Same as above
52	1.0 gpm	1357	17.5	8.48	72.7	5	Same as above
54	1.0 gpm	1359	17.5	8.48	72.7	3	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW09

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
54 gal.	1.0 gpm	1359	17.5	8.48	72.7	3	Pumped at 19 ft bTOC, clear, no odor

Development Completed at 54 Gallons Discharged. Date: 11/9/2007 Time: 1359

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: S. Carroll, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW10

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/15/2007
Personnel/Company: B. Strand/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-13 bgs
Total Length of Well Casing: 10 ft
Measured Total Depth (TOC): Initial 15.02 ft; Final 15.07 ft
Initial Depth to Water (TOC): 8.34 ft Date 11/15/2007 Time 1550
Stabilized Depth to Water (TOC): 8.43 ft Date 11/15/2007 Time 1700

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 6.680 Ft. of water
x 0.163 Gallons/Foot
= 1.089 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.260 Gallons
Actual Purge Volume: 51 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0 gpm @ 14 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
40	1.00 gpm	1638	19.6	8.41	77.4	32	Pumped at 14 ft bTOC, cloudy, no odor
43	1.00 gpm	1641	19.4	8.35	78.0	100	Same as above
48	1.00 gpm	1646	19.4	8.33	78.1	10	Same as above
51	1.00 gpm	1649	19.1	8.33	78.7	0	Pumped at 14 ft bTOC, clear, no odor

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW10

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
51 gal.	1.0 gpm	1649	19.1	8.33	7877	0	Pumped at 17 ft bTOC, clear, no odor

Development Completed at 51 Gallons Discharged. Date: 11/15/2007 Time: 1649

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. Strand, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW11

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/15/2007
Personnel/Company: B. Strand/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18 bgs
Total Length of Well Casing: 15 ft
Measured Total Depth (TOC) Initial: 20.22 ft
Final: 20.24 ft
Initial Depth to Water (TOC): 7.54 ft Date: 11/15/2007 Time: 1310
Stabilized Depth to Water (TOC): 7.65 ft Date: 11/15/2007 Time: 1545

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.68 Ft. of water
x 0.163 Gallons/Foot
= 2.067 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 6.201 Gallons
Actual Purge Volume: 85 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
75	1.00 gal/min	1430	18.9	7.99	67.0	54	Pumped at 17 ft bTOC, cloudy, no odor
80	1.00 gal/min	1435	18.8	8.18	67.2	21	Same as above
83	1.00 gal/min	1438	18.3	8.23	67.5	10	Same as above
85	1.00 gal/min	1440	18.7	8.24	67.2	0	Pumped at 17 ft bTOC, clear, no odor

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW11

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
85 gal.	1.0 gpm	1440	18.7	8.24	67.2	0	Pumped at 17 ft bTOC, clear, no odor

Development Completed at 85 Gallons Discharged. Date: 11/15/2007 Time: 1440

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. Strand, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW12

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/10/2007
Personnel/Company S. Carroll/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18
Total Length of Well Casing 18
Measured Total Depth (TOC) Initial 19.98 ft
Final 20.04 ft
Initial Depth to Water (TOC) 8.64 ft Date 11/10/2007 Time 0922
Stabilized Depth to Water (TOC) 8.68 ft Date 11/10/2007 Time 1050

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.34 Ft. of water
x 0.163 Gallons/Foot
= 1.848 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.545 Gallons
Actual Purge Volume: 54 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0 gpm @ 14 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
40	1.0 gpm	1021	19.1	8.18	37.5	311	Pumped at 19 ft bTOC, clear, no odor
44	1.0 gpm	1025	19.7	8.22	37.4	35	Same as above
47	1.0 gpm	1028	19.9	8.23	37.1	13	Same as above
50	1.0 gpm	1031	19.8	8.23	37.2	8	Same as above
52	1.0 gpm	1033	19.8	8.24	37.2	5	Same as above
54	1.0 gpm	1035	19.9	8.24	36.3	4	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW12

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
54 gal.	1.0 gpm	1035	19.9	8.24	36.3	4	Pumped at 19 ft bTOC, clear, no odor

Development Completed at 54 Gallons Discharged. Date: 11/10/2007 Time: 1035

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: S. Carroll, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW13

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/10/2007
Personnel/Company S. Carroll/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-15
Total Length of Well Casing 17.3
Measured Total Depth (TOC) Initial 17.11 ft
Final 17.11 ft
Initial Depth to Water (TOC) 7.37 ft Date 11/10/2007 Time 1102
Stabilized Depth to Water (TOC) 7.39 ft Date 11/10/2007 Time 1236

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.74 Ft. of water
x 0.163 Gallons/Foot
= 1.588 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.764 Gallons
Actual Purge Volume: 60 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0 gpm @ 16 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
45	1.0 gpm	1207	19.0	8.41	38.6	27	Pumped at 16 ft bTOC, clear, no odor
48	1.0 gpm	12110	19.2	8.51	38.8	13	Same as above
50	1.0 gpm	1212	19.3	8.54	38.6	6	Same as above
53	1.0 gpm	1215	19.3	8.55	38.9	4	Same as above
55	1.0 gpm	1217	19.2	8.56	38.8	4	Same as above
57	1.0 gpm	1219	19.3	8.57	38.7	3	Same as above
60	1.0 gpm	1222	19.4	8.57	38.7	2	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW13

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60 gal.	1.0 gpm	1222	19.4	8.57	38.7	2	Pumped at 16 ft bTOC, clear, no odor

Development Completed at 60 Gallons Discharged. Date: 11/10/2007 Time: 1222
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: S. Carroll, T. Garver

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16 – MW 14

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/14/2007
Personnel/Company L. Niell/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-18 bgs
Total Length of Well Casing 17.3 ft
Measured Total Depth (TOC) Initial 17.80 ft
Final 17.79 ft
Initial Depth to Water (TOC) 5.92ft Date 11/14/2007 Time 1510
Stabilized Depth to Water (TOC) 6.02 ft Date 11/14/2007 Time 1653

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.88 Ft. of water
x 0.163 Gallons/Foot
= 1.936 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 5.809 Gallons
Actual Purge Volume: 69 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.5 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.25 gpm @ 16 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
60	1.25 gpm	1628	19.7	7.97	52.1	8	Pumped at 16 bTOC, clear, no odor
63.75	1.25 gpm	1631	19.3	8.05	52.8	1	Same as above
66.25	1.25 gpm	1633	19.2	8.09	53.0	0	Same as above
68.75	1.25 gpm	1635	19.2	8.12	53.1	1	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16 – MW 14

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
68.75	1.25 gpm	1635	19.2	8.12	53.1	1	Pumped at 16 ft bTOC, clear, slight petroleum odor, slight sheen present in bailed water,

Development Completed at 69 Gallons Discharged. Date: 11/14/2007 Time: 1635

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: L.Niell, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-15 (Site 16)

Project Well Development
Project No. I4302.300.04.10
Date(s) of Installation _____
Date(s) of Development 11/10/2007
Personnel/Company S. Carroll/Tetra Tech
T. Garver/Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in.
Screened Interval(s) 3-13
Total Length of Well Casing 14.75
Measured Total Depth (TOC) Initial 14.92 ft
Final 15.04 ft
Initial Depth to Water (TOC) 7.88 ft Date 11/10/2007 Time 0735
Stabilized Depth to Water (TOC) 7.04 ft Date 11/10/2007 Time 0911

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 7.04 Ft. of water
x 0.163 Gallons/Foot
= 1.147 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 3.441 Gallons
Actual Purge Volume: 65 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0 gpm @ 14 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
40	1.0 gpm	0829	15.3	7.65	70.2	55	Pumped at 14 ft bTOC, clear, no odor
46	1.0 gpm	0835	17.0	7.78	70.0	30	Same as above
51	1.0 gpm	0840	17.2	7.97	70.0	24	Same as above
54	1.0 gpm	0843	17.2	8.05	70.0	18	Same as above
56	1.0 gpm	0845	17.3	8.10	69.6	15	Same as above
59	1.0 gpm	0848	17.4	8.13	69.7	12	Same as above
61	1.0 gpm	0850	17.4	8.16	69.5	8	Same as above
63	1.0 gpm	0852	17.5	8.18	69.5	7	Same as above
65	1.0 gpm	0854	17.5	8.19	69.4	5	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-15 (Site 16)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
65 gal.	1.0 gpm	0854	17.5	8.19	69.4	5	Pumped at 14 ft bTOC, clear, no odor

Development Completed at 65 Gallons Discharged. Date: 11/10/2007 Time: 0854

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: S. Carroll, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT16-MW16

Project: Well Development
Project No. I4302.300.04.10
Date(s) of Installation: _____
Date(s) of Development: 11/16/2007
Personnel/Company: B. Strand/Tetra Tech; T. Garver/Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in.
Screened Interval(s): 3-18
Total Length of Well Casing: 15 ft
Measured Total Depth (TOC): Initial 20.21 ft; Final 20.23 ft
Initial Depth to Water (TOC): 10.0 ft Date 11/16/2007 Time 0730
Stabilized Depth to Water (TOC): 10.20 ft Date 11/16/2007 Time 0940

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (1/2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: Unknown Gallons
Lost Purge Water: unknown Gallons
Water During Installation: unknown Gallons
Total Fluids Added: unknown Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 10.21 Ft. of water
x 0.163 Gallons/Foot
= 1.654 Gallons per Single Casing Volume
Sand Pack Volume: unknown Ft. of Saturated Sand Pack
x NA Gallons/Foot (borehole diameter)
= NA Gallons (in borehole)
- NA Gallons of Casing Volume
= NA x 0.3 (Assuming porosity = 30%)
= NA Gallons Within Sand Pack
Single Purge Volume: NA Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 4.962 Gallons
Actual Purge Volume: 90 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1.0 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1.0 gpm @ 18 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (Temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
84	1.0 gpm	0915	17.3	7.83	71.5	16	Pumped at 18 ft bTOC, clear, no odor
87	1.0 gpm	0918	17.2	8.04	72.3	2	Same as above
09	1.0 gpm	0921	17.1	8.04	72.1	0	Same as above

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. MW-16 (Site 16)

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
90 gal.	1.0 gpm	0921	17.1	8.09	72.1	0	Pumped at 18 ft bTOC, clear, no odor

Development Completed at 90 Gallons Discharged. Date: 11/16/2007 Time: 0921

Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: B. Strand, T. Garver

*Instruments calibrated by Gregg Drilling personnel.

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TT16-MW17

Project: Well Development
Project No. 14302.300.10.01
Date(s) of Installation: 3/16/08

Date(s) of Development: 3/18/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18

Total Length of Well Casing: 20
Measured Total Depth (TOC) Initial: 19.94 ft
Final: 19.94 ft
Initial Depth to Water (TOC): 8.32 ft Date: 3/18/2008 Time: 1526
Stabilized Depth to Water (TOC): 8.33 ft Date: 3/18/2008 Time: 1630

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.62 Ft. of water
x 0.163 Gallons/Foot
= 1.89 Gallons per Single Casing Volume
Sand Pack Volume: 11.62 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 30.33 Gallons (in borehole)
- 1.89 Gallons of Casing Volume
= 28.44 x 0.3 (Assuming porosity = 30%)
= 8.53 Gallons Within Sand Pack
Single Purge Volume: 10.42 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 31.26 Gallons
Actual Purge Volume: 38 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
26	1 gpm	1610	16.4	6.41	465	150	
29	1 gpm	1613	16.2	6.43	464	50	
32	1 gpm	1616	16.3	6.44	465	10	Clear
35	1 gpm	1619	16.3	6.43	465	10	
38	1 gpm	1622	16.4	6.44	464	10	

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TT16-MW17**

Development Completed at 38 Gallons Discharged. Date: 3/18/08 Time: 1622
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 20

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TT20-MW02

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/15/08

Date(s) of Development: 3/18/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18

Total Length of Well Casing: 20
Measured Total Depth (TOC) Initial: 20.52 ft
Final: 20.52 ft
Initial Depth to Water (TOC): 7.28 ft Date: 3/18/2008 Time: 1142
Stabilized Depth to Water (TOC): 7.30 ft Date: 3/18/2008 Time: 1300

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 13.24 Ft. of water
x 0.163 Gallons/Foot
= 2.16 Gallons per Single Casing Volume
Sand Pack Volume: 13.24 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 34.55 Gallons (in borehole)
- 2.16 Gallons of Casing Volume
= 32.39 x 0.3 (Assuming porosity = 30%)
= 9.72 Gallons Within Sand Pack
Single Purge Volume: 11.91 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 35.64 Gallons
Actual Purge Volume: 45 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
21	1 gpm	1230	15.9	6.72	4.73	900	
24	1 gpm	1233	15.7	6.71	4.74	850	
27	1 gpm	1236	15.7	6.74	4.71	720	
30	1 gpm	1239	15.7	6.74	4.72	500	
33	1 gpm	1242	15.6	6.73	4.73	350	
36	1 gpm	1245	15.5	6.72	4.73	150	
39	1 gpm	1248	15.6	6.72	4.73	10	Clear
42	1 gpm	1251	15.6	6.73	4.74	10	
45	1 gpm	1254	15.6	6.73	4.73	10	

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TT20-MW02**

Development Completed at 45 Gallons Discharged. Date: 3/18/08 Time: 1254
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Site 22

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT22-MW01

Project Well Development
Project No. I4302.300.04.07
Date(s) of Installation 3/14/08
Date(s) of Development 5/13/08
Personnel/Company R. Knapp/Tetra Tech

Type of Rig Used None

Casing Diameter/Type 2 in. / PVC
Borehole Diameter 8 in
Screened Interval(s) 3-18
Total Length of Well Casing 20
Measured Total Depth (TOC) Initial 20.40 ft
Final 20.40 ft
Initial Depth to Water (TOC) 5.61 ft Date 5/13/2008 Time 0939
Stabilized Depth to Water (TOC) 5.62 ft Date 5/13/2008 Time 1211

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in disposable bailer
___ Pumping	
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 14.79 Ft. of water
x 0.163 Gallons/Foot
= 2.41 Gallons per Single Casing Volume
Sand Pack Volume: 14.79 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 35.66 Gallons (in borehole)
- 2.41 Gallons of Casing Volume
= 33.25 x 0.3 (Assuming porosity = 30%)
= 9.97 Gallons Within Sand Pack
Single Purge Volume: 12.38 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 37.14 Gallons
Actual Purge Volume: 38 Gallons
Volume Measured by: 5-gallon bucket
Rate of Development about 0.3 Gallons/Minute (Hour,Day)
Pumping Rate/Depth NA @ NA Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: YSI
pH 4.0 = 4.0 @ 19.73 °C
pH 7.0 = 7.0 @ 19.90 °C
pH 10.0 = 9.98 @ 19.96 °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: YSI
Standard 1.410 mS/cm@ 25°C
Reading 1.410 mS/cm @ 19.47 °C
Turbidity Meter: LaMotte
Other: (temperature) YSI

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
21	various	1100	14.57	8.71	36.85	150	
22.5	0.2	1108	14.27	8.66	37.98	140	
24	0.25	1114	14.19	8.66	38.17	220	
26	0.29	1121	14.11	8.63	38.05	100	
30	0.57	1128	14.09	8.66	38.18	100	
32	0.25	1136	14.06	8.65	38.01	75	Becomes clearer
34	0.33	1142	13.96	8.65	37.93	80	
36	0.29	1149	13.95	8.66	37.95	60	
38	0.33	1155	13.98	8.66	37.98	60	

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT22-MW01

Development Completed at 38 Gallons Discharged. Date: 5/13/08 Time: 1155

Criteria: Parameters except turbidity stabilized within 10 percent. Turbidity elevated due to bailing instead of using pump.

Personnel: R. Knapp

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT22-MW02

Project Well Development
Project No. I4302.300.10.01
Date(s) of Installation 3/13/08
Date(s) of Development 3/26/08
Personnel/Company R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used Smeal T5

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8 in
Screened Interval(s) 3-18
Total Length of Well Casing 20
Measured Total Depth (TOC) Initial 20.44 ft
Final 20.44 ft
Initial Depth to Water (TOC) 7.19 ft Date 3/26/2008 Time 1220
Stabilized Depth to Water (TOC) 7.20 ft Date 3/26/2008 Time 1330

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 13.25 Ft. of water
x 0.163 Gallons/Foot
= 2.16 Gallons per Single Casing Volume
Sand Pack Volume: 13.25 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 34.58 Gallons (in borehole)
- 2.16 Gallons of Casing Volume
= 32.42 x 0.3 (Assuming porosity = 30%)
= 9.73 Gallons Within Sand Pack
Single Purge Volume: 11.89 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 35.66 Gallons
Actual Purge Volume: 39 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
24	1 gpm	1300	13.8	7.39	44.3	341	
27	1 gpm	1303	13.9	7.41	44.9	250	
30	1 gpm	1306	14.1	7.42	44.9	150	
33	1 gpm	1309	14.2	7.41	44.9	30	Clear
36	1 gpm	1312	14.4	7.40	44.8	10	
39	1 gpm	1315	14.6	7.41	44.7	10	

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TT22-MW02

Development Completed at 39 Gallons Discharged. Date: 3/26/08 Time: 1315
Criteria: Parameters stabilized within 10 percent. Water visibly clear. Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Basewide

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TTBW-MW01

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/12/08

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18

Date(s) of Development: 3/17-18/2008
Personnel/Company: R. Knapp/Tetra Tech; A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Total Length of Well Casing: 20
Measured Total Depth (TOC): Initial 20.44 ft; Final 20.44 ft
Initial Depth to Water (TOC): 9.19 ft Date 3/17/2008 Time 1517
Stabilized Depth to Water (TOC): 9.09 ft Date 3/24/2008 Time 1447

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.25 Ft. of water
x 0.163 Gallons/Foot
= 1.83 Gallons per Single Casing Volume
Sand Pack Volume: 11.25 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 29.36 Gallons (in borehole)
- 1.83 Gallons of Casing Volume
= 27.53 x 0.3 (Assuming porosity = 30%)
= 8.26 Gallons Within Sand Pack
Single Purge Volume: 10.09 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 30.27 Gallons
Actual Purge Volume: 31 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 0.5 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 0.5 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
14	0.5 gpm	1605	15.7	6.44	1.82	750	Poor recharge; pumped dry
17	0.5 gpm	1622	15.7	6.45	1.83	750	Pumped dry; left overnight
31	0.5 gpm	0835	13.9	6.41	1.79	>999	
34	0.5 gpm	0855	13.7	6.43	1.77	800	Pumped dry
37	0.5 gpm	0911	14.2	6.44	1.75	>999	Pumped dry
41	0.5 gpm	0930	14.1	6.43	1.76	950	Pumped dry; unable to reduce turbidity

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TTBW-MW01**

Development Completed at 41 Gallons Discharged. Date: 3/18/08 Time: 0930
Criteria: > 3 well bores purged. Parameters except turbidity stabilized w/in 10%. Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW15

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/20/08
Date(s) of Development: 3/27/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18
Total Length of Well Casing: 20
Measured Total Depth (TOC): Initial 20.49 ft
Final 20.49 ft
Initial Depth to Water (TOC): 10.19 ft Date 3/27/2008 Time 0730
Stabilized Depth to Water (TOC): 10.37 ft Date 3/27/2008 Time 0920

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 10.30 Ft. of water
x 0.163 Gallons/Foot
= 1.68 Gallons per Single Casing Volume
Sand Pack Volume: 10.30 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 26.88 Gallons (in borehole)
- 1.68 Gallons of Casing Volume
= 25.20 x 0.3 (Assuming porosity = 30%)
= 7.56 Gallons Within Sand Pack
Single Purge Volume: 9.24 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 27.72 Gallons
Actual Purge Volume: 32 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
20	1 gpm	0849	12.3	8.86	1.85	650	
23	1 gpm	0852	12.5	8.87	1.84	400	
26	1 gpm	0855	12.4	8.87	1.86	200	
29	1 gpm	0858	12.6	8.88	1.86	10	
32	1 gpm	0901	12.6	8.88	1.87	10	Clear

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW15

Development Completed at 32 Gallons Discharged. Date: 3/27/08 Time: 0901
Criteria: Parameters stabilized within 10 percent. Water visibly clear. Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW14

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/26/08
Date(s) of Development: 3/27/08
Personnel/Company: R. Knapp/Tetra Tech; A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18
Total Length of Well Casing: 18
Measured Total Depth (TOC): Initial 18.59 ft; Final 18.59 ft
Initial Depth to Water (TOC): 5.11 ft Date 3/27/2008 Time 0935
Stabilized Depth to Water (TOC): not measured Date _____ Time _____

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 13.48 Ft. of water
x 0.163 Gallons/Foot
= 2.20 Gallons per Single Casing Volume
Sand Pack Volume: 13.48 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 35.18 Gallons (in borehole)
- 2.20 Gallons of Casing Volume
= 32.98 x 0.3 (Assuming porosity = 30%)
= 9.89 Gallons Within Sand Pack
Single Purge Volume: 12.09 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 36.28 Gallons
Actual Purge Volume: 47 Gallons
Volume Measured by: 55-gallon drum
Rate of Development <0.5 Gallons/Minute (Hour,Day)
Pumping Rate/Depth <0.5 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
20	<0.5 gpm	1050	12.2	8.46	5.52	>999	Stop to recharge
23	<0.5 gpm	1058	12.4	8.47	5.52	>999	Stop to recharge
26	<0.5 gpm	1105	12.6	8.32	13.1	>999	Stop to recharge
29	<0.5 gpm	1125	12.7	8.45	8.20	>999	Stop to recharge
32	<0.5 gpm	1147	11.7	8.24	16.3	550	Stop to recharge
35	<0.5 gpm	1156	11.3	8.58	4.44	177	Stop to recharge
38	<0.5 gpm	1201	11.7	8.53	4.41	450	
41	<0.5 gpm	1204	11.6	8.67	4.81	430	Stop to recharge
44	<0.5 gpm	1226	11.4	8.48	5.91	815	Stop to recharge
47	<0.5 gpm	1240	11.4	8.14	21.3	188	Unable to stabilize parameters; 3 hours spent developing well

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW14

Development Completed at 47 Gallons Discharged. Date: 3/27/08 Time: 1240
Criteria: Three hours spent attempting to develop well. Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW13

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/24/08
Date(s) of Development: 3/27/08
Personnel/Company: R. Knapp/Tetra Tech; A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18
Total Length of Well Casing: 20
Measured Total Depth (TOC): Initial 20.44 ft; Final 20.44 ft
Initial Depth to Water (TOC): 8.88 ft Date 3/27/2008 Time 1255
Stabilized Depth to Water (TOC): 8.98 ft Date 3/27/2008 Time 1420

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.56 Ft. of water
x 0.163 Gallons/Foot
= 1.88 Gallons per Single Casing Volume
Sand Pack Volume: 11.56 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 30.17 Gallons (in borehole)
- 1.88 Gallons of Casing Volume
= 28.29 x 0.3 (Assuming porosity = 30%)
= 8.49 Gallons Within Sand Pack
Single Purge Volume: 10.37 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 31.10 Gallons
Actual Purge Volume: 32 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
11	1 gpm	1344	14.8	7.36	6.51	700	
14	1 gpm	1347	14.7	7.35	3.66	100	
17	1 gpm	1350	14.3	7.34	3.65	10	Clear
20	1 gpm	1353	14.4	7.35	3.65	5	
23	1 gpm	1356	14.6	7.36	3.63	10	
26	1 gpm	1359	14.6	7.35	3.62	10	
29	1 gpm	1402	14.5	7.34	3.63	5	
32	1 gpm	1405	14.5	7.35	3.64	5	

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW13

Development Completed at 32 Gallons Discharged. Date: 3/27/08 Time: 1405
Criteria: Parameters stabilized within 10 percent. Water visibly clear. Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TTBW-MW12

Project: Well Development
Project No. 14302.300.10.01
Date(s) of Installation: 3/16/08

Date(s) of Development: 3/20/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18

Total Length of Well Casing: 20
Measured Total Depth (TOC) Initial: 20.43 ft
Final: 20.44 ft
Initial Depth to Water (TOC): 7.99 ft Date: 3/20/2008 Time: 1352
Stabilized Depth to Water (TOC): 8.05 ft Date: 3/20/2008 Time: 1501

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water:
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water:

PURGE VOLUME CALCULATION

Casing Volume: 12.44 Ft. of water
x 0.163 Gallons/Foot
= 2.03 Gallons per Single Casing Volume
Sand Pack Volume: 12.44 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 32.47 Gallons (in borehole)
- 2.03 Gallons of Casing Volume
= 30.44 x 0.3 (Assuming porosity = 30%)
= 9.13 Gallons Within Sand Pack
Single Purge Volume: 11.16 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 33.48 Gallons
Actual Purge Volume: 35 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
23	1 gpm	1438	14.7	6.39	431	10	Clear
26	1 gpm	1441	14.5	6.41	431	10	
29	1 gpm	1444	14.5	6.40	432	10	
32	1 gpm	1447	14.7	6.41	431	10	
35	1 gpm	1450	15.1	6.42	431	10	

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TTBW-MW12**

Development Completed at 35 Gallons Discharged. Date: 3/20/08 Time: 1450
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Water visibly clear. Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TTBW-MW11

Project: Well Development
Project No.: I4302.300.10.01
Date(s) of Installation: 3/17/08

Date(s) of Development: 3/19/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 4.5-19.5

Total Length of Well Casing: 22
Measured Total Depth (TOC) Initial: 22.56 ft
Final: 22.56 ft
Initial Depth to Water (TOC): 12.76 ft Date: 3/19/2008 Time: 1113
Stabilized Depth to Water (TOC): 12.85 ft Date: 3/24/08 Time: 0955

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.8 Ft. of water
x 0.163 Gallons/Foot
= 1.60 Gallons per Single Casing Volume
Sand Pack Volume: 9.8 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 25.58 Gallons (in borehole)
- 1.60 Gallons of Casing Volume
= 23.98 x 0.3 (Assuming porosity = 30%)
= 7.19 Gallons Within Sand Pack
Single Purge Volume: 8.79 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 26.37 Gallons
Actual Purge Volume: 32 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 20 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
20	1 gpm	1245	15.9	6.64	431	230	
23	1 gpm	1248	15.8	6.62	433	200	Well draws down to near bottom but keeps flowing
26	1 gpm	1251	15.8	6.62	432	150	
29	1 gpm	1254	15.8	6.63	433	97	
32	1 gpm	1257	15.7	6.64	432	47	Turbidity elevated

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TTBW-MW11**

Development Completed at 32 Gallons Discharged. Date: 3/19/08 Time: 1257
Criteria: > 3 well bores purged. Parameters except turbidity stabilized w/in 10%. Turbidity less than 50. Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW10-Redrill

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/26/08
Date(s) of Development: 3/27/08
Personnel/Company: R. Knapp/Tetra Tech; A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18
Total Length of Well Casing: 20
Measured Total Depth (TOC): Initial 20.46 ft; Final 20.46 ft
Initial Depth to Water (TOC): 7.21 ft Date 3/27/2008 Time 1450
Stabilized Depth to Water (TOC): 7.24 ft Date 3/27/2008 Time 1600

DEVELOPMENT TECHNIQUE(S) / EQUIPMENT TYPE/CAPACITY

____	Jetting (Airlift)	
X	Surge Block	2-in diameter surge tool
X	Bailing	2-in stainless steel bailer
X	Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____	Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 13.25 Ft. of water
x 0.163 Gallons/Foot
= 2.16 Gallons per Single Casing Volume
Sand Pack Volume: 13.25 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 34.58 Gallons (in borehole)
- 2.16 Gallons of Casing Volume
= 32.42 x 0.3 (Assuming porosity = 30%)
= 9.73 Gallons Within Sand Pack
Single Purge Volume: 11.89 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 35.66 Gallons
Actual Purge Volume: 36 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
21	1 gpm	1535	14.5	7.01	9.35	400	
21	1 gpm	1537	14.6	7.03	9.34	68	
27	1 gpm	1540	14.9	7.02	9.34	10	Clear
30	1 gpm	1543	14.9	7.03	9.33	5	
33	1 gpm	1546	14.7	7.02	9.32	10	
36	1 gpm	1549	14.9	7.02	9.32	13	

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW10-Redrill

Development Completed at 36 Gallons Discharged. Date: 3/27/08 Time: 1549
Criteria: Parameters stabilized within 10 percent. Water visibly clear. Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TTBW-MW09

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/13/08

Date(s) of Development: 3/17/2008
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18

Total Length of Well Casing: 20
Measured Total Depth (TOC) Initial: 20.33 ft
Final: 20.39 ft
Initial Depth to Water (TOC): 8.23 ft Date: 3/17/2008 Time: 1141
Stabilized Depth to Water (TOC): 8.22 ft Date: 3/17/2008 Time: 1259

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.1 Ft. of water
x 0.163 Gallons/Foot
= 1.97 Gallons per Single Casing Volume
Sand Pack Volume: 12.1 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 31.58 Gallons (in borehole)
- 1.97 Gallons of Casing Volume
= 29.61 x 0.3 (Assuming porosity = 30%)
= 8.88 Gallons Within Sand Pack
Single Purge Volume: 10.85 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 32.55 Gallons
Actual Purge Volume: 35 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
14	1 gpm	1220	12.5	6.61	7.44	525	
17	1 gpm	1223	12.9	6.62	7.32	440	
20	1 gpm	1226	12.9	6.61	7.31	320	
23	1 gpm	1229	12.8	6.63	7.32	200	
26	1 gpm	1232	13.1	6.62	7.31	100	
29	1 gpm	1235	12.8	6.62	7.32	50	
32	1 gpm	1238	12.7	6.63	7.31	20	Clear
35	1 gpm	1241	12.9	6.64	7.32	10	

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TTBW-MW09**

Development Completed at 35 Gallons Discharged. Date: 3/17/08 Time: 1241
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TTBW-MW07

Project: Well Development
Project No.: I4302.300.10.01
Date(s) of Installation: 3/15/08

Date(s) of Development: 3/18/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18

Total Length of Well Casing: 20
Measured Total Depth (TOC) Initial: 20.46 ft
Final: ft
Initial Depth to Water (TOC): 7.59 ft Date: 3/18/2008 Time: 1331
Stabilized Depth to Water (TOC): 7.60 ft Date: 3/18/2008 Time: 1458

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.87 Ft. of water
x 0.163 Gallons/Foot
= 2.10 Gallons per Single Casing Volume
Sand Pack Volume: 12.87 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 33.59 Gallons (in borehole)
- 2.10 Gallons of Casing Volume
= 31.49 x 0.3 (Assuming porosity = 30%)
= 9.45 Gallons Within Sand Pack
Single Purge Volume: 11.55 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 34.65 Gallons
Actual Purge Volume: 36 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
24	1 gpm	1430	15.9	6.81	503	15	Clear
27	1 gpm	1433	15.6	6.83	504	15	
30	1 gpm	1436	15.4	6.83	504	10	
33	1 gpm	1439	15.6	6.84	503	10	
36	1 gpm	1442	15.6	6.85	504	10	
							Could not get 10 ft bailer down well; 5 ft bailer passed. Well may be crooked.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TTBW-MW07**

Development Completed at 36 Gallons Discharged. Date: 3/18/08 Time: 1442
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TTBW-MW08

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/13/08

Date(s) of Development: 3/17/2008
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18

Total Length of Well Casing: 20
Measured Total Depth (TOC) Initial: 20.39 ft
Final: 20.39 ft
Initial Depth to Water (TOC): 9.39 ft Date: 3/17/2008 Time: 0720
Stabilized Depth to Water (TOC): 9.39 ft Date: 3/17/2008 Time: 1120

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11 Ft. of water
x 0.163 Gallons/Foot
= 1.79 Gallons per Single Casing Volume
Sand Pack Volume: 11 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 28.71 Gallons (in borehole)
- 1.79 Gallons of Casing Volume
= 26.92 x 0.3 (Assuming porosity = 30%)
= 8.08 Gallons Within Sand Pack
Single Purge Volume: 9.87 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 29.61 Gallons
Actual Purge Volume: 32 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
14	1 gpm	1040	14.8	6.39	23.0	790	
17	1 gpm	1043	14.7	7.20	22.8	<10	Clear
20	1 gpm	1046	14.6	7.21	22.7	<10	
23	1 gpm	1049	14.6	7.34	23.0	<10	
26	1 gpm	1052	14.7	7.32	23.0	<10	
29	1 gpm	1055	14.5	7.33	23.1	<10	
32	1 gpm	1058	14.5	7.32	23.6	<10	

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TTBW-MW08**

Development Completed at 32 Gallons Discharged. Date: 3/17/2008 Time: 1058
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TTBW-MW07

Project: Well Development
Project No.: I4302.300.10.01
Date(s) of Installation: 3/15/08

Date(s) of Development: 3/18/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18

Total Length of Well Casing: 20
Measured Total Depth (TOC) Initial: 20.46 ft
Final: ft
Initial Depth to Water (TOC): 7.59 ft Date: 3/18/2008 Time: 1331
Stabilized Depth to Water (TOC): 7.60 ft Date: 3/18/2008 Time: 1458

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.87 Ft. of water
x 0.163 Gallons/Foot
= 2.10 Gallons per Single Casing Volume
Sand Pack Volume: 12.87 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 33.59 Gallons (in borehole)
- 2.10 Gallons of Casing Volume
= 31.49 x 0.3 (Assuming porosity = 30%)
= 9.45 Gallons Within Sand Pack
Single Purge Volume: 11.55 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 34.65 Gallons
Actual Purge Volume: 36 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ___ °C
pH 7.0 = NA @ ___ °C
pH 10.0 = NA @ ___ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ ___ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
24	1 gpm	1430	15.9	6.81	503	15	Clear
27	1 gpm	1433	15.6	6.83	504	15	
30	1 gpm	1436	15.4	6.83	504	10	
33	1 gpm	1439	15.6	6.84	503	10	
36	1 gpm	1442	15.6	6.85	504	10	
							Could not get 10 ft bailer down well; 5 ft bailer passed. Well may be crooked.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TTBW-MW07**

Development Completed at 36 Gallons Discharged. Date: 3/18/08 Time: 1442
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TTBW-MW06

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/17/08

Date(s) of Development: 3/19/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 2.3-17.3

Total Length of Well Casing: 20
Measured Total Depth (TOC) Initial: 20.39 ft
Final: 20.39 ft
Initial Depth to Water (TOC): 8.62 ft Date: 3/19/2008 Time: 1454
Stabilized Depth to Water (TOC): 8.55 ft Date: 3/19/2008 Time: 1617

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.77 Ft. of water
x 0.163 Gallons/Foot
= 1.92 Gallons per Single Casing Volume
Sand Pack Volume: 11.77 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 30.72 Gallons (in borehole)
- 1.601.92 Gallons of Casing Volume
= 28.80 x 0.3 (Assuming porosity = 30%)
= 8.64 Gallons Within Sand Pack
Single Purge Volume: 10.56 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 31.68 Gallons
Actual Purge Volume: 42 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
20	1 gpm	1543	13.7	6.69	265	>999	
23	1 gpm	1546	13.9	6.68	266	>999	
26	1 gpm	1549	13.9	6.67	265	850	
29	1 gpm	1552	13.8	6.68	267	635	
32	1 gpm	1555	13.9	6.67	267	250	
35	1 gpm	1558	13.9	6.66	268	200	
39	1 gpm	1601	13.7	6.67	269	10	Clear
42	1 gpm	1604	13.9	6.68	268	10	

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TTBW-MW06**

Development Completed at 42 Gallons Discharged. Date: 3/19/08 Time: 1604
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW05

Project: Well Development
Project No. I4302.300.04.07
Date(s) of Installation: 3/24/08
Date(s) of Development: 5/12/08
Personnel/Company: R. Knapp/Tetra Tech
K. Thompson/Tetra Tech
Type of Rig Used: None

Casing Diameter/Type: 2 in. / PVC
Borehole Diameter: 8 in
Screened Interval(s): 8-23
Total Length of Well Casing: 25
Measured Total Depth (TOC) Initial: 25.35 ft
Final: 25.35 ft
Initial Depth to Water (TOC): 14.72 ft Date: 5/12/2008 Time: 1408
Stabilized Depth to Water (TOC): 14.79 ft Date: 5/12/2008 Time: 1800

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
___ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in disposable bailer
___ Pumping	
___ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 10.63 Ft. of water
x 0.163 Gallons/Foot
= 1.73 Gallons per Single Casing Volume
Sand Pack Volume: 10.63 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 27.74 Gallons (in borehole)
- 1.73 Gallons of Casing Volume
= 26.01 x 0.3 (Assuming porosity = 30%)
= 7.08 Gallons Within Sand Pack
Single Purge Volume: 9.53 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 28.6 Gallons
Actual Purge Volume: 48 Gallons
Volume Measured by: 5-gallon bucket
Rate of Development: about 0.4 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: NA @ NA Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: YSI
pH 4.0 = 4.0 @ 19.73 °C
pH 7.0 = 7.0 @ 19.90 °C
pH 10.0 = 9.98 @ 19.96 °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: YSI
Standard 1.410 mS/cm@ 25°C
Reading 1.410 mS/cm @ 19.47 °C
Turbidity Meter: LaMotte
Other: (temperature) YSI

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
13	various	1625	13.50	9.20	3.87	>1000	Cloudy
15	0.3	1632	13.47	9.22	4.29	>1000	
17.5	0.5	1637	13.70	9.34	5.17	>1000	
21	0.5	1644	13.72	9.32	5.40	>1000	
24	0.4	1652	13.84	9.35	5.30	>1000	
26	0.35	1658	13.72	9.30	5.62	>1000	
28	0.3	1705	13.82	9.36	5.67	>1000	
31	0.5	1711	13.91	9.36	5.63	450	Becoming clearer
35	0.4	1721	13.83	9.42	5.55	900	
37	0.23	1730	14.05	9.36	5.94	250	
40	0.5	1736	13.54	9.34	5.60	500	
43	0.3	1747	13.66	9.35	5.77	350	
46	0.5	1753	13.51	9.35	5.77	260	
Total Volume	Rate of	Time	Temp	pH	Specific	Turbidity	Clarity, Odor, PID Readings,

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Discharged	Discharge		(°C)		Conductance** (mS/cm)	(NTU)	Other:
48	0.4	1758	13.49	9.32	5.88	160	

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. __TTBW-MW05____

Development Completed at ____48_____ Gallons Discharged. Date: ___5/12/08_____ Time: _____1758_____
Criteria: __Parameters except turbidity stabilized within 10 percent. Turbidity elevated due to bailing instead of using pump.
Personnel: R. Knapp, K. Thompson_____

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW04

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/20/08
Date(s) of Development: 3/26/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 4.5-19.5
Total Length of Well Casing: 21.5
Measured Total Depth (TOC): Initial 22.41 ft
Final 22.41 ft
Initial Depth to Water (TOC): 10.75 ft Date 3/26/2008 Time 1400
Stabilized Depth to Water (TOC): 10.99 ft Date 3/26/2008 Time 1520

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 11.66 Ft. of water
x 0.163 Gallons/Foot
= 1.90 Gallons per Single Casing Volume
Sand Pack Volume: 11.66 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 30.43 Gallons (in borehole)
- 1.90 Gallons of Casing Volume
= 28.53 x 0.3 (Assuming porosity = 30%)
= 8.56 Gallons Within Sand Pack
Single Purge Volume: 10.46 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 31.38 Gallons
Actual Purge Volume: 45 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 18.5 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
24	1 gpm	1440	15.7	8.16	18.3	>999	
27	1 gpm	1443	16.0	8.16	18.3	>999	
30	1 gpm	1446	15.9	8.16	18.3	>999	
33	1 gpm	1449	15.8	8.17	18.3	900	
36	1 gpm	1452	15.9	8.16	18.3	500	
39	1 gpm	1455	15.8	8.16	18.3	50	
42	1 gpm	1458	15.8	8.16	18.4	10	Clear
45	1 gpm	1501	15.8	8.16	18.4	10	

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WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW04

Development Completed at 45 Gallons Discharged. Date: 3/26/08 Time: 1501
Criteria: Parameters stabilized within 10 percent. Water visibly clear. Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** TTBW-MW03

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/14/08

Date(s) of Development: 3/17/2008
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18

Total Length of Well Casing: 20
Measured Total Depth (TOC) Initial: 20.45 ft
Final: 20.45 ft
Initial Depth to Water (TOC): 8.29 ft Date: 3/17/2008 Time: 1356
Stabilized Depth to Water (TOC): 8.29 ft Date: 3/17/2008 Time: 1458

TECHNIQUE(S)	DEVELOPMENT EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.16 Ft. of water
x 0.163 Gallons/Foot
= 1.98 Gallons per Single Casing Volume
Sand Pack Volume: 12.16 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 31.74 Gallons (in borehole)
- 1.98 Gallons of Casing Volume
= 29.76 x 0.3 (Assuming porosity = 30%)
= 8.93 Gallons Within Sand Pack
Single Purge Volume: 10.91 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 32.73 Gallons
Actual Purge Volume: 33 Gallons
Volume Measured by: 55-gallon drum
Rate of Development: 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth: 1 gpm @ 19 Ft. (Below TOC)
Immiscible Phases Present: Y **N** Thickness: NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
14	1 gpm	1430	13.2	6.35	5.41	250	
17	1 gpm	1433	12.9	6.32	5.44	150	
20	1 gpm	1436	12.9	6.35	5.45	80	
23	1 gpm	1439	13.0	6.33	5.44	50	
26	1 gpm	1442	12.9	6.34	5.44	30	
29	1 gpm	1445	13.2	6.33	5.42	15	Clear
33	1 gpm	1448	13.2	6.34	5.43	5	

Tetra Tech EM Inc

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ **WELL NO.** **TTBW-MW03**

Development Completed at 33 Gallons Discharged. Date: 3/17/08 Time: 1448
Criteria: > 3 well bores purged. Parameters stabilized w/in 10%. Visibly clear Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW02

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/17/08
Date(s) of Development: 3/20/08
Personnel/Company: R. Knapp/Tetra Tech; A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3-18
Total Length of Well Casing: 20
Measured Total Depth (TOC): Initial 20.43 ft; Final 20.43 ft
Initial Depth to Water (TOC): 8.42 ft Date 3/20/2008 Time 0812
Stabilized Depth to Water (TOC): 8.44 ft Date 3/27/2008 Time 1108

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.01 Ft. of water
x 0.163 Gallons/Foot
= 1.96 Gallons per Single Casing Volume
Sand Pack Volume: 12.01 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 31.35 Gallons (in borehole)
- 1.96 Gallons of Casing Volume
= 29.39 x 0.3 (Assuming porosity = 30%)
= 10.78 Gallons Within Sand Pack
Single Purge Volume: 12.74 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 38.21 Gallons
Actual Purge Volume: 14 Gallons
Volume Measured by: 55-gallon drum
Rate of Development <0.5 Gallons/Minute (Hour,Day)
Pumping Rate/Depth <0.5 gpm @ 17 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
9	<0.5 gpm	0914	14.4	6.58	5.12	500	Pumped dry
11	<0.5 gpm	0930	14.4	6.59	5.13	800	Pumped dry
14	<0.5 gpm	1115	14.5	6.57	5.14	>999	Pumped dry. Well exhibits extremely slow recharge.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW02

Development Completed at 14 Gallons Discharged. Date: 3/20/08 Time: 1115
Criteria: 3 hours spent trying to develop well; extremely slow to recharge Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW16

Project: Well Development
Project No. I4302.300.10.01
Date(s) of Installation: 3/20/08
Date(s) of Development: 3/26/08
Personnel/Company: R. Knapp/Tetra Tech
A. Johnson /Gregg Drilling
Type of Rig Used: Smeal T5

Casing Diameter/Type: 2 in. / pvc
Borehole Diameter: 8 in
Screened Interval(s): 3.5-18.5
Total Length of Well Casing: 20.5
Measured Total Depth (TOC): Initial 20.46 ft
Final 20.46 ft
Initial Depth to Water (TOC): 8.23 ft Date 3/26/2008 Time 1645
Stabilized Depth to Water (TOC): 8.25 ft Date 3/26/2008 Time 1750

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in diameter surge tool
X Bailing	2-in stainless steel bailer
X Pumping	Grundfos Redi Flo (2-in. dia., 1/2 hp)
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: n/a Gallons
Lost Purge Water: none Gallons
Water During Installation: none Gallons
Total Fluids Added: none Gallons
Source of Added Water: _____
Ground Water Quality Parameters of Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 12.23 Ft. of water
x 0.163 Gallons/Foot
= 1.99 Gallons per Single Casing Volume
Sand Pack Volume: 12.23 Ft. of Saturated Sand Pack
x 2.61 Gallons/Foot (borehole diameter)
= 31.92 Gallons (in borehole)
- 1.99 Gallons of Casing Volume
= 29.93 x 0.3 (Assuming porosity = 30%)
= 8.98 Gallons Within Sand Pack
Single Purge Volume: 10.97 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 32.91 Gallons
Actual Purge Volume: 33 Gallons
Volume Measured by: 55-gallon drum
Rate of Development 1 Gallons/Minute (Hour,Day)
Pumping Rate/Depth 1 gpm @ 17.5 Ft. (Below TOC)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: Water Checker U-10
pH 4.0 = 4.00 @ ____ °C
pH 7.0 = NA @ ____ °C
pH 10.0 = NA @ ____ °C
Dissolved Oxygen Meter: NA

Spec. Conductance Meter: Water Checker U-10
Standard 4.49 mS/cm@ 25°C
Reading 4.49 mS/cm @ __ °C
Turbidity Meter: Water Checker U-10
Other: (temperature) Water Checker U-10

Total Volume Discharged	Rate of Discharge	Time	Temp (°C)	pH	Specific Conductance** (mS/cm)	Turbidity (NTU)	Clarity, Odor, PID Readings, Other:
15	1 gpm	1717	15.7	7.78	68.1	200	
18	1 gpm	1720	15.8	7.79	68.2	100	
21	1 gpm	1723	15.7	7.80	67.9	50	
24	1 gpm	1726	15.8	7.80	68.1	20	Clear
27	1 gpm	1729	15.6	7.81	68.2	5	
30	1 gpm	1732	15.7	7.81	68.1	5	
33	1 gpm	1735	15.7	7.80	68.0	5	

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW16

Development Completed at 33 Gallons Discharged. Date: 3/26/08 Time: 1735
Criteria: Parameters stabilized within 10 percent. Water visibly clear. Personnel: R. Knapp, A. Johnson

*Instruments calibrated by Gregg Drilling personnel.
** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

Tetra Tech EM Inc.

WELL DEVELOPMENT DATA SHEET

BORING NO. _____ WELL NO. TTBW-MW17

Project Well Development
Project No. I4302.300.11.01
Date(s) of Installation 10/18/2008
Date(s) of Development 10/21/2008
Personnel/Company W.Wilcoxon and A. Johnson /Tetra Tech

Type of Rig Used developed by hand

Casing Diameter/Type 2 in. / pvc
Borehole Diameter 8-inch
Screened Interval(s) 5-13
Total Length of Well Casing 5.5
Measured Total Depth (TOC) Initial 15.04
Final _____

Initial Depth to Water
(TOC) 5.84 Date 10/21/2008 Time 1445
Stabilized Depth to Water
(TOC) _____ Date _____ Time ____

DEVELOPMENT

TECHNIQUE(S)	EQUIPMENT TYPE/CAPACITY
____ Jetting (Airlift)	
X Surge Block	2-in block, foot valve
X Bailing	30-in long, 1½-in diameter
___ Pumping	
____ Other	

FLUIDS ADDED

Lost Drilling Fluid: 0 Gallons
Lost Purge Water: 0 Gallons
Water During Installation: 2 Gallons
Total Fluids Added: 2 Gallons
Source of Added Water: base water
Ground Water Quality Parameters of
Added Water Measured: Y N
Sample Collected of Added Water: Y N
Sample Designation of Added Water: _____

PURGE VOLUME CALCULATION

Casing Volume: 9.48 Ft. of water
x 0.164 Gallons/Foot
= 1.55 Gallons per Single Casing Volume
Sand Pack Volume: 9.4 Ft. of Saturated Sand Pack
x 0.6 Gallons/Foot (borehole diameter)
= _____ Gallons (in borehole)
- _____ Gallons of Casing Volume
= _____ x 0.3 (Assuming porosity = 30%)
= 5.69 Gallons Within Sand Pack
Single Purge Volume: 7.24 Gallons (Casing Vol. + Sand Pack Vol. + Fluids Added)
Minimum Purge Volume: 21.72 Gallons
Actual Purge Volume: 17.5 Gallons
Volume Measured by: 5-gallon bucket
Rate of Development 0.25 Gallons/Minute (Hour,Day)
Pumping Rate/Depth NA @ _____ Ft. (Below Grd.)
Immiscible Phases Present: Y N Thickness NA

INSTRUMENT CALIBRATION*

pH Meter: YSI
pH 4.0 = 4.00 @ 21.1 °C
pH 7.0 = 7.00 @20.9 °C
pH 10.0 = 9.97 @ 21.6 °C
Dissolved Oxygen Meter: 8.84 mg/L @ 21.97 °C

Spec. Conductance Meter: YSI
Standard 1.413 mS/cm@ 25°C
Reading 1.327 ms/cm @ 21.97 °C
Turbidity Meter: None
Other: _____

Total Volume Discharged	Rate of Discharge	Time	Temp	pH	Specific Conductance**	Turbidity or D.O.*	Clarity, Odor, PID Readings, Other: ORP
1.0	0.25 gpm	1458	19.11	8.54	34.08	21.9	84.8
8.0	0.25 gpm	1520	17.27	8.80	30.67	16.31	38.6
*							
10.0	0.25 gpm	1350	19.66	8.88	10.73	--	157.8
12.0	0.25 gpm	1352	19.39	8.80	11.87	--	157.8
15.0	0.50 gpm	1358	18.11	8.73	21.05	--	159.5
16.0	0.50 gpm	1400	17.68	8.95	24.61	--	161.7
17.0	0.20 gpm	1406	17.69	8.99	21.33	--	145.6
17.5	0.15 gpm	1411	17.66	8.99	18.88	--	133.0

Development Completed at 28.0 Gallons Discharged. Date: 10/21/2008 Time: 1030
Criteria: 3 well vol. purged. Parameters stabilized Personnel: W.Wilcoxon and A.Johnson

** Specific Conductance readings temperature compensated to 25°C, if not, report temperatures at which reading obtained.

APPENDIX C
LITHOLOGIC LOGS AND MONITORING WELL COMPLETION REPORTS

APPENDIX C-1
WELLS USED IN MONITORING WELL NETWORK

Site 1

Lithologic logs were not available for the following monitoring wells located at Site 1 during report development:

Well ID	Installation Date
MW-11L	6/25/1990
MW-51U	11/19/1991
MW-68	3/15/1996
MW-69	3/15/1996
MW-70	3/15/1996
MW-71	3/19/1996

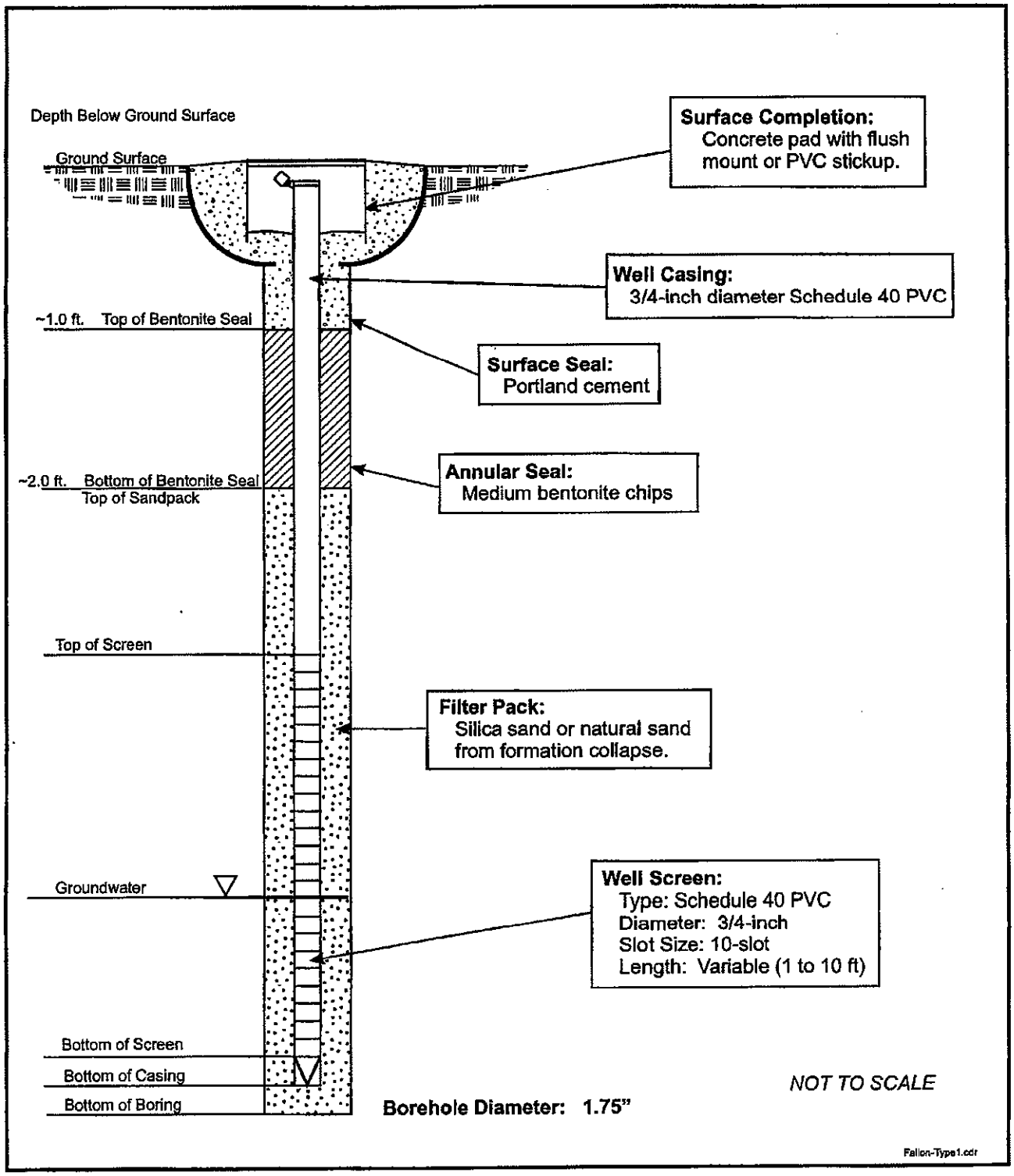
Notes & Comments:

Wells BAT-1-H and BAT-1-I are of the construction shown on either of the next two pages, Figure G-1 or G-2. Specific well details are listed in the table (G.1-1) that immediately follows the above figures.

Battelle
. . . Putting Technology To Work

Figure G-1

WELL COMPLETION DIAGRAM SILICA/NATURAL SAND PACK[a]

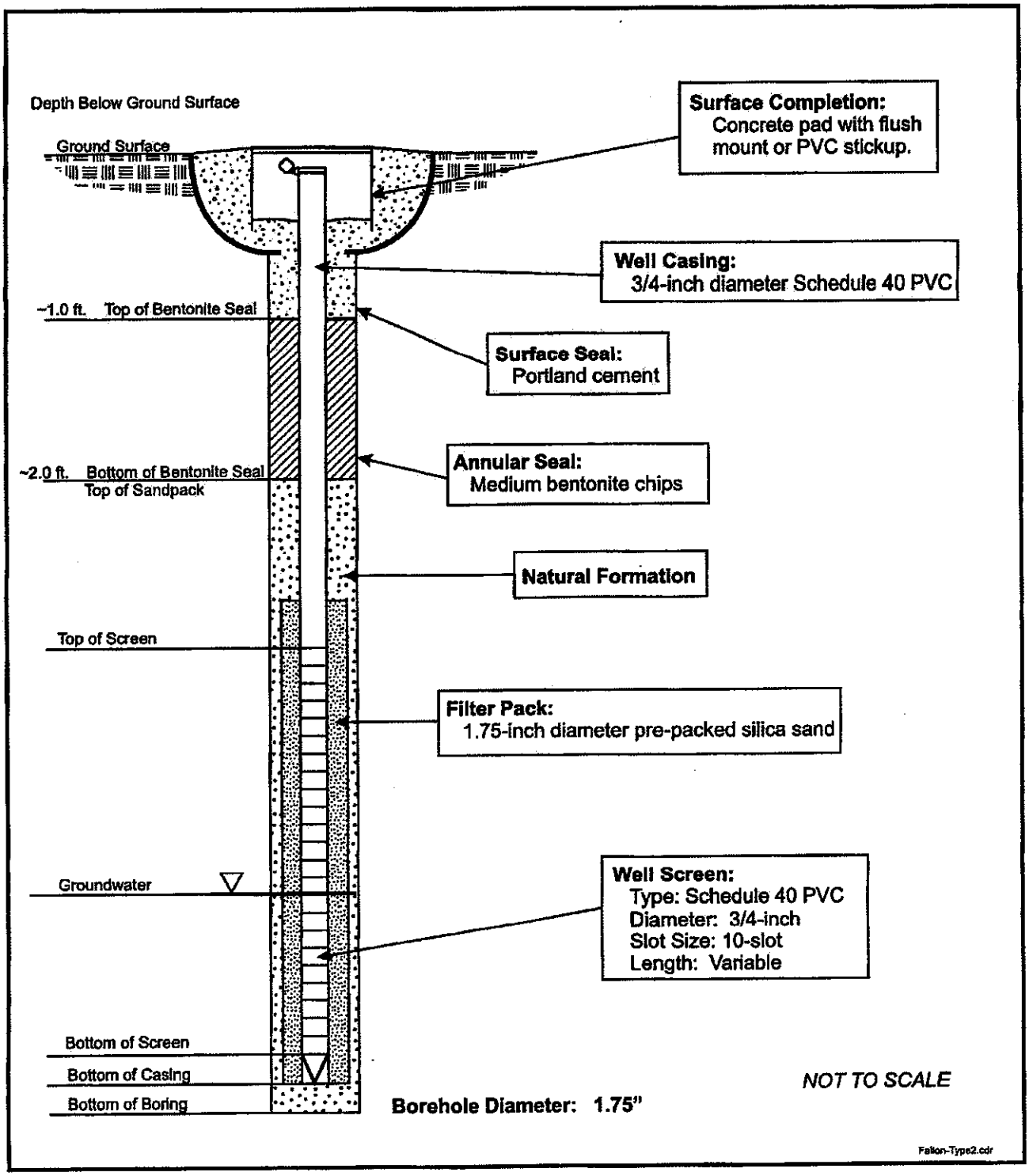


a) Note: all wells installed in September 1997 were constructed in this manner.

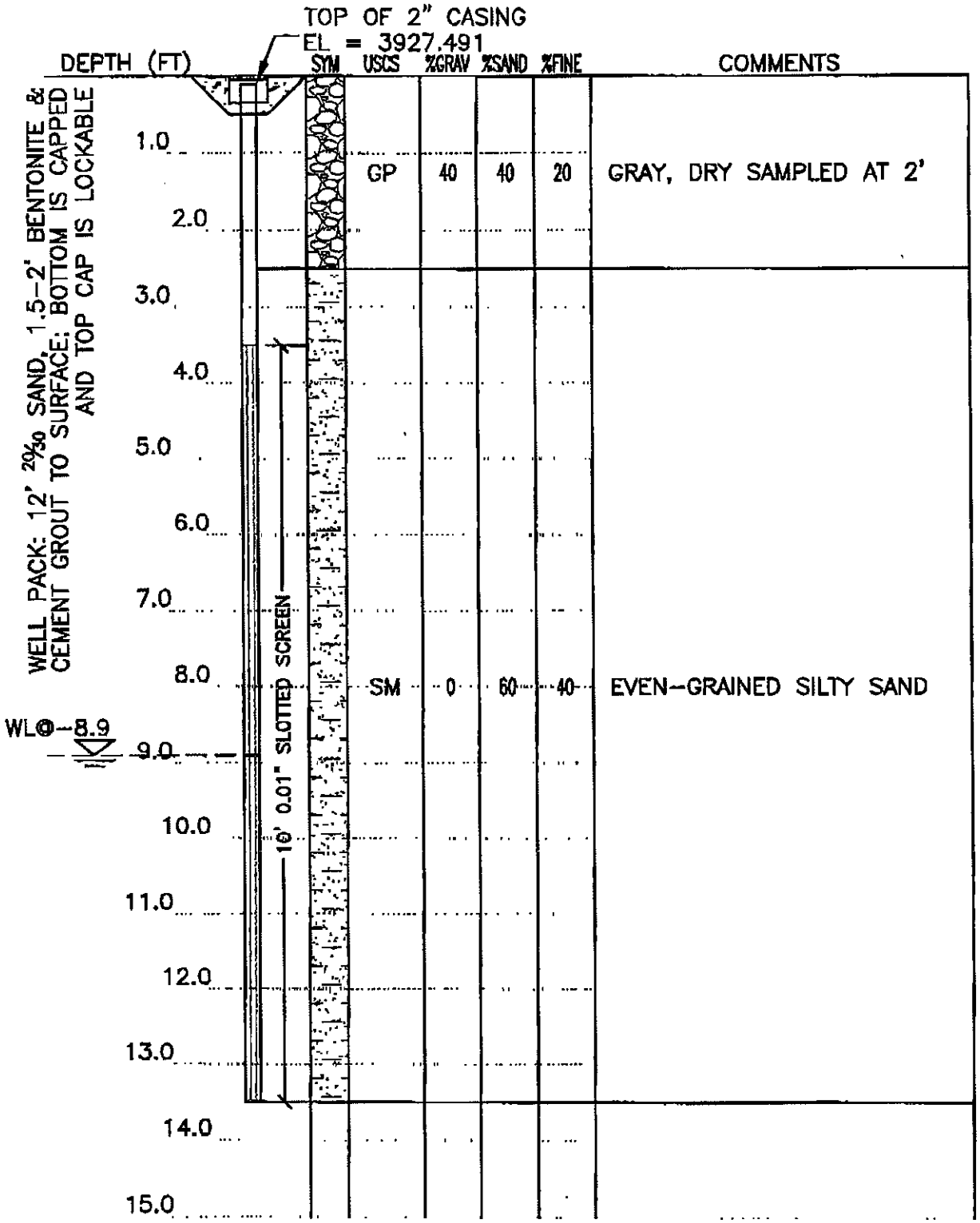
Battelle
. . . Putting Technology To Work

Figure G-2

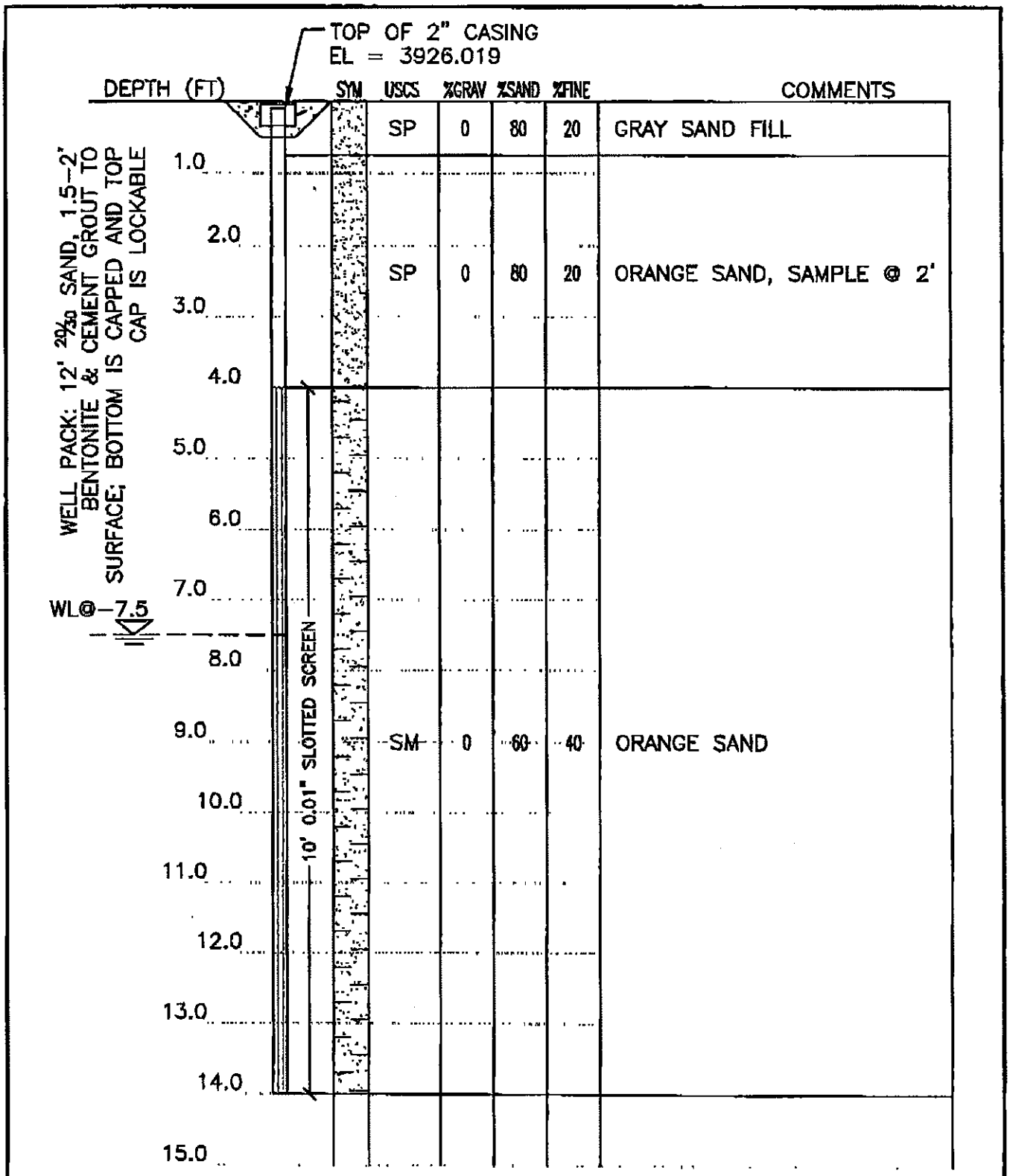
WELL COMPLETION DIAGRAM PRE-PACKED SCREEN[a]



a) Note: all wells installed after September 1997 were constructed in this manner.



SATO ENVIRONMENTAL	PREPARED FOR: FALLON NAVAL AIR STATION	NOTE: WATER LEVEL (WL) MEASURED 0.5 HOURS AFTER WELL COMPLETION	Base Housing Work Site Soil & Groundwater Sampling
DRAWN: NER/RENG	Contract # N44255-03-C-0657	0 1 2 SCALE IN: FEET	DRAFT SUMMARY REPORT FIGURE 4-1 WELL BW-1-1 LOG
DATE: 02/07/2005			
REFERENCE: ROBISON ENG. FIELD LOG 10-18-04			



SATO ENVIRONMENTAL

DRAWN: NER/RENG

DATE: 02/07/2005

REFERENCE: US NAVY BASE MAP

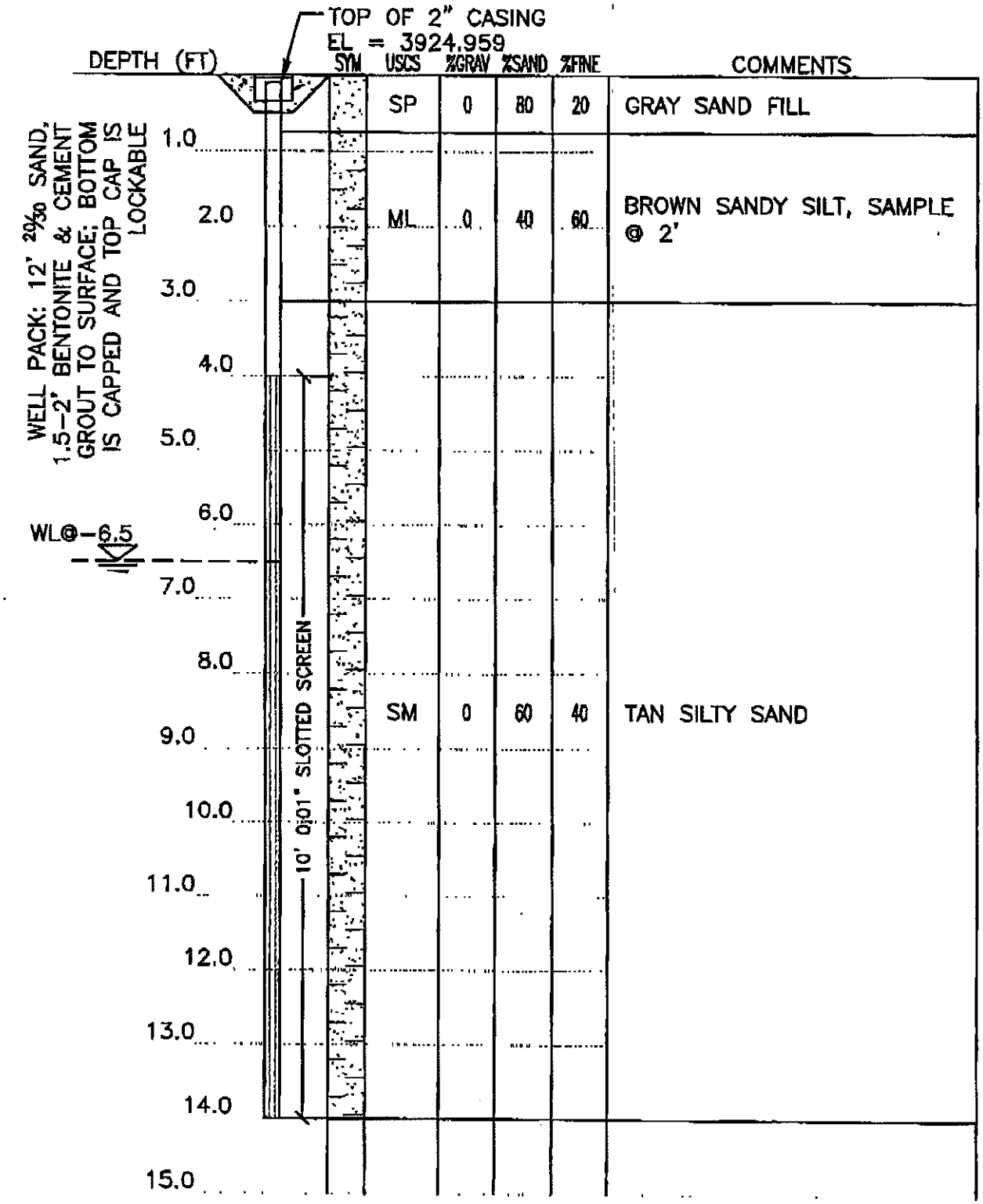
PREPARED FOR:
FALLON NAVAL AIR STATION
Contract # N44255-03-C-0657

NOTE: WATER LEVEL (WL) MEASURED 0.5 HOURS AFTER WELL COMPLETION

0 1 2
SCALE IN: FEET

Base Housing Work Site
Soil & Groundwater Sampling

DRAFT SUMMARY REPORT
FIGURE 4-2
WELL BW-1-2 LOG



SATO ENVIRONMENTAL	PREPARED FOR: FALLON NAVAL AIR STATION Contract # N44255-03-C-0657	NOTE: WATER LEVEL (WL) MEASURED 0.5 HOURS AFTER WELL COMPLETION	Base Housing Work Site Soil & Groundwater Sampling
DRAWN: NER/RENG		0 1 2 SCALE IN: FEET	DRAFT SUMMARY REPORT FIGURE 4-3 WELL BW-1-3 LOG
DATE: 02/07/2005			
REFERENCE: ROBISON ENG. FIELD LOG 10-18-04			

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

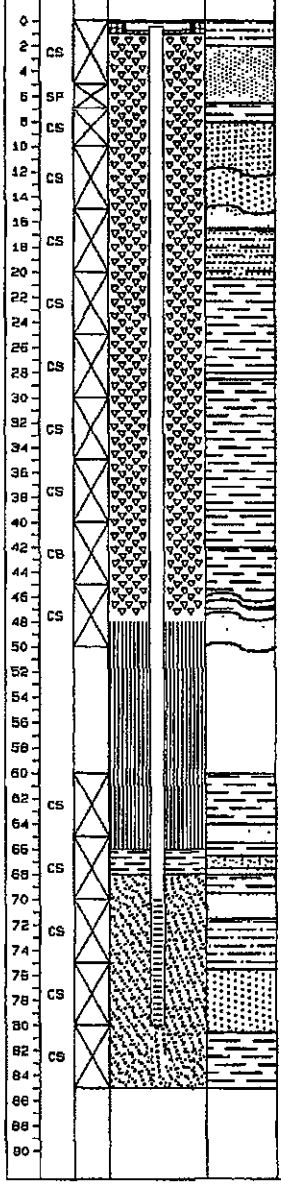
Prepared By: Bob Schlosser Date: 6/25/90 Page: 1 OF 1

Hole No.: MW11L Casing Elevation: 3925.61' Ground Elevation: 3925.82'

Total Depth: 85.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 1

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 6/26/90



DESCRIPTION

SP SAND: grayish brown (10YR5/2), very silty

SP SAND: grayish brown (10YR5/2), micaceous

SP SAND: as above, root hairs, saturated at 6.5'

CL CLAYEY SILT: brown (10YR5/3), limonite staining some dark organics

SW SAND: dark brown (10YR4/4), fine to medium grained (fL-mL), micaceous, saturated

SW SAND: as above, (mU-vcL), some 3-5 mm pebbles, arkosic, subrounded to rounded, limonite stained

SP SAND: very fine fo fine grained

CL SILTY CLAY: olive gray (5Y5/3) mottled grayish brown (10YR5/2), blocky, scattered shell frags.

CL CLAYEY SILT: with 4-5 cm very fine sand at 23' strong limonite staining CARSON RIVER-LAHONTON LAKE contact

CL CLAY: olive gray as above, 1-5 mm evaporite beds evapbrites from 25'-27, rest very calcareous

CL CLAY: light gray (5Y7/1)

CL CLAY: olive, with evaporites as above, blocky, more clay downward, abundant oolids and shell fragments

CL CLAY: as above with fine sand in vertical cracks from 38'-39'

CL CLAY: olive gray to dark olive gray (5Y4/2-3/2) mottled with olive clay, color as above

CL CLAYEY SILT: black (7.5RN4/), soft, micaceous, GYPSUM at 47.0', light green, banded 2-3 mm.

SP SAND: dark gray very fine grained

SAND HEAVED UP AUGERS 3' DURING CONNECTION
AUGER TO 55'
DRILLER AUGERED TO 60', BUT ONLY HAD 55' OF ROD IN HOLE, NO SAMPLE
RUN IN HOLE WITH CENTER BIT AND CLEAN OUT HOLE TO 60'

CL CLAYEY SILT: black (7.5RN/2), plastic

SP SAND: black (5Y2.5/1), very fine to fine grained, abundant fish scales and bones

CL CLAY: black with small stringer SW sand below

CL CLAY: dark greenish gray (5G4/1), silty

CL CLAY: black as above, structureless

SP SAND: black, fine grained, silty in part

CL CLAY: greenish gray, interbedded with sand 4 mm

SW SAND: medium to coarse grained (mL-cU), well graded, some mica and dark accessory minerals

CL CLAY: black as above, sandy in part, becoming silty with depth

SLOTTED PVC SCREEN (0.010") 70'-80'
NATIVE SAND 84'-87', 48'-66'
BENTONITE PELLETS (1/4") 66'-68'
CEMENT BENTONITE GROUT (6/1) 1'-48'
FRAC SAND (8/12) 68'-85'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

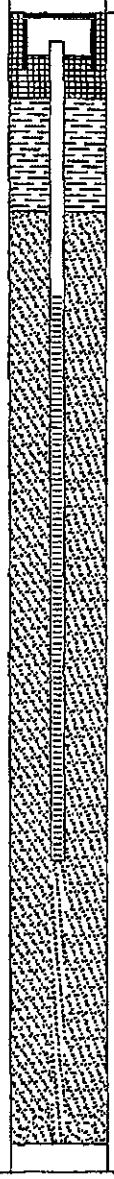
Prepared By: Bob Schlosser Date: 6/26/90 Page: 1 OF 1

Hole No.: MW11U Casing Elevation: 3925.89' Ground Elevation: 3925.82'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 1

Auger Size: 8" O.D. Sample Type: None

Project: NAS Fallon Data Verified By: David Smuin Date: 6/27/90

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					HOLE NOT LOGGED, SEE MW11L
4					CONCRETE SURFACE SEAL, 0'-1.5'
6					AUGER TO 20.0' SET CASING 15.0'
8					
10					
12					SLOTTED SCREEN (0.010") 5.0'-15.0' FRAC SAND (8/12) 3.5'-20.0' BENTONITE PELLETS (1/4") 1.5'-3.5', HYDRATED WITH POTABLE WATER (2 GALLONS)
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

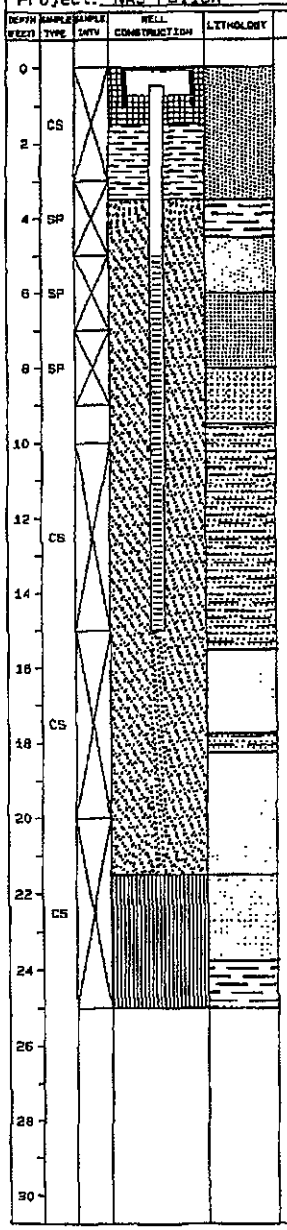
Prepared By: Bob Schlosser Date: 3/5/91 Page: 1 OF 1

Hole No.: MW14 Casing Elevation: 3927.91' Ground Elevation: 3927.98'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 1

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/8/91



DESCRIPTION

SP SAND: dark yellowish brown (10YR4/4), mU-vfL, some coarse grained, grading to

SP SAND: very pale brown (10YR7/3), mU, predominantly angular, abundant feldspar, scattered muscovite and dark minerals

CL CLAY: brown (10YR4/3) stiff, fe stained zones locally, some scattered vf sand, some root hairs and vesicles.

SP SAND: pale brown (10YR6/3)

SW SAND: brown (10YR4/3), fL-mU, subangular to subrounded, loosely consolidated, predominantly clear to translucent quartz, abundant dark accessory minerals and feldspar

CS CLAYEY SILT: dark brown, (10YR3/2), abundant fe staining from 10'-12', some dark organics in lower 3', blocky from 12'-15', less silty at 13', micaceous

SP SAND: dark grayish brown (10YR5/2), predominanty mU, subangular-subrounded, clear to translucent quartz, saturated, micaceous, becoming fU-fL, some shell fragments

CS CLAYEY SILT: some very fine grained sand, tight

SP SAND: as above

CL CLAY: olive, (5Y5/3), mottled greenish gray (5G4/1), tight, blocky, some fe stained very fine grained sand lenses at 24.5' and 24.7'

CARSON RIVER-LAKE LAHONTON CONTACT

CONCRETE 0'-1.5'
BENTONITE PELLETS (3/8") 1/5'-3'.5'
FRAC SAND (8/20) 3.5'-21.5'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'
NATIVE FILL 21.5'-25'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

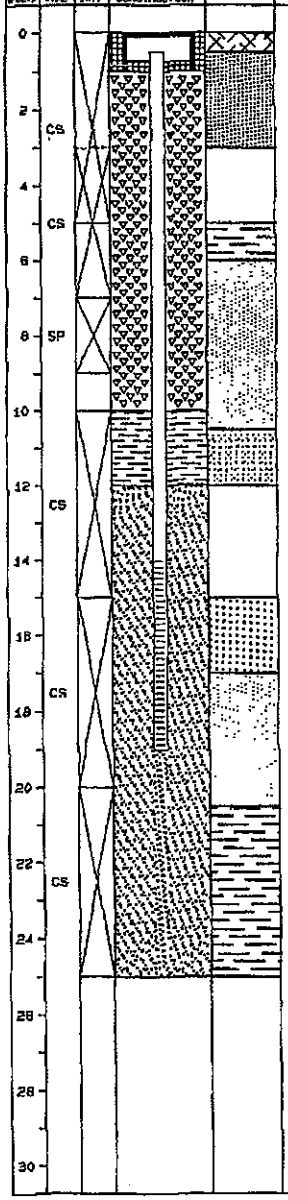
Prepared By: Bob Schlosser Date: 3/6/91 Page: 1 OF 1

Hole No.: MW15L Casing Elevation: 3926.77' Ground Elevation: 3926.76'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 1

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2"Calif. Method" SS

Project: NAS Fallon Date Verified By: David Smuin Date: 3/10/91



DESCRIPTION

FILL: Gravel
SP SAND: pale brown, fL-mU, predominantly clear quartz, abundant basalt, micaceous

LOST 3'-5'

CL SILTY CLAY: yellow brown (10YR5/6), mottled yellowish brown (10YR5/4), abundant organics, some Fe staining

SP SAND: yellowish brown (10YR5/4), subangular to subrounded, abundant Fe staining at 11.5'

SW SAND: yellowish brown (10YR5/6), well graded, predominantly clear quartz, slightly arkosic, loosley consolidated

LOST 12'-15'

SW SAND: as above

SP SAND: very fine grained, silty in part, becoming very silty at 19.75'

CL CLAYEY SILT: light brownish gray, (10YR6/2) silty and sandy in part. Some Fe stained from about 20.5'-23.5' evidence of sand fill in vert. cracks. CARSON RIVER-LAHONTON LAKE contact

CL CLAY: as above, blocky, some scattered dark olive mottling
CONCRETE 0'-1'
NEAT CEMENT (6/1) 1'-10'
BENTONITE PELLETS (3/8") 10'-12'
FRAC SAND (8/20) 12'-25'
SLOTTED 2" PVC SCREEN (.010") 14'-19'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: Bob Schlosser Date: 3/6/91 Page: 1 OF 1

Hole No.: MW15U Casing Elevation: 3926.79' Ground Elevation: 3926.76'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 1

Auger Size: 8" O.D. Sample Type: None

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91

DEPTH FEET	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					NO SAMPLES TAKEN. SEE MW15L FOR LITHOLOGY
4					AUGER TO 20'
6					
8					
10					NEAT CEMENT (5/1) 0'-2.5' SLOTTED 2" PVC SCREEN (0.010"), 5'-11' BENTONITE PELLETS (3/8"), 2.5'-4.0' FRAC SAND (8/20), 4'-8' NATIVE FILL 8'-20'
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

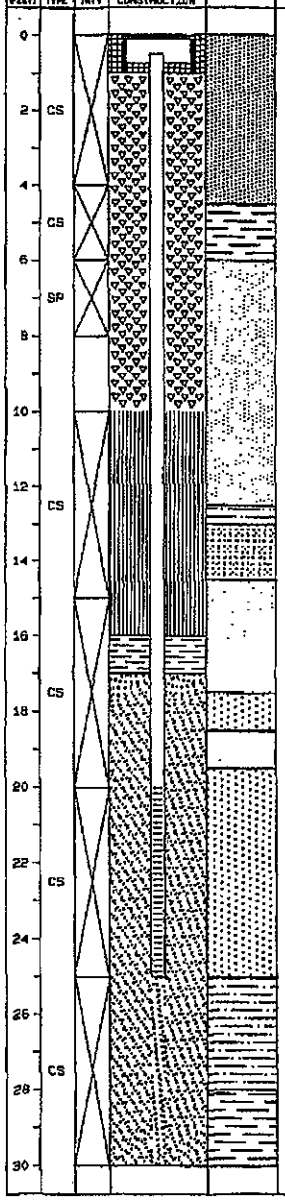
Prepared By: Bob Schlosser Date: 3/6/91 Page: 1 OF 1

Hole No.: MW16L Casing Elevation: 3927.05' Ground Elevation: 3927.14'

Total Depth: 30.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 1

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/1/91



DESCRIPTION

SP SAND: pale brown, fL-mU, predominantly clear quartz, abundant basalt, micaceous, abundant root hairs and organics

CL CLAY: dark grayish brown

SP SAND: brown (10YR5/3), fU-fL subangular to subrounded, loosely consolidated, predominantly clear quartz, arkosic in part, some vfL dark accessory minerals, abundant basalt

SP SAND: as above

SC SILTY SAND: HNU=.04 ppm

SW SAND: yellowish brown (10YR5/6), mU-vcU some scattered pebbles to 3 mm, micaceous, some dark accessory minerals

SP SAND: fL
LOST "A" ROD DOWN HOLE, SKID RIG UPGRADIENT 4'.
AUGER TO 15'

SW SAND: as above, mU-cL, sugangular to subrounded, predominantly translucent quartz, some fractured clear, becoming coarser with depth

SP SAND: very fine grained, silty in part

SW SAND: fU-cL, subangular to subrounded, fining upward, very loosely consolidated, abundant dark accessory minerals, occasionally micaceous

CL CLAYEY SILT: light brownish gray, (10YR6/2) silty and sandy in part. Some Fe stained from 26.0'-26.5' 2-3 cm thick. CARSON RIVER-LAHONTON LAKE CONTACT

CL CLAY: color as above, blocky

CEMENT 0'-1'
NEAT CEMENT (6/1) 1'-10'
BENTONITE PELLETS (3/8") 10'-12'
FRAC SAND (8/20) 12'-25'
SLOTTED 2" PVC SCREEN (0.010"). 14'-19'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

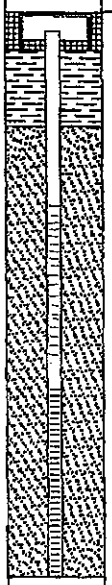
Prepared By: Bob Schlosser Date: 3/6/91 Page: 1 OF 1

Hole No.: MW16U Casing Elevation: 3927.05' Ground Elevation: 3927.14'

Total Depth: 15.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 1

Auger Size: 8" O.D. Sample Type: None

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					NO SAMPLES TAKEN SEE MW15L FOR LITHOLOGY
4					AUGER TO 15'
6					
8					
10					CONCRETE 0'-1.0' SLOTTED 2" PVC SCREEN (.020) 5'-15' BENTONITE PELLETS (3/8") 1.0'-3.0' FRAC SAND (8/20) 3'-15'
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

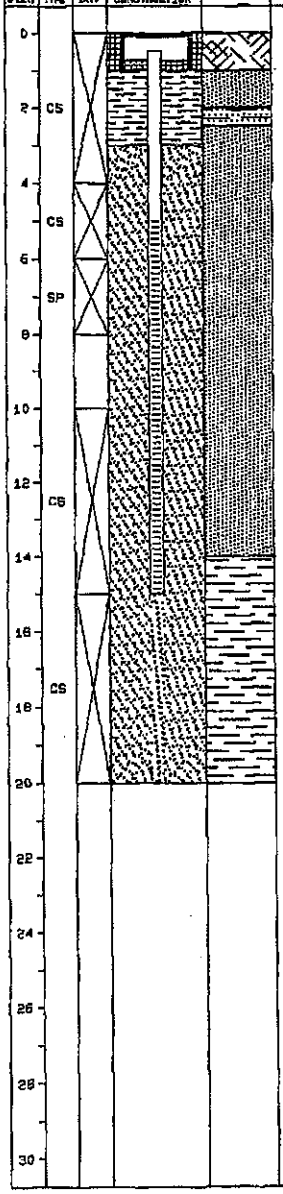
Prepared By: Bob Schlosser Date: 3/7/91 Page: 1 OF 1

Hole No.: MW17 Casing Elevation: 3924.64' Ground Elevation: 3924.82'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 4

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91



DESCRIPTION
FILL: very fine grained sand and gravel SP SAND: yellowish brown, (10YR5/4), oxidized
CS CLAYEY SILT:
SP SAND: as above, vfU, loosely consolidated.
SP SAND: dark yellowish brown (10YR4/4), mL, predominantly clear quartz
SP SAND: dark yellowish brown (10YR4/2), vfL-fL, abundant silt size dark accessory minerals, slightly arkosic
SP SAND: as above becoming silty
SW SAND: color as above, fU-cU, some scattered pebbles, subangular to subrounded, micaceous, abundant vfL dark accessory minerals, arkosic, loosely consolidated, saturated
CL CLAY: light olive brown (2.5Y5/6) mottled olive brown, sandy in upper part, light brown oxidize sand at 19.0'. CARSON RIVER-LAKE LAHONTON CONTACT
CL CLAY: as above, blocky, hard, less silty
CONCRETE 0'-1' BENTONITE PELLETS (3/8") 1'-3' FRAC SAND (8/20), 3'-14' SLOTTED 2" PVC SCREEN (0.010") 5'-15' NATIVE FILL 8'-14'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

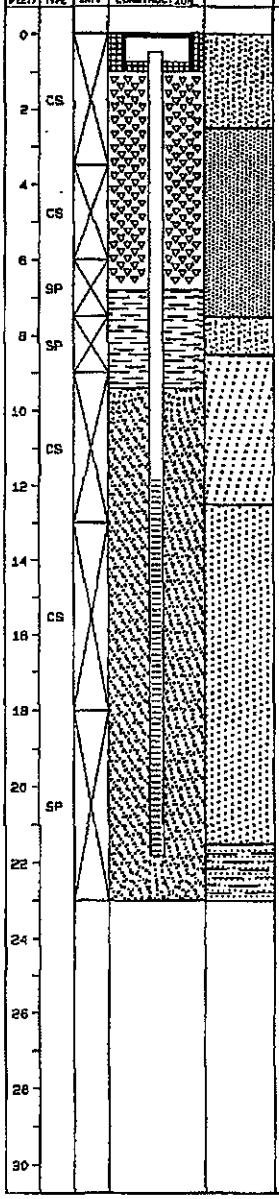
Prepared By: R.M. Schlosser Date: 11/18/91 Page: 1 OF 1

Hole No.: MW50L Casing Elevation: 3924.86' Ground Elevation: 3925.03'

Total Depth: 23.0' No. of Compl.: 1 Rig Type: CME-75 Location: Site 1

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smyth Date: 12/1/91



DESCRIPTION
SW SAND: dark grayish brown (10YR4/2) vfU-cU, subangular to subrounded, predominantly clear quartz, abundant dark accessory minerals.
SP SAND: very dark grayish brown (10Y3/2), silty in part to very silty, abundant Fe staining, becoming very dark gray (2.5YRN/3) staining from weathered fuel at 5.5'.
SP SAND: as above, weathered fuel, HNU 80 ppm.
SW SAND: yellowish brown (10YR5/6), fL-cU, predominantly clear and translucent quartz, subangular abundant mafics.
SP SAND: as above, becoming coarse.
SW SAND: mU-vcL, abundant 3-5mm pebbles throughout.
SW SAND: dark grayish brown (10YR4/2), mL-vcL, subangular to subrounded, calcareous in part to very calcareous, micaceous, loosly consolidated.
SW SAND: as above with pebbles from 2-5mm, abundant mafics, slightly arkosic.
CS SILTY CLAY: olive (5Y5/4), mottled occasionally olive (5Y5/6). HNU 5 ppm at contact.
CONCRETE 0-1' NEAT CEMENT 1'-6.8' BENTONITE PELLETS (3/8") 6.8'-9.4' FRAC SAND (#2), 9.4'-23' SLOTTED 2" PVC SCREEN (0.010") 11.8'-21.8'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

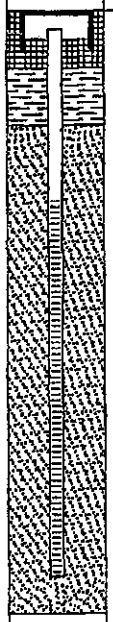
Prepared By: R.M. Schlosser Date: 11/19/91 Page: 1 OF 1

Hole No.: MW50U Casing Elevation: 3924.86' Ground Elevation: 3925.03'

Total Depth: 16.0' No. of Compl.: 1 Rig Type: CME-75 Location: Site 1

Auger Size: 7 5/8" O.D. Sample Type: NONE

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					NO SAMPLES TAKEN. SEE MW50L FOR LITHOLOGY AUGER TO 16' CONCRETE 0'-1.5' SLOTTED 2" PVC SCREEN (0.010") 5'-15' BENTONITE PELLETS (3/8") 1.5'-3' FRAC SAND (#2) 3'-16'
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

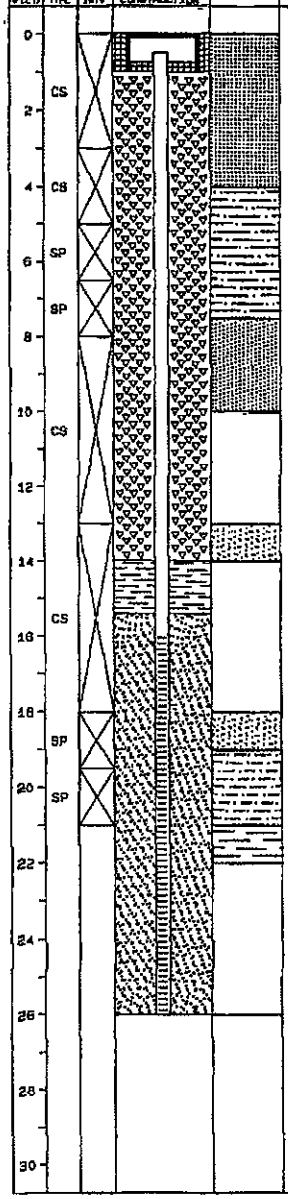
Prepared By: R.M. Schlosser Date: 11/19/91 Page: 1 OF 1

Hole No.: MW51L Casing Elevation: 3927.88' Ground Elevation: 3927.66'

Total Depth: 26.0' No. of Compl.: 1 Rig Type: CME-75 Location: Site 1

Auger Size: 7.5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

SP SAND: stained very dark gray (2.5YN3/) predominantly mU, some scattered cL, becoming dark grayish brown at 3.0'.

SC CLAYEY SILT: very dark grayish brown (10YR3/2), stained black from product locally, micaceous, becoming sandy at 6.5', grading at 7.5' to

SP SAND: vfL, stained black, smell of product.

LOST 10'-13'

SW SAND: light brown, vfL-mU, scattered 3-6mm pebbles.

LOST 14'-18'
Lost sampler in hole, fished out, sampler ruined.

SW SAND: as above.

SM SANDY SILT: dark medium brown to olive. LAHONTON LAKE, CARSON RIVER CONTACT at 20.5', HNU at this depth 18 ppm., at 22', olive silty clay.

CONCRETE 0-1.0'
NEAT CEMENT 1.0'-14'
BENTONITE PELLETS (3/8") 14.0'-15.4'
FRAC SAND (#2) 15.4'-26.0'
SLOTTED 2" PVC SCREEN (0.010") 16.0'-26.0'

Driller: Gordon A. Jensen

Total Depth: 17' Ground Surface El:

Date Began: 3/15/96 Top of Casing El: 3923.77

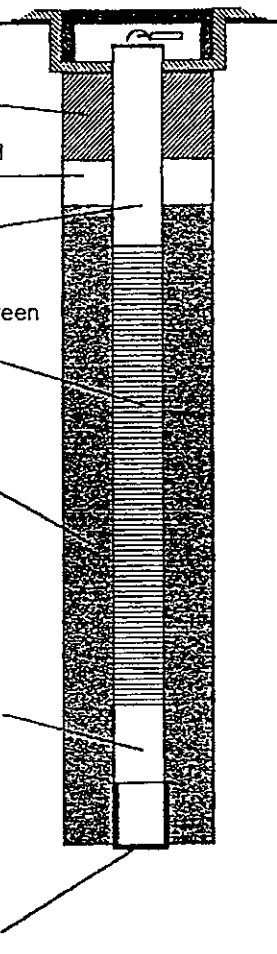
Date Finished: 3/15/96

Depth Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	
						Vegetation, Native soil
-1	SP/01	18/18	9 7	SW		Clean medium grain, well graded sand tan in color with roots, ect.
-2 -3 -4				SW		Water at 5.0' bs
	SP/02	18/18	4 14			Medium to coarse grain sand brown in color saturated
10	SP/03	18/18	12 50	SP		Poorly graded sand, fine to coarse, some pea gravel Saturated
	?/04	18/18	7 23	ML		Clayey silt, yellow to gray in color, some silty sand lenses
20						
25						

All samples are grabs

WELL SUMMARY

MW-68



Bottom of hole at 17' bs

Well set at 17' bs

Readings taken after Well Devolpement

pH: 6.50

Temperature: 6.75

Conductivity: Conductivity is higher than range on meter

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

Engineering Field Activity, West

Naval Air Station Fallon, Nevada

bs - Below Grade Surface

▼ Denotes Water Table

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: T701-MW01
PROJECT: RI Addendum
SITE: 1
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 19.6

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-10-07 TIME: 1035
WELL INSTALLATION BEGAN:
DATE: 11-10-07 TIME: 1050
WELL INSTALLATION FINISHED:
DATE: 11-10-07 TIME:
DRILLING CO.: Gregg
DRILLER: J Neff
LICENSE:
DRILL RIG: Mari MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 4.6

WELL SCREEN

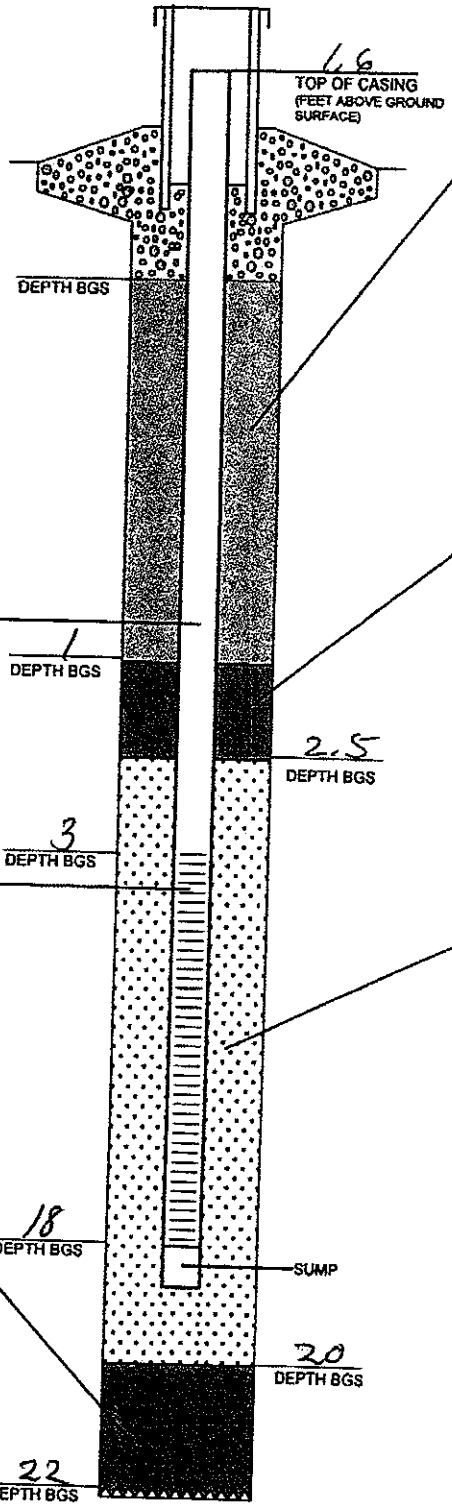
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☒ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND ~~WITH BUMPER POST~~
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Holeplug
MFG. BY: Baroid
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 100 lb
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Pennsp
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL: 8.0
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

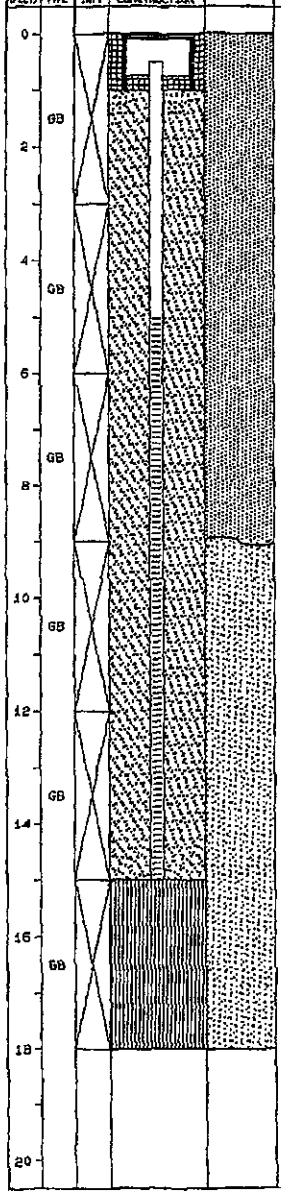
Prepared By: S.R. Sturm Date: 12/5/91 Page: 1 OF 1

Hole No.: PZ1-6 Casing Elevation: 3925.94 Ground Elevation: 3925.82

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 1

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91



DESCRIPTION
SP SAND: pale brown, eolian, fine grained.
SP SAND: light gray, micaceous, very fine grained.
SP SAND: as above.
SW SAND: light gray, very fine to medium grained.
SW SAND: as above.
SW SAND: light gray, fine to coarse grained, some pebbles to 2 mm, channel sand. Frac sand (8/20), 1'-15'. Native sand 15'-18'. PVC (.010"), 1.5" screen, 5'-15'.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

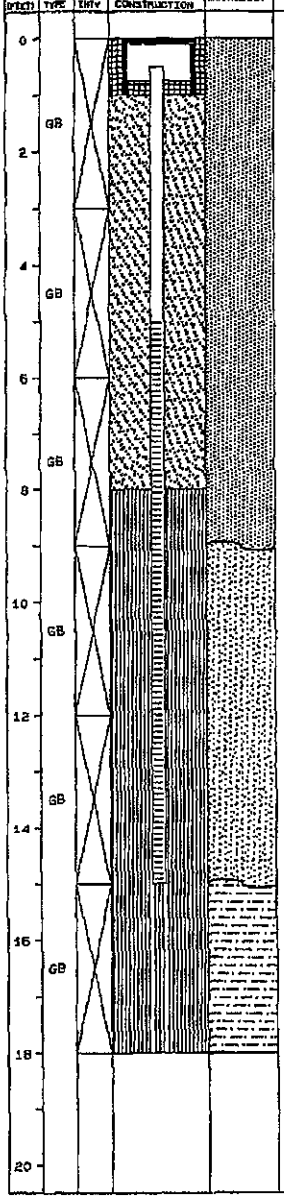
Prepared By: S.R. Sturm Date: 12/5/91 Page: 1 OF 1

Hole No.: PZ1-8 Casing Elevation: 3925.03 Ground Elevation: 3924.94

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 1

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91



DESCRIPTION
SP SAND: pale brown, silty.
SP SAND: as above, very fine grained.
SP SAND: altered to dark gray.
SW SAND: fine to coarse grained.
SP SAND: as above, no pebbles.
SM CLAYEY SAND: light brown, dense. HNU, 130 ppm in hole. Frac sand (8/20), 1'-8'. Native sand 8'-18'. PVC (.010"), 1.5" screen, 5'-15'. Sample bailed.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

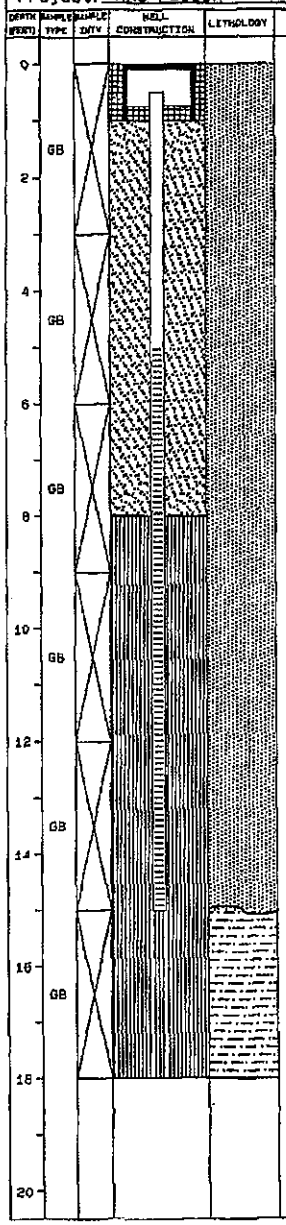
Prepared By: S.R. Sturm Date: 12/5/91 Page: 1 OF 1

Hole No.: PZ1-9 Casing Elevation: 3925.37 Ground Elevation: 3924.38

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 1

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91



DESCRIPTION

SP SAND: light brown, eolisn, very fine grained.

SP SAND: as above, very fine grained.

SP SAND: fine grained.

SW SAND: as above.

SP SAND: as above.

SM CLAYEY SAND: light brown, dense.
HNU, 215 ppm in hole.

Frac sand (8/20), 1'-6'.
Native sand 6'-18'.
PVC (.010"), 1.5" screen, 5'-15'.
Sample bailed.

UST-R Site 1 (395)

Lithologic logs and/or Monitoring Well Completion Reports were not available for the following monitoring wells located at UST-R Site 1 (395) during report development:

Well ID	Installation Date
395H	10/1/1997

BORING NO. 395B

FIELD GEOLOGIST F. Gius
EDITED BY C. Carlton
CHECKED BY M. Moise
TOTAL DEPTH 18.5 ft.

COORDINATES N 14,826,218.2 E 2,586,194.7
DATE BEGAN 12-8-94
DATE FINISHED 12-8-94
GROUND SURFACE EL. 3937.88'
CASING EL. 3937.30'

DEPTH IN FEET	SAMPLE TYPE & NUMBER	RECOVERY/DRIVE (in.)	BLOWS PER FOOT	WELL SUMMARY	USCS	PROFILE	
0				Christy Box; Cement; Top of Casing with Locking Cap			Well Graded SAND; variegated, slightly moist, very loose, backfill material (not native).
	01	18/18	5	2% Bentonite-Cement Grout			
				3/8" Bentonite Chips Holeplug			
5	02	18/18	3				Sand becomes dark moderate brown at 5.0'.
				4" dia. S.S. Casing			
	03	18/18	3				
					sw		Sand becomes olive gray at 7.0', wet, strong petroleum odor.
				#2/12 Sand			
10	Grab						
				4" dia. S.S. Screen .010" Slot			Sand becomes dark olive gray at 14.0'.
							15.0'
15				4" dia. S.S. Sediment Trap			SILTY SAND; dark moderate brown, wet, medium dense, well graded, micaceous.
				4" dia. S.S. Screw on End Plug	sm		
							TOTAL DEPTH 18.5 FEET
20							
25							
30							
35							

DRILLING CO.: Western Strata
DRILL METHOD: Hollow Stem Auger, 9-1/2" diameter
SAMPLING METHOD: California Modified Sampler/Grab

PROJECT NO.: 385055
CLIENT: Engineering Field Activity, West
LOCATION: Naval Air Station Fallon, Nevada

INTERNATIONAL TECHNOLOGY CORPORATION

FN-395B(FN2) 1-18-95

BORING NO. 395C

FIELD GEOLOGIST F. Glus
EDITED BY C. Carlton
CHECKED BY M. Moise
TOTAL DEPTH 18.0 ft

COORDINATES N 14,826,209.4 E 2,586,230.9
DATE BEGAN 12-7-94
DATE FINISHED 12-7-94
GROUND SURFACE EL. 3937.85'
CASING EL. 3937.33'

DEPTH IN FEET	SAMPLE TYPE & NUMBER	RECOVERY/DRIVE (in.)	BLOWS PER FOOT	WELL SUMMARY	USCS	PROFILE	
0				Christy Box; Cement; Top of Casing with Locking Cap			Asphalt and Road Base—Cobbles.
	01	18/18	16	2% Bentonite-Cement Grout; 3/8" Bentonite Chips Holeplug	sm		SILTY SAND; brown to dark brown, slightly moist to dry, medium dense, 20% silt, 80% well graded sand. 3.5'
5	02	9/18	20	4" dia. S.S. Casing	sw-sm		SAND with SILT; moderate brown to olive brown, slightly moist, loose, well graded sand. 7.5'
	03	12/18	20	#2/12 Sand	sw		Well Graded SAND; olive gray, moist, medium dense, predominantly coarse grained, petroleum odor. 11.0'
10	Grab-GT01	26/30		4" dia. S.S. Screen .010" Slot	sm		SILTY SAND; moderate brown to brown, moist, loose, 40% silt, very fine sand.
15	TOC-01	28/30		4" dia. S.S. Sediment Trap; 4" dia. S.S. Screw on End Plug			Few thin poorly sorted sand layers 0–6" thick.
20							TOTAL DEPTH 18.0 FEET
25							
30							
35							

DRILLING CO.: Western Strata
DRILL METHOD: Hollow Stem Auger, 9-1/2" diameter
SAMPLING METHOD: California Modified Sampler/Grab

PROJECT NO.: 385055
CLIENT: Engineer Field Activity, West
LOCATION: Naval Air Station Fallon, Nevada

INTERNATIONAL TECHNOLOGY

Driller: Gordon A. Jensen

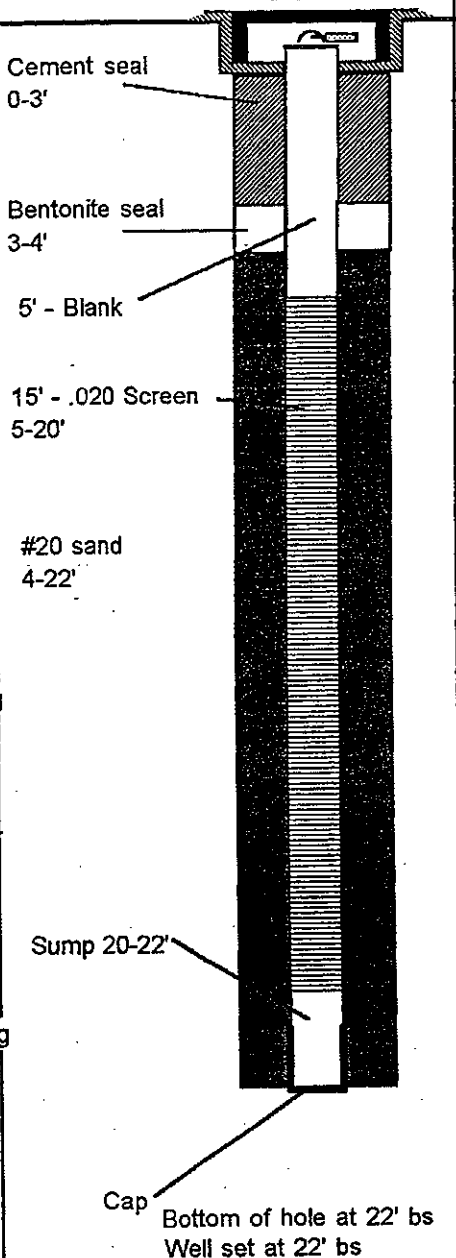
Total Depth: 22' Ground Surface El:

Date Began: 3/22/96 Top of Casing El: 3933.32

Date Finished: 3/22/96

WELL SUMMARY

MW-395F



Depth in Feet	Sam. Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	
0						Asphalt with 4" base rock
1	SP/01	18/12	5 17	SM		Silty sand, brown in color, fine with light moisture content
2						
3						
4				SM		Must be drilling down old boring Interbeded with silts and sands, very moist and brown in color
5	SP/02	18/18	6 18			Water at 6.5' bs
10	SP/03	18/18	8 23	SM		Same as above
	Grab sample from bag					
15						Same as above
20				SM		Drill out to 22.0' bs, down old boring
	Grab sample from bag					
25						
	All samples are grabs					

Readings taken after Well Devolpement

pH: 7.00

Temperature: 60.4

Conductivity: Conductivity is higher than range on meter

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.
Sampling Method: California Modified Sampler/Grab

ct No: N62474-95-D-3457
Client: Engineering field Activity, West
Location: Naval Air Station Fallon, Nevada

bs- Below Grade Surface
▼ Denotes Water Table

Driller: Gordon A. Jensen

Total Depth: 22.5' Ground Surface El:

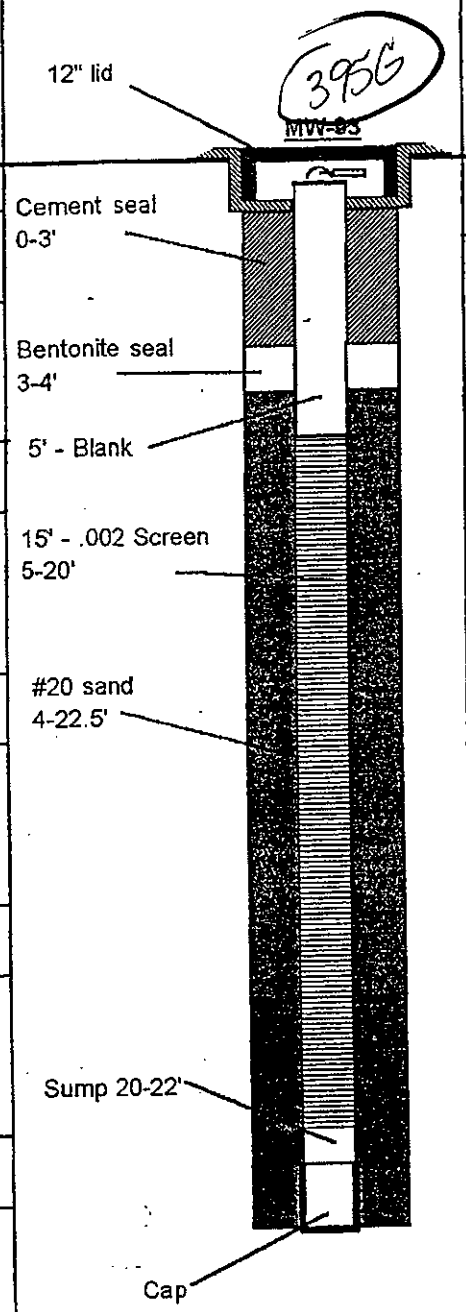
Date Began: 3/26/96 Top of Casing El: 3933.73

Date Finished: 3/26/96

Depth in ft	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	
						Parking lot with base rock
0–1	SP/01	18/6	12 31	SM		Dark brown silty sand Silt and fill material Damp
5	SP/02	18/12	5 28	SM SC		Mottled silty sand-sandy silt, brown to tan in color Moist Water at 6.0' bs
10	SP/03	18/18	6 24	SW		Clean well graded sands, granitic in appearence Fine to coarse to poorly graded coarse sand Saturated
15	Grab from bag			SP		Clean sand, poorly graded Saturated Heaving sands, pulled augers and installed wood plug Drilled to 22.5' bs Collected sample from augers
20	Grab from bag			CL		Dark brown clayey silt
25						

All samples are grabs

WELL SUMMARY



Bottom of hole at 22.5' bs

Well set at 22' bs

Readings taken after Well Devolpement

pH: 7.01

Temperature: 61.6

Conductivity: 19.25

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

Client: Engineering field Activity, West

Location: Naval Air Station Fallon, Nevada

bs - Below Grade Surface

▼ Denotes Water Table

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT395-MW01
PROJECT: RI Addendum
SITE: 395
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-17-07 TIME: 0840
WELL INSTALLATION BEGAN:
DATE: 10-17-07 TIME: 0900
WELL INSTALLATION FINISHED:
DATE: 10-17-07 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mari MST All Terrain
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING:

WELL SCREEN

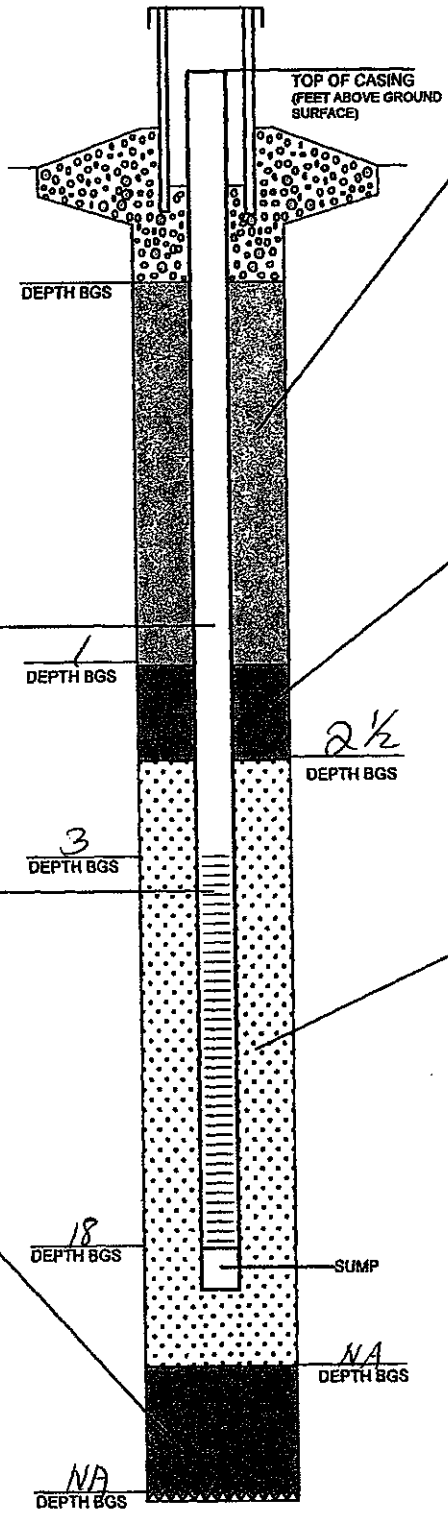
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED: None
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☒ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☒ PREPARED MIX
PRODUCT: Sakrete
MFG. BY:
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: medium
☐ OTHER:
PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 400 lb
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

MONITORING WELL COMPLETION RECORD

3/3

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT 395 - MW02
PROJECT: RI Addendum
SITE: 395 FALLON
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 18.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11/12/07 TIME: 1231
WELL INSTALLATION BEGAN:
DATE: 11/12/07 TIME: 1300
WELL INSTALLATION FINISHED:
DATE: 11/12/07 TIME: 1330
DRILLING CO.: Gregs
DRILLER: J Neff
LICENSE: M2328
DRILL RIG: MARL M5T
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT:
MFG. BY: BORT
CASING DIAMETER:
ID: OD: 2
LENGTH OF CASING: ~3

WELL SCREEN

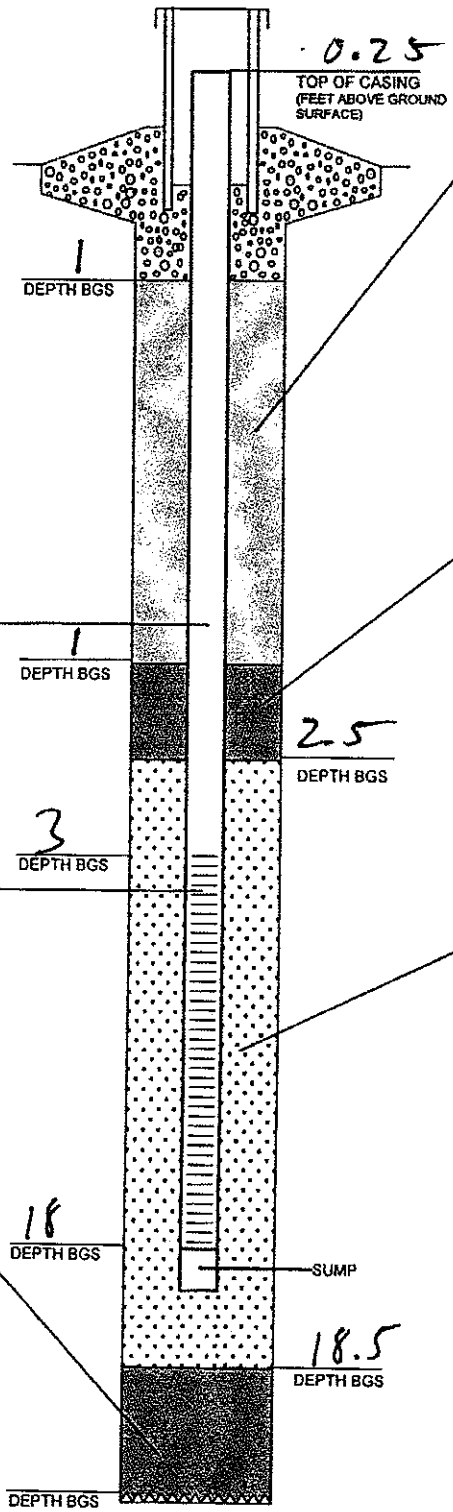
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT:
MFG. BY: BORT
CASING DIAMETER:
ID: OD: 2"
SLOT SIZE: 0.010 (10 slot)
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☒ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 25 lb
AMOUNT USED:
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: HOLE PLUG
MFG. BY: BAROID
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2 GAL

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED:
☒ SAND, SIZE: 2/16
PRODUCT: LAPIS LUSTRE
MFG. BY: CEMEX
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

MONITORING WELL COMPLETION RECORD

3/3

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT 395-MW03
PROJECT:
SITE: 395
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11/12/07 TIME: 1000
WELL INSTALLATION BEGAN:
DATE: 11/12/07 TIME: 1030
WELL INSTALLATION FINISHED:
DATE: 11/12/07 TIME: 1100
DRILLING CO.: GREGG
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: MARL MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT:
MFG. BY: BOART
CASING DIAMETER:
ID: OD: 2"
LENGTH OF CASING: 3"

WELL SCREEN

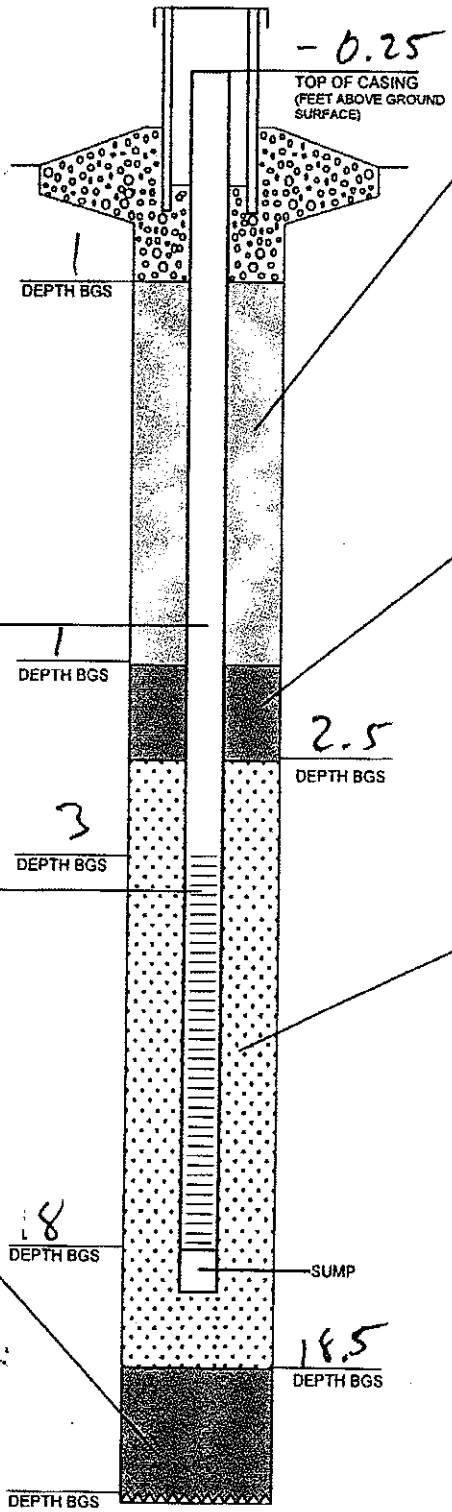
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC
MFG. BY: BOART
CASING DIAMETER:
ID: OD: 2"
SLOT SIZE: 0.010 (10 Slot)
LENGTH OF SCREEN: 15"

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☒ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Hole plug
MFG. BY: Baroid
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2 GAL

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED:
☒ SAND, SIZE: 2/16
PRODUCT: Lapis lustre
MFG. BY: Cemex
METHOD INSTALLED:
☒ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO:
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

MONITORING WELL COMPLETION RECORD

3/3

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT 345-MW04
PROJECT: RI Add
SITE: 345
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 18

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11/12/07 TIME: 0830
WELL INSTALLATION BEGAN:
DATE: 11/12/07 TIME: 0915
WELL INSTALLATION FINISHED:
DATE: 11/12/07 TIME: 0930
DRILLING CO.: Gauss
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mari MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT:
MFG. BY: BOART
CASING DIAMETER:
ID: OD: 2"
LENGTH OF CASING: 3

WELL SCREEN

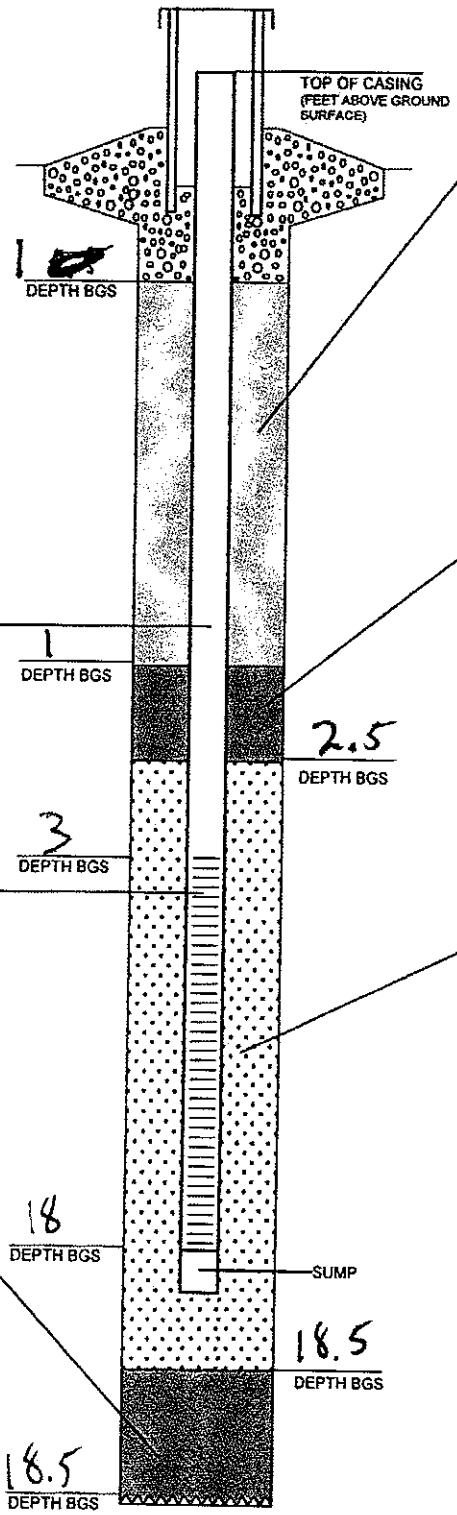
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT:
MFG. BY: BOART
CASING DIAMETER:
ID: OD: 2"
SLOT SIZE: 10 (0.010)
LENGTH OF SCREEN: 15'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☒ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Holeplug
MFG. BY: Baroid
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED:
☒ SAND, SIZE: #2/16
PRODUCT: Inpis lustre
MFG. BY: Cemex
METHOD INSTALLED:
☒ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO:
CENTRALIZER DEPTHS:

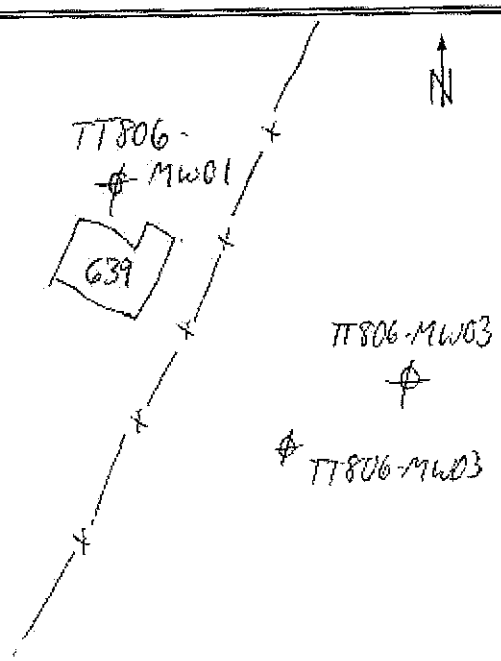
LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

UST-R Site 2 (800 Complex)

Boring ID:	
Monitoring Well ID: TT806 - MW01	
Project Number: I 4302 300	Project Name: R.I. Addendum
Client: U.S Navy	
Site: 806	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mobil MST All Terrain	
Sampler Type: Hand auger to 5', continuous core to TD	
Borehole Diameter (inches): 8	to: 18 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 10-15-07	Drill Start Time: 1338
Drill Finish Date: 10-15-07	Drill Finish Time: 1408
Total Borehole Depth (feet bgs): 18	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6.5	Date: 10-15-07 Time: 1340
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-15-07	Well Completion Time: 1545
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

CTO:
BORING ID: MW ID: TT8CH-MW01

LOGGED BY: R. Knapp

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
Hand auger											Hand auger to 5 ft					
									1							
		1338							2	SM	Sand dark brown (10YR 3/2), silty, slmoist, trace clay probably contained GH, sl calc		2	15	50	33
									3							
									4							
		1340	18/18						5	CL	Clay, silty dark grayish brown 10YR 4/2, sl plastic, moist, stiff, noncalc				2	98
Split Spoon							3.2		6							
									7	SP	Sand, brown (10YR 4/3), med dense, wet			10	90	
		1343	4/18				2.8		8		No recovery					
									9							

CTO:
BORING ID: MW ID: TT8Q-MW01 LOGGED BY: R. Knapp

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
									11							
	↓	1346	36/48				29		12							
									13	SW	Sand with trace gravel, brown (10YR 4/3) med dense, noncalc wet	3	5	10	72	10
									14	CL	Clay, sandy, brown (10YR 4/3) med stiff PL, moist, noncalc				10	90
									15	SP	Sand, grayish brown (10YR 5/2) loose, wet, mainly quartz and K-feldspar			60	40	
	↓	1350	24/24				25		16							
									17							
	↓						40		18	SC	Sand, silty, clayey (10YR 4/3) dense, wet,				20	80
											TD = 18'					
									19							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT806-MW01
PROJECT: RI Addendum
SITE: 806
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-15-07 TIME: 1338
WELL INSTALLATION BEGAN:
DATE: 10-15-07 TIME: 1400
WELL INSTALLATION FINISHED:
DATE: 10-15-07 TIME: 1500
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mari MST All Terrain
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING:

WELL SCREEN

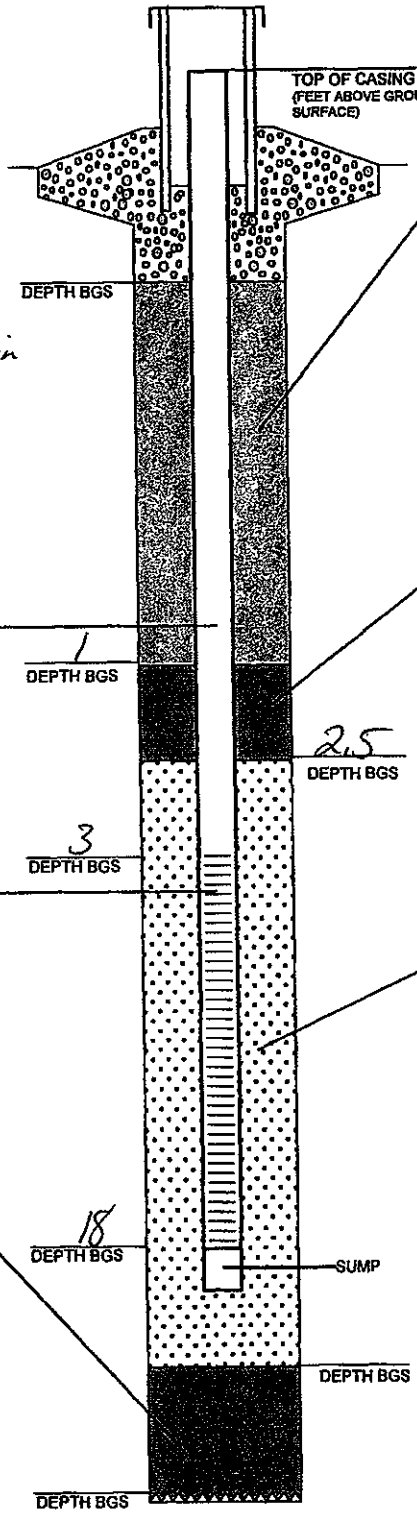
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010"
LENGTH OF SCREEN:

BOREHOLE BACKFILL

AMOUNT CALCULATED: None
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☒ PREPARED MIX
PRODUCT: Sakrete
MFG. BY:
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 30 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: medium
☐ OTHER:
PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 3 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 400 lb
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

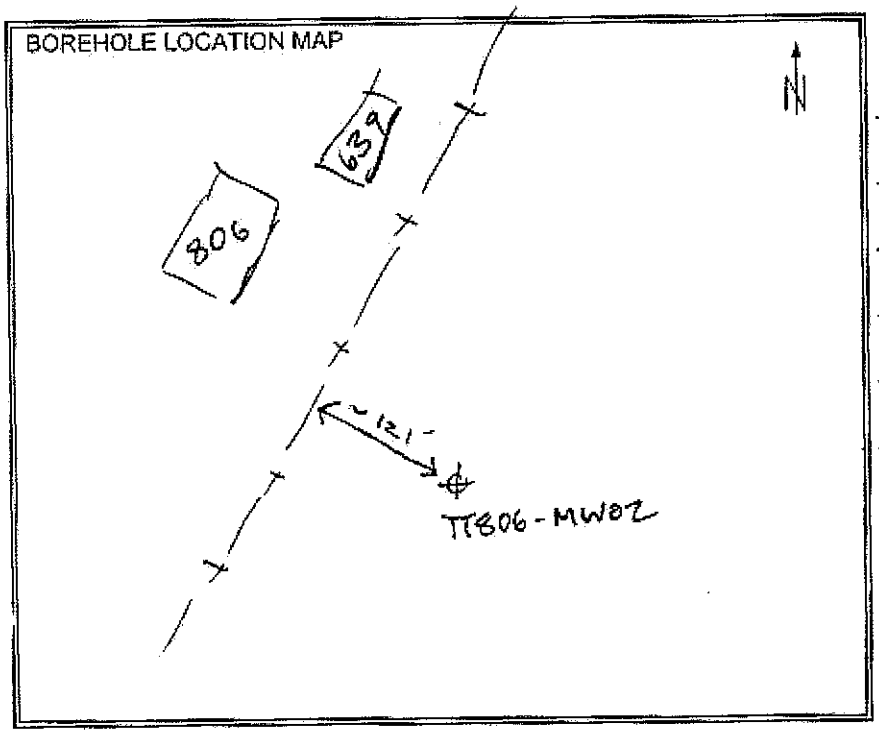
☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT806 - MW02	
Project Number: T4302300	Project Name: RI Addendum
Client: US NAVY	
Site: 806	
Borehole Location (Township, Range, Section):	
Logged By: Bo O'Brien	
Reviewed By:	Review Date:
Drilling Contractor: Greggs Drilling	
Drill Rig Type/Method: Mari MST All Terrain	
Sampler Type: Hand Auger to 5', Split Spoon to 18'	
Borehole Diameter (inches): 8	to: 18' feet bgs
Overdrilled Diameter (inches): —	to: feet bgs
Drill Start Date: 10/14/2007	Drill Start Time: 0940
Drill Finish Date: 10/14/2007	Drill Finish Time: 1005
Total Borehole Depth (feet bgs): 18'	
Soil Boring Backfill Date:	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 9'	Date: / Time:
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10/14/07	Well Completion Time:
Screen Interval (feet bgs): 3-18'	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 7.85 TOC - 2.3 stickup = 5.55'	

BOREHOLE LOCATION MAP



NOTES/REMARKS

CTO:

BORING ID: MW ID: TT806-MW02 LOGGED BY: K. Knapp

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
HAND AUGER											Alkali crust @ surface. Hand auger to 5' bgs					
		0940								ML	Silt, grayish brown 10YR 5/2 loose, dry, noncalc.			10	20	70
									1							
									2							
									3							
		0945								SC	Clayey SAND, slightly moist, non calc, slightly plastic, very dark brown 10YR 2/2			20	70	10
									4							
SPLIT SPOON		0948	36/36				0.5		5	CL	Silty CLAY, slightly moist, medium dense, medium stiff dark brown 10YR 3/3				5	95
									6							
		0950							7	CL	Same as above, soft				5	95
		0955	48/48						8	SC	Same as above, slightly moist, trace plastic fines			10	80	10
		0957							9	SP	SAND very dark grayish brown 10YR 3/2, moist, loose,				95	5

CTO:
BORING ID: MW ID: TT806-MW02 LOGGED BY: Bo O'Brien

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
SPLIT SPOON							0.2									
		1000							11	CL	Silty CLAY as above				5	95
		1001	48/48						12	SP	SAND, moist, mica flakes, loose, brown 10YR 4/3, non calc			30	70	
		1002							13	SP	Same as above, slightly moist			30	70	
									14							
									15							
			24/24				0.4		16							
									17							
		1005							18	SC	Clayey SAND, moist, mica flakes, brown 10YR 4/3, noncalc., ~~non~~ medium dense			10	80	10
									19							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT806-MW02
PROJECT: RI for Active Sites
SITE: 806
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20'4"

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-14-07 TIME:
WELL INSTALLATION BEGAN:
DATE: 10-14-07 TIME:
WELL INSTALLATION FINISHED:
DATE: 10-14-07 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: J. West
LICENSE: M2328
DRILL RIG: Mart MST All-Terrain
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4.25" OD: 8"

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING:

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15

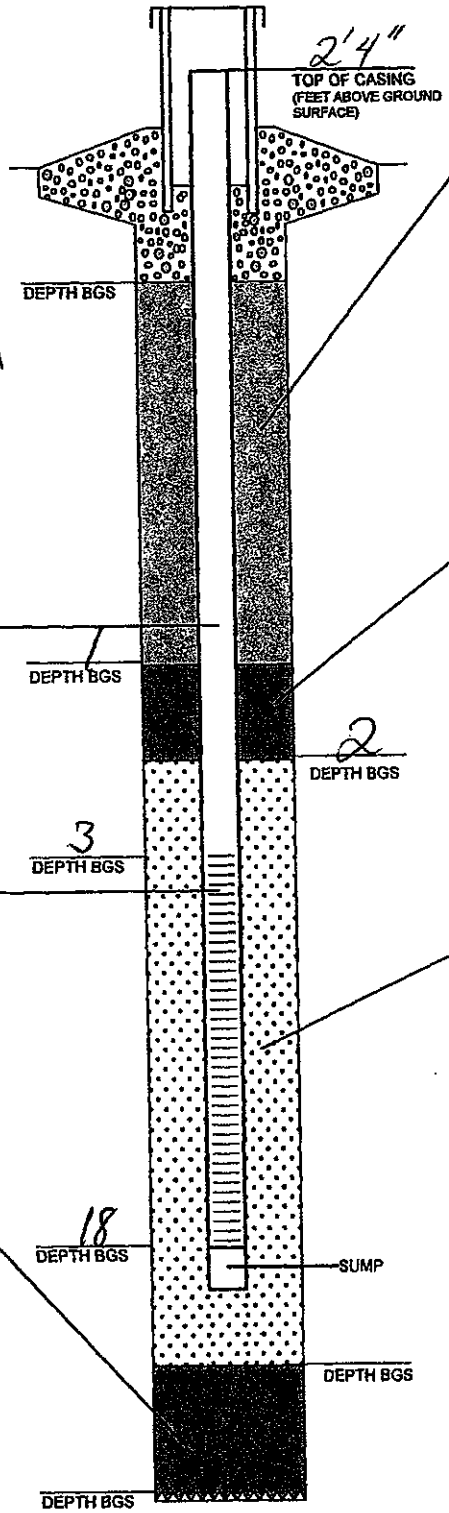
BOREHOLE BACKFILL

AMOUNT CALCULATED: None
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [x] PREPARED MIX
  - PRODUCT: Sakrete
  - MFG. BY:

METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 50 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: Medium
- [ ] OTHER:

PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED:
- [x] SAND, SIZE: #2/16

PRODUCT: Lolis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO:

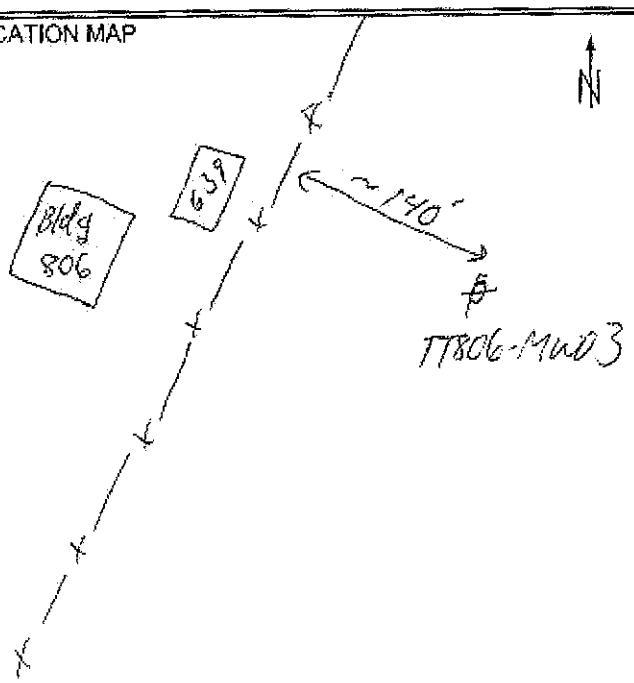
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT806-MW03	
Project Number: I4302.300	Project Name: RI Addendum
Client: U.S. Navy	
Site: 806	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mark MST All terrain	
Sampler Type: Hand auger to 5'	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): N/A	to: feet bgs
Drill Start Date: 10-14-07	Drill Start Time: 0742
Drill Finish Date: 10-14-07	Drill Finish Time: 0815
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date:	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 11	Date: / Time:
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-14-07	Well Completion Time:
Screen Interval (feet bgs): 4-19	Total Well Depth (feet bgs): 19
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 5.6	

BOREHOLE LOCATION MAP



NOTES/REMARKS

CTO:

LOGGED BY:

BORING ID:

MW ID: TT806-MW03

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
Hand Auger											Alkali crust on surface. Hand auger to 5'					
		0742							1	ML	Silt greyish brown (10YR 5/2) loose, dry, noncalc			10	20	70
									2							
		0748							3	SP	Sand, light olive brown (2.5Y 5/3) loose, sl moist			10	80	10
									4							
Split Spoon		754	24/18						5	CL	Clay silty olive brown (2.5Y 4/3) med stiff, noncalc				2	98
									6							
									7							
		757	24/18				0		8	ML	Silt, olive brown (2.5Y 4/3, med stiff, moist, noncalc			10	20	70
									9	CL	as above					

CTG:
BORING ID:

MW ID: TT806-MW03

LOGGED BY:

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
							1.1									
SPLIT SPOON									11							
	✓	800	48/48						12	CL	Clay, speckled grayish brown (2.5Y 3/2), silty, plastic very stiff, v. moist				3	97
							0.1		13	SP	Sand, olive brown (2.5Y 4/3) loose, wet			5	93	2
									14							
									15	SC	Sand, clayey, olive brown (2.5Y 4/3), wet, med dense				75	25
	✓	0815	48/48						16							
							0.2		17	SP	Sand, olive brown (2.5Y 4/3) loose, wet				95	5
									18							
									19	SM	Silty sand olive brown (2.5Y 4/3) med dense, wet				70	30
	✓										TD = 20'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT806-MW03
PROJECT: RI Activity 3.75 (143002)
SITE: 806
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-4-07 TIME:
WELL INSTALLATION BEGAN:
DATE: 10-4-07 TIME:
WELL INSTALLATION FINISHED:
DATE: 10-4-07 TIME:
DRILLING CO.: Cortez Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mari MST All-Terrain
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4.25" OD: 8"

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING:

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15

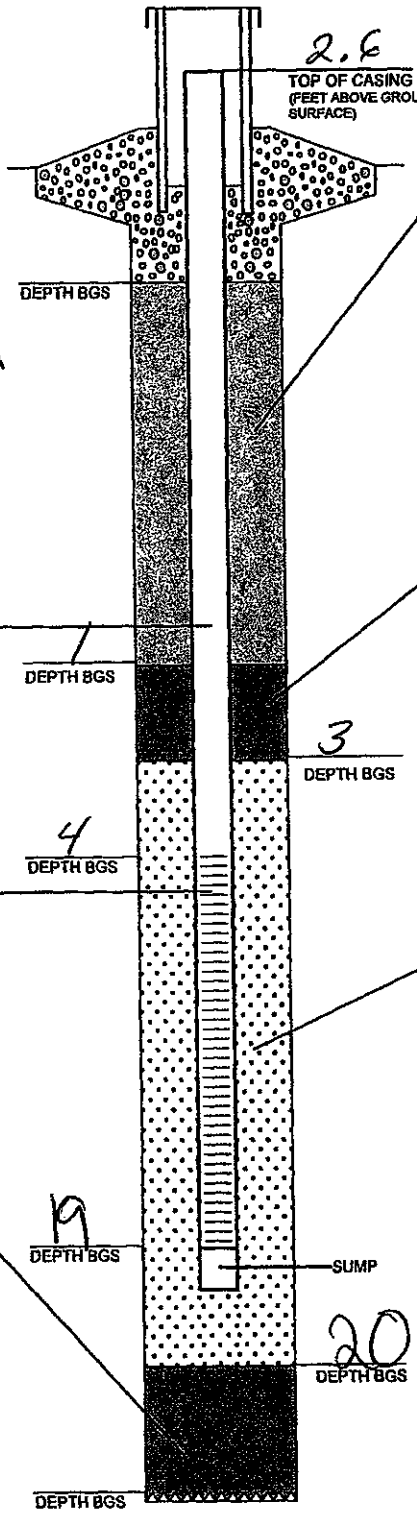
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [x] PREPARED MIX
  - PRODUCT: Sakrete
  - MFG. BY:

METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: Medium
- [ ] OTHER:

PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 3 gal

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED: 500 lbs
- [x] SAND, SIZE: #2/16
- PRODUCT: Lapis Lustre
- MFG. BY: Cemex

METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL: 8.2
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

MONITORING WELL COMPLETION RECORD

TETRATECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT806-MW04
PROJECT: RI Addendum
SITE: UST-R Site 2 (800 Complex)
BOREHOLE NO.: TT806-SB14
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-19-08 TIME: 840
WELL INSTALLATION BEGAN:
DATE: 10-19-08 TIME: 900
WELL INSTALLATION FINISHED:
DATE: 10-19-08 TIME: 1040
DRILLING CO.: Gregg Drilling
DRILLER: Robert Gregurak
LICENSE: M2322
DRILL RIG: Mark MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼ OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 5.5

WELL SCREEN

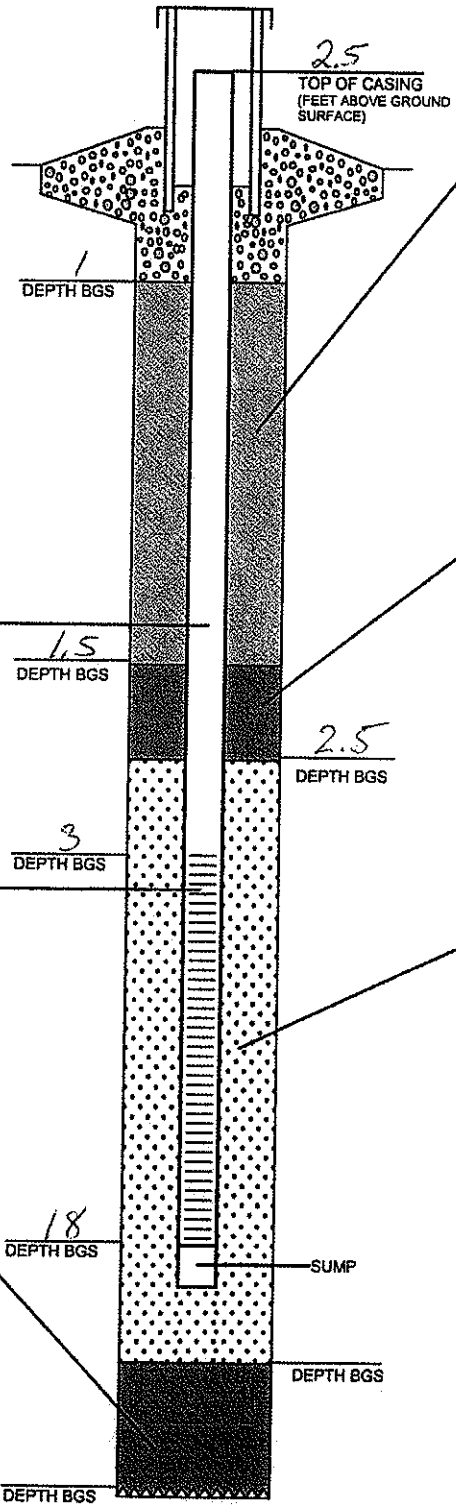
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT:
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: OD:
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED: NA
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☒ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT: 50 lb
BENTONITE: NA
WATER: 3.5 gal
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: ½ bag (25 lb.)
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Holeplug
MFG. BY: Baroid
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 600 lbs
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL: 5.9+2.5=8.4
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Note: Well installed in boring TT806-SB14 which ~~was~~ had a temp well installed

Sites 2/4

Lithologic logs were not available for the following monitoring wells located at the Hot Pit during report development:

Well ID	Installation Date
AVGAS	1/1/1991
EW-15	4/25/1988
KMW	Unknown

Environmental Resources Management

Drilling Log

Project Fuel Farm Owner NAVY

Location Fallon NAS W.O. Number 400.61

Well Number W-16 Total Depth 15' Diameter 2"

Surface Elevation 3935.25' Water Level: Initial 7.0' 24-hrs. 3928.78'

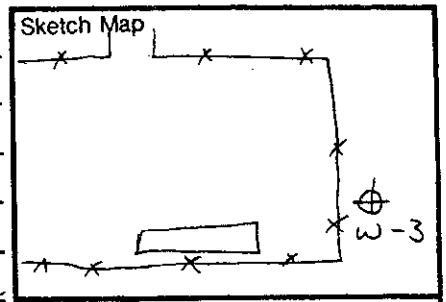
Screen: Dia. 2" Length 10' Slot Size .02"

Casing: Dia. 2" Length 3.32' Type Schedule 40 PVC

Drilling Company Andresen Drilling Method Hollow Stem Auger

Driller Rick + Russ Log By CES Date Drilled 4/26/88

Sketch Map



Notes

Blows per foot	Depth (Feet) / Sample recovery	Well Graphic Log Construction	Well Construction	OVA / Sample Number	Description/Soil Classification (Color, Texture, Structures)
2	2				
2 4	4		CL / SC	.8	Silty Clay (CL), med stiff, some v. fine sand, moist, Dark Brown, grades to clay, stiff, plastic @ 35', with med. coarse sand lenses. Sand, med. to coarse (SC) loose, mottled brown, moist
2 2 3	6		SM / WL	.7	Sandy Clay (SC) med stiff, moist, some coarse sand, Dark Brown. Silty Sand (SM) med stiff, saturated, fine sand + silt, some clay Dark Brown. (6.5-7' tube definatelly wet)
	8		SC		Clayey Sand (SC), loose, coarse sand, dark brown, saturated
2 3 5	10		CL	.7	change to clay Silty Clay (CL) with sand lenses, brown, wet.
5 9 15	12		SC	2.6 9:30AM	Sand (SC) fine to med. grained, mottled Gray-Brown Saturated., med dense.
8 17 19	14		BOTH 15'	.8	" " " " "
	16				

WL 4/26/88 7.5'

Set PVC-screen at 14.5' to 24.5' below ground surface
set solid PVC from 4.5' bgs to .5 (above g.s.)

Sand from 14.5' to 3.6' (from top of PVC)
bentonite from 3.5' to 2.1' (from top PVC)

2 1/2 bags sand
1/2 bucket bentonite 1/4" pellets.

4.5
- 3.6
1.5

Environmental Resources Management

Drilling Log

Project: Fuel Farm Owner: NAVY
Location: Fallon NAS W.O. Number: 400.61
Well Number: W-20 Total Depth: 15.0 Diameter: 2"
Surface Elevation: 3940.31' Water Level: Initial 3933.31' 24-hrs. 3929.52'
Screen: Dia. 2" Length 10' Slot Size .02"
Casing: Dia. 2" Length 7.21 Type Schedule 40 PVC
Drilling Company: Andiesen Drilling Method: Hollow stem Auger
Driller: Russ / Rick Log By: CES Date Drilled: 4/27/88

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	OVA Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				
2				CLAYEY SAND (SC), fine sand, lt. brown, moist to wet.
3 4 3	3 3		.8	SILTY CLAY (CL), some sand < 5%, dark brown, stiff, moist, no odor.
6				
4 3 6 8				no recovery - sands, wet.
10	SC		3:16PM 3:10PM 80 ppm	Dark Gray Sands with petroleum, prevalent odor. → color changes here to lt. brown sand, med. to coarse grained, saturated.
12				
4 7 12 14			620	Dark Gray SAND, med to coarse grained, saturated floating product.
15	BoN			

2 1/2 bags No. 3 Sand.
1/2 bucket bentonite
completed hole 4:00 PM

Environmental Resources Management

Drilling Log

Project Fuel Farm Owner NAVY

Location Fallon NAS W.O. Number 400.61

Well Number W-22 Total Depth 15' Diameter 2"

Surface Elevation 3938.23' Water Level: Initial 3931.23' 24-hrs. 3928.20'

Screen: Dia. 2" Length .10' Slot Size .02"

Casing: Dia. 2" Length 7.24' Type Schedule 40 PVC

Drilling Company Andersen Drilling Method Hollow Stem Auger

Driller Russ / Rick Log By CES Date Drilled 4/28/88

Sketch Map

Notes

Depth (Feet)	Graphic Log	Well Construction	OVA Reading / Sample Number	Description/Soil Classification (Color, Texture, Structures)
0				
2				
4 (4 7 10)	ML		3	SILTY CLAY (ML), with mica & small Fe staining spots, stiff, moist.
6				
4 (4 6 6)	SC Fine Coarse Fine		6	SAND, fine sand with middle tube coarse grained, saturated, Brown, med. dense
10 (4 5 5)			4	SAND, med. to coarse sand grains saturated. Most sample fell out of bottom of tube.
12				
14				
15 (3 4 4)			4	SILTY CLAY, (ML) stiff, brown, no noticable odor, saturated.

3 sand samples composited in jar.

TOC 3940.8

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-1**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 10.38 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 8 ft. Type SCH 40 PVC
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/23/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. D1370

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							All percentages are approximate.
0							
2						SM	0-3', SILTY SAND (SM): 60% sand; 40% silt; poorly graded; loose; dark yellowish brown (10YR 4/2); damp; no odor.
4							3-5', SILTY SAND WITH GRAVEL (SM): 60% fine, subrounded to subangular sand; 25% subrounded to subangular gravel to 20mm; 15% silt; poorly graded; loose; dark yellowish brown (10YR 4/2).
		9	1-5	4 5 6		SP	5-6', POORLY GRADED SAND (SP): 95% fine, rounded to subrounded to subangular sand; 5% silt; loose; moderate yellowish brown (10YR 5/4); damp; no odor.
6						SM	6', SILTY SAND (SM): 70% fine, subrounded to subangular sand; 30% silt; poorly graded; loose; dark yellowish brown (10YR 4/2); damp; no odor.
8							
10		47	1-10	4 5 5		CL	10', LEAN CLAY (CL): 80% silt; 20% slightly plastic clay; stiff; dark yellowish brown (10YR 4/2); saturated; moderate hydrocarbon odor.
12							
14						CH	
			1-15	8 12 13			15', FAT CLAY (CH): 100% plastic clay; very stiff; dark yellowish brown (10YR 4/2); saturated; no hydrocarbon odor.
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-10**

Project *NAS Fallon* Owner *US Navy*
Location *Fallon, NV* Proj. No. *830011068*
Surface Elev. *-- ft.* Total Hole Depth *18 ft.* Diameter *10 in.*
Top of Casing *-- ft.* Water Level Initial *-- ft.* Static *13.51 ft.*
Screen: Dia *4 in.* Length *10 ft.* Type/Size *.020 in.*
Casing: Dia *4 in.* Length *10 ft.* Type *SCH 40 PVC*
Fill Material *#2/12 sand* Rig/Core *CME 75/split spoon*
Drill Co. *West Hazmat* Method *HSA*
Driller *Mike Barr* Log By *Bob Davis* Date *5/23/95* Permit # *N/A*
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL Well drilled in former aviation gas tank location. D1374

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							All percentages are approximate.
0							
2							0-3', PEA GRAVEL FILL.
4							
6		14	10-5	10 12 11		SM	5', SILTY SAND (SM): 85% fine, subrounded to subangular sand; 15% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); damp; no odor. Plastic liner at 5 ft. Fill material.
8							
10		120	10-10	10 12 17			10', FILL MATERIAL. Encountered pure product at 10 ft.
12							
14			10-15	7 10 12			15', FILL MATERIAL.
16							
18							

Drilling Log

GROUNDWATER TECHNOLOGY

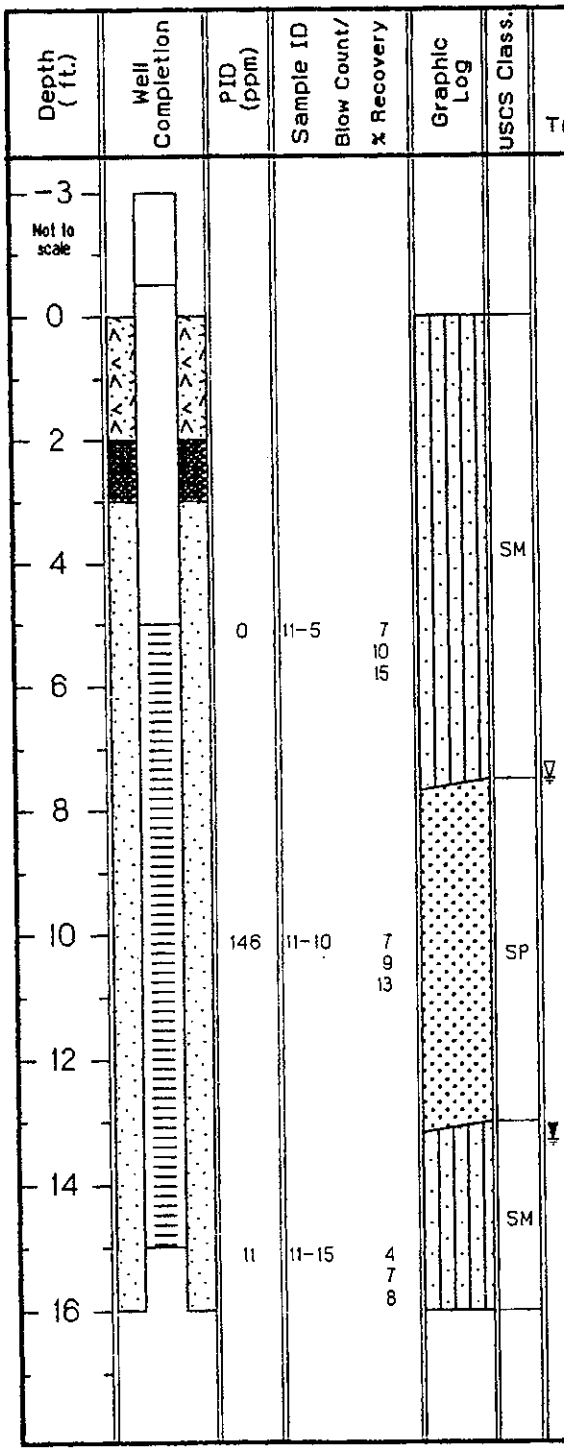
Extract. / Inject. Well **GTI-11**

Project *NAS Fallon* Owner *US Navy*
Location *Fallon, NV* Proj. No. *830011068*
Surface Elev. *-- ft.* Total Hole Depth *16 ft.* Diameter *10 in.*
Top of Casing *-- ft.* Water Level Initial *7.5 ft.* Static *13.30 ft.*
Screen: Dia *4 in.* Length *10 ft.* Type/Size *.010 in.*
Casing: Dia *4 in.* Length *8 ft.* Type *SCH 40 PVC*
Fill Material *#1C sand* Rig/Core *CME 75/split spoon*
Drill Co. *West Hazmat* Method *HSA*
Driller *Mike Barr* Log By *Bob Davis* Date *5/24/95* Permit # *N/A*
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL Initial water estimated at 7.5 ft. Steel well monument installed. DI375



Description

(Color, Texture, Structure)
Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

All percentages are approximate.

5', SILTY SAND (SM): 60% fine, subrounded to subangular sand; 40% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); damp; no odor.

10', POORLY GRADED SAND (SP): 25% fine sand, 70% medium sand, 5% coarse sand, subrounded to subangular; 10% silt; medium dense; pale yellowish brown (10YR 6/2) (some sections of core stained black due to hydrocarbons); saturated; strong hydrocarbon odor.

15', SILTY SAND (SM): 50% fine sand, 40% medium sand, subrounded to subangular; 10% silt; medium dense; pale yellowish brown (10YR 6/2); saturated; strong hydrocarbon odor.

Drilling Log

GROUNDWATER TECHNOLOGY

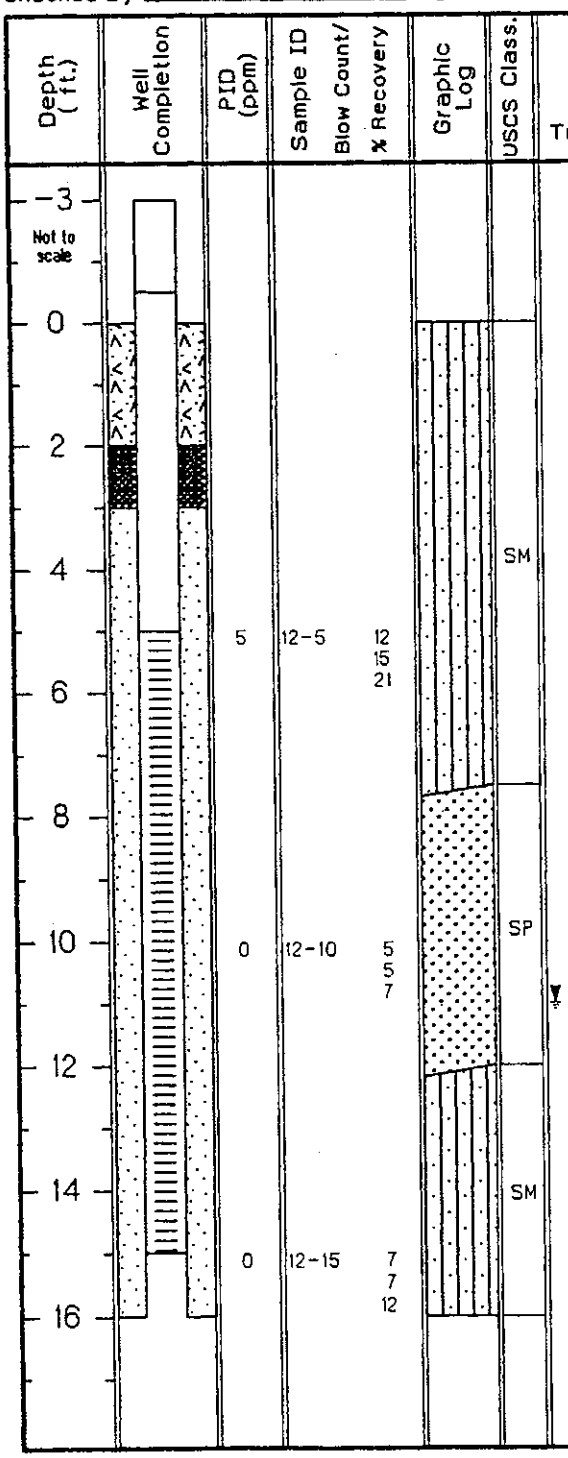
Extract. / Inject. Well **GTI-12**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial ~7 ft. Static 11.00 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 8 ft. Type SCH 40 PVC
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/24/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL Hydrocarbon-stained and saturated sand encountered at 7 ft. DI376



Description

(Color, Texture, Structure)

Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

All percentages are approximate.

5', SILTY SAND (SM): 40% fine, subrounded sand; 60% silt; medium dense; dark yellowish brown (10YR 4/2); moist; no odor.

10', POORLY GRADED SAND (SP): 40% fine sand, 50% medium sand, 5% coarse sand, rounded to subrounded to subangular; 5% silt; poorly graded; loose; dark yellowish brown (10YR 4/2); saturated; no odor.

15', SILTY SAND (SM): 60% fine, subrounded to subangular sand; 40% silt; medium dense; dark yellowish brown (10YR 4/2); saturated; no odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-13**

Project *NAS Fallon* Owner *US Navy*
Location *Fallon, NV* Proj. No. *830011068*
Surface Elev. *-- ft.* Total Hole Depth *16 ft.* Diameter *10 in.*
Top of Casing *-- ft.* Water Level Initial *~7 ft.* Static *11.10 ft.*
Screen: Dia *4 in.* Length *10 ft.* Type/Size *.010 in.*
Casing: Dia *4 in.* Length *8 ft.* Type *SCH 40 PVC*
Fill Material *#1C sand* Rig/Core *CME 75/split spoon*
Drill Co. *West Hazmat* Method *HSA*
Driller *Mike Barr* Log By *Bob Davis* Date *5/24/95* Permit # *N/A*
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL Hydrocarbon-contaminated sand below 6 ft. Steel well monument installed. DI377

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							All percentages are approximate.
0							
2							
4						MH	
6			13-5	8 12 18			5', ELASTIC SILT (MH): 70% silt; 30% slightly plastic clay; very stiff; dark yellowish brown (10YR 4/2); wet; faint hydrocarbon odor.
8							6-10', POORLY GRADED SAND (SP): 95% fine, subrounded to subangular sand; 5% silt; poorly graded; loose; olive gray (5Y 6/1); wet; strong hydrocarbon odor. Color due to hydrocarbon contamination.
10			13-10	5 11 16			10', POORLY GRADED SAND (SP): 80% fine sand, 15% medium sand; 5% silt; poorly graded; olive gray (5Y 6/1); saturated; strong hydrocarbon odor.
12						SP	
14							15', POORLY GRADED SAND (SP): 80% fine sand, 15% medium sand, subrounded to subangular; 5% silt; poorly graded; medium dense; olive gray (5Y 6/1); saturated; strong hydrocarbon odor.
16			13-15	11 13 14			

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-14**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 15 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 5 ft. Static 7.00 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 3 ft. Type SCH 40 PVC
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/18/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. Product encountered at 3.5 ft. DI334

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2						CL	
4		152	GTI14-5	3 4 6			4-5.5', LEAN CLAY (CL): 80% plastic clay; 20% silt; medium soft; olive black (5Y2/1); saturated; strong hydrocarbon odor. Interbedded clay and sands.
6						SM	5.5-6.5', SILTY SAND (SM): 80% fine to medium, subrounded to subangular sand; 20% silt; poorly graded; medium dense; olive black (5Y2/1); saturated; strong hydrocarbon odor.
						CL	6.5-7', LEAN CLAY (CL): 80% plastic clay; 20% silt; medium soft; olive black (5Y2/1); saturated; strong hydrocarbon odor.
8						SM	7-9', SILTY SAND (SM): 80% fine to medium, subrounded to subangular sand; 20% silt; poorly graded; medium dense; olive black (5Y2/1); saturated; strong hydrocarbon odor.
10		120	GTI14-10	4 5 6			9-10.5', SILTY SAND (SM): 75% fine, subrounded to subangular sand; 25% silt; poorly graded; loose; olive black (5Y 2/1); saturated; weak hydrocarbon odor.
							10.5-11', LEAN CLAY (CL): 80% plastic clay; 20% silt; stiff; olive gray (5Y 4/1); saturated; weak hydrocarbon odor.
12						CL	
14		4	GTI14-15	2 3 4			14-14.5', LEAN CLAY (CL): 90% plastic clay; 10% silt; medium soft; olive gray (5Y 4/1); saturated; faint hydrocarbon odor.
						SP	14.5-15', POORLY GRADED SAND (SP): 75% fine/20% medium/5% coarse, subrounded to subangular sand; 5% silt; poorly graded; loose; saturated; faint hydrocarbon odor.
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-15**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 10.47 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/18/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL DI335

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2						ML	0-4', SILT WITH GRAVEL (ML): 60% silt; 25% nonplastic clay; 10% fine, subrounded to subangular sand; 5% subrounded gravel to 20mm; medium stiff; dark yellowish brown (10YR 4/2); damp; moderate hydrocarbon odor. Sample from augers.
4							
6		15	GTI15-5	4 5 7		CH	4-7', FAT CLAY WITH GRAVEL (CH): 70% slightly plastic clay; 25% silt; 5% subrounded gravel 10-30mm; medium stiff; dark yellowish brown (10YR 4/2); damp; moderate hydrocarbon odor.
8							
10		14	GTI15-10	4 7 11		MH	7-12', SANDY ELASTIC SILT (MH): 60% silt; 30% clay; 10% fine, subrounded sand; stiff; olive black (5Y 2/1); saturated; strong hydrocarbon odor. Product saturated at 7 ft. PID reading at 7' = 1283ppm.
12							
14		194	GTI15-15	4 5 7		SP	12-16', POORLY GRADED SAND (SP): 100% fine sand; poorly graded; loose; dark yellowish brown (10YR 4/2); saturated; strong hydrocarbon odor.
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-17**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 15 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 14.55 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 4 ft. Type SCH 40 PVC
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/18/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location -

COMMENTS:

FREE PRODUCT RECOVERY WELL Steel well monument installed. D1336

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2							
4						SP	
		916	GTI17-5	7 8 10			5', POORLY GRADED SAND (SP): 95% fine, subrounded sand; 5% silt; poorly graded; dark yellowish brown (10YR 4/2); wet; strong hydrocarbon odor. Product at 5 ft.
6							
8						MH	7.5-10.5, ELASTIC SILT WITH SAND (MH): 70% silt; 20% clay; 10% fine sand; olive gray with black mottling (5Y 4/1); saturated; strong hydrocarbon odor.
10		1296	GTI17-10	11 13 18		SP	10.5', POORLY GRADED SAND (SP): 95% fine, subrounded to subangular sand; 5% silt; poorly graded; medium dense; olive gray (5Y 4/1); saturated; strong hydrocarbon odor.
12							
14						ML	15', SILT WITH SAND (ML): 45% silt; 40% fine, subrounded sand; 15% clay; soft; dark yellowish brown with black mottling (10YR 4/2); saturated; strong hydrocarbon odor.
		262	GTI17-15	3 3 4			
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-18**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial ~10 ft. Static 11.09 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/24/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. Initial water level probably affected by dewatering project. DI378

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2							
4						ML	
6		3	18-5	5 15 12			5', SANDY SILT (ML): 60% silt; 40% fine, subrounded sand; poorly graded; stiff; dark yellowish brown (10YR 4/2); damp; no odor.
8							
10		1	18-10	16 17 20		SC	10', CLAYEY SAND (SC): 60% fine, subrounded to subangular sand; 30% clay; 10% silt; poorly graded; dense; dark yellowish brown (10YR 4/2); wet; faint hydrocarbon odor.
12							
14						SP	15', POORLY GRADED SAND (SP): 60% medium sand, 35% fine sand, subrounded to subangular; 5% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; faint hydrocarbon odor.
16		4	18-15	6 12 16			

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-19**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 11.65 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/17/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location -

COMMENTS:

FREE PRODUCT RECOVERY WELL. D1337

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2							
4							
6		0	GTI19-5	7 8 10			5', POORLY GRADED SAND (SP): 98% fine to medium, subrounded to subangular sand; 2% silt; poorly graded; medium dense; moderate yellowish brown (10YR 5/4); moist; no odor.
8						SP	
10		144	GTI19-10	5 7 7			10', POORLY GRADED SAND (SP): 99% fine to medium, subrounded to subangular sand; 1% silt; poorly graded; medium dense; olive gray (5Y 4/1); saturated; strong hydrocarbon odor.
12							
14		0	GTI19-15	8 12 21			15', POORLY GRADED SAND (SP): 97% sand; 3% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; no hydrocarbon odor. Formation sand appears very close in size to filter pack sand #IC.
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-2**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth _____ Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 10.85 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 8 ft. Type SCH 40 PVC
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/19/95 Permit # N/A
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL DI329

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							All percentages are approximate.
0						SM	0-3', SILTY SAND (SM): 70% fine, subrounded sand; 30% silt; poorly graded; loose; dark yellowish brown (10YR4/2); damp; no hydrocarbon odor. Sample from augers.
2							
4						ML	3-5.5', SANDY SILT (ML): 70% silt; 20% fine, subrounded sand; 10% clay; stiff; dark yellowish brown (10YR4/2); damp; moderate hydrocarbon odor.
		15	GTI2-5	5 5 8			
6						SP-SM	5.5', POORLY GRADED SAND (SP-SM): 90% fine, subrounded to subangular sand; 10% silt; poorly graded; medium dense; dark yellowish brown (10YR4/2); damp; moderate hydrocarbon odor.
8							
10		137	GTI2-10	6 8 11		SM	10', SILTY SAND (SM): 70% fine, subrounded to subangular sand; 20% silt; 10% clay; dark greenish gray (5GY4/1); poorly graded; saturated; strong hydrocarbon odor.
12							
14						CL	15', LEAN CLAY (CL): 70% plastic clay; 30% silt; very stiff; dark yellowish brown (10YR4/2); saturated; strong hydrocarbon odor.
		43	GTI2-15	6 8 9			
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-20**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 11.55 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/17/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. DI338

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2							
4						SM	
6		0	GTI20-5	3 6 8			5', SILTY SAND (SM): 70% fine, subrounded sand; 30% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); moist; no odor.
8							
10		2	GTI20-10	6 8 5		SP	10', POORLY GRADED SAND (SP): 95% fine, subrounded sand; 5% silt; poorly graded; medium dense; olive gray (5Y 4/1); saturated; no odor.
12							
14						SM	15-15.5', SILTY SAND (SM): 70% fine, subrounded sand; 30% silt; poorly graded; medium dense; dark yellowish brown (10Yr 4/2); saturated; no odor.
16		0	GTI20-15	3 6 8		SP	15.5-16', POORLY GRADED SAND (SP): 95% medium to coarse, rounded to subrounded to subangular sand; 5% silt; poorly graded; medium dense; olive gray (5Y 4/1); saturated; no odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-21**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 8± ft. Static 14.75 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/25/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. Steel well monument installed. DI379

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0						SM	0-2', SILTY SAND (SM): 60% fine, subrounded to subangular sand; 40% silt; poorly graded; loose; dark yellowish brown (10YR 4/2); damp; no odor. Sample description from augers.
2							
4							2-7', POORLY GRADED SAND (SP): 60% fine sand, 35% medium sand, rounded to subrounded to subangular; 5% silt; poorly graded; medium dense; dark yellowish brown (10YR 6/6); wet; no odor. Contaminated sand encountered around 8 ft.
6		0	21-5	6 7 9		SP	
8							8-11', POORLY GRADED SAND (SP): 80% fine sand, 15% medium sand, rounded to subrounded to subangular; 5% silt; poorly graded; medium dense; medium dark gray (N4); saturated; strong hydrocarbon odor.
10		121	21-10	6 8 13			
12						CL	11-13', LEAN CLAY (CL): 60% slightly plastic clay; 40% silt; very stiff; dark yellowish brown (10YR 4/2); saturated; moderate hydrocarbon odor.
14		47	21-15	9 14 16		SP	15', POORLY GRADED SAND (SP): 95% fine, subrounded to subangular sand; 5% silt; poorly graded; medium dense; olive gray (5Y 4/1); saturated; strong hydrocarbon odor.
16							15.5', POORLY GRADED SAND (SP): 60% medium sand, 20% fine sand, 20% coarse sand; poorly graded; medium dense; olive gray (5Y 4/1); saturated; weak hydrocarbon odor. Coarse sand lense at bottom of core.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-22**

Project *NAS Fallon* Owner *US Navy*
Location *Fallon, NV* Proj. No. *830011068*
Surface Elev. *-- ft.* Total Hole Depth *16 ft.* Diameter *10 in.*
Top of Casing *-- ft.* Water Level Initial *est 10 ft.* Static *12.06 ft.*
Screen: Dia *4 in.* Length *10 ft.* Type/Size *.010 in.*
Casing: Dia *4 in.* Length *8 ft.* Type *SCH 40 PVC*
Fill Material *#1C sand* Rig/Core *CME 75/split spoon*
Drill Co. *West Hazmat* Method *HSA*
Driller *Mike Barr* Log By *Bob Davis* Date *5/25/95* Permit # *N/A*
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL Steel well monument installed. DI380

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							All percentages are approximate.
0							
2							
4						SM	
6		11	22-5	6 10 12			5', SILTY SAND (SM): 60% fine, subrounded to subangular sand; 40% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); damp; no odor.
8							
10		119	22-10	6 14 19		SP	10', POORLY GRADED SAND (SP): 90% fine sand, 5% medium sand; 5% silt; poorly graded; stiff; olive gray (5Y 4/1); saturated; strong hydrocarbon odor.
12							
14						CL	
16		14	22-15	6 7 9			15', LEAN CLAY (CL): 60% slightly plastic clay; 40% silt; stiff; dark yellowish brown (10YR 4/2); wet to saturated; no odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-23**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 9.00 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/17/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL DI339

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2							
4						SW/SC	
6		0	GTI23-5	4 6 8			5', WELL GRADED SAND WITH CLAY (SW/SC): 60% fine sand; 20% plastic clay; 15% silt; 5% subrounded to subangular gravel to 20mm; well graded; medium dense; dark yellowish brown (10YR 4/2); damp; no odor.
8							
10		265	GTI23-10	5 6 8		ML	10', SANDY SILT (ML): 60% silt; 40% fine, subangular sand; poorly graded; stiff; dark yellowish brown streaked with black (10YR 4/2); saturated; strong hydrocarbon odor.
12							
14						MH	
16		24	GTI23-15	5 8 11			15', ELASTIC SILT WITH SAND (MH): 75% silt; 20% fine, subrounded sand; 5% slightly plastic clay; poorly graded; very stiff; dark yellowish brown with streaks of black (10YR 4/2); saturated; strong hydrocarbon odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-24**

Project *NAS Fallon* Owner *US Navy*
Location *Fallon, NV* Proj. No. *830011068*
Surface Elev. *-- ft.* Total Hole Depth *16 ft.* Diameter *10 in.*
Top of Casing *-- ft.* Water Level Initial *7 ft.* Static *8.30 ft.*
Screen: Dia *4 in.* Length *10 ft.* Type/Size *.010 in.*
Casing: Dia *4 in.* Length *5 ft.* Type *SCH 40 PVC*
Fill Material *#1C sand* Rig/Core *CME 75/split spoon*
Drill Co. *West Hazmat* Method *HSA*
Driller *Mike Barr* Log By *Bob Davis* Date *5/17/95* Permit # *N/A*
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. DI340

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2						SW	
4		2	GTI24-5	4 7 9			5-5.5', WELL GRADED SAND (SW): 90% fine, subrounded sand; 5% silt; 5% subrounded gravel to 20mm; well graded; medium dense; dark yellowish brown (10YR 4/2); moist; faint hydrocarbon odor.
6						CL	5.5-6.5', LEAN CLAY (CL): 80% clay; 20% silt; stiff; dark yellowish brown (10YR 4/2); moist; faint hydrocarbon odor.
						SM	6.5', SILTY SAND (SM): 80% fine, subrounded sand; 20% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); moist; faint hydrocarbon odor.
8							
10		2	GTI24-10	3 4 6			10', CLAYEY SAND (SC): 60% fine, subrounded sand; 25% clay; 5% silt; poorly graded; loose; dark yellowish brown (10YR 4/2); saturated; faint hydrocarbon odor.
12						SC	
14							
16		1	GTI24-15	3 4 5			15', CLAYEY SAND (SC): 80% fine, subrounded sand; 15% clay; 5% silt; loose; dark yellowish brown (10YR 4/2); saturated; faint hydrocarbon odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-25**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 8.25 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/17/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location -

COMMENTS:

FREE PRODUCT RECOVERY WELL. DI341

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2							
4							
6		9	GTI25-5	3 4 6		SP	5', POORLY GRADED SAND (SP): 95% fine, subrounded sand; 5% silt; poorly graded; loose; pale yellowish brown (10YR 6/2); moist; no odor.
8							
10		13	GTI25-10	8 12 12			10', POORLY GRADED SAND (SP): 95% fine, subrounded sand; 5% silt; poorly graded; olive black (5Y 2/1); medium dense; saturated; faint hydrocarbon odor. Initial water @ ~7 ft.
12							
14						CL	14-15, LEAN CLAY (CL): 75% plastic clay; 25% silt; pale yellowish brown (10YR 6/2); saturated; no odor. Described from HSA.
16		8	GTI25-15	4 4 12		SP	15', POORLY GRADED SAND (SP): 95% fine to medium, subrounded to subangular to angular sand; 5% silt; poorly graded; loose; olive gray (5Y 4/1); saturated.

Drilling Log

GROUNDWATER TECHNOLOGY

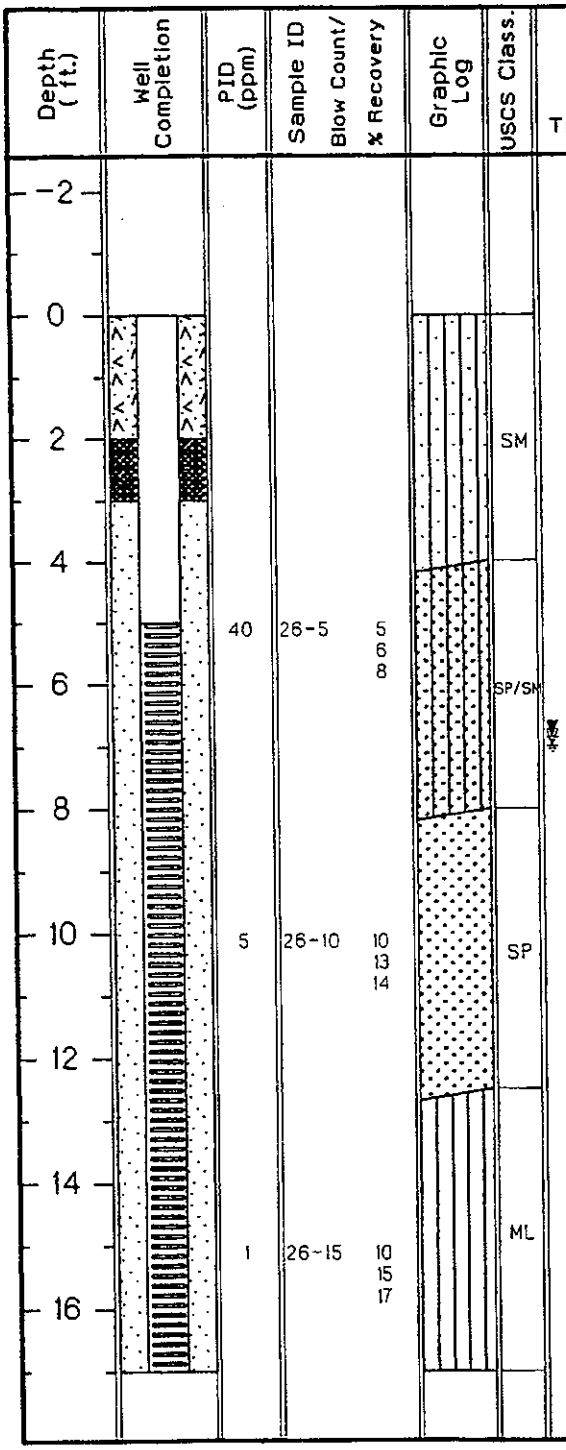
Extract. / Inject. Well **GTI-26**

Project *NAS Fallon* Owner *US Navy*
Location *Fallon, NV* Proj. No. *830011068*
Surface Elev. *-- ft.* Total Hole Depth *21 ft.* Diameter *10 in.*
Top of Casing *-- ft.* Water Level Initial *7 ft.* Static *6.86 ft.*
Screen: Dia *4 in.* Length *15 ft.* Type/Size *.010 in.*
Casing: Dia *4 in.* Length *5 ft.* Type *stainless steel*
Fill Material *#IC sand* Rig/Core *CME 75/split spoon*
Drill Co. *West Hazmat* Method *HSA*
Driller *Mike Barr* Log By *Bob Davis* Date *5/25/95* Permit # *N/A*
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL D1381



Description

(Color, Texture, Structure)

Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

All percentages are approximate.

0-4', SILTY SAND (SM): 60% fine, subrounded to subangular sand; 40% silt; poorly graded; loose; dark yellowish brown (10YR 4/2); damp; no odor.

5', POORLY SORTED SAND WITH SILT (SP/SM): 75% fine, subrounded to subangular sand; 20% silt; 5% gravel to 10mm; poorly graded; medium dense; dark yellowish brown (10YR 4/2); wet; strong hydrocarbon odor. Hydrocarbon contamination at 6 ft.

10', POORLY GRADED SAND (SP): 60% medium sand, 33% fine sand, 2% coarse sand, subrounded to subangular; 5% silt; poorly graded; medium dense; pale yellowish brown (10YR 6/2); saturated; faint hydrocarbon odor.

15', SANDY SILT (ML): 80% silt; 20% fine, subrounded to subangular sand; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; no odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-26**

Project *NAS Fallon* Owner *US Navy*

Location *Fallon, NV* Proj. No. *830011068*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
17							
19						ML	
		0	26-20	4 5 6			20', SANDY SILT (ML): 70% silt; 30% fine, subrounded to subangular sand; medium dense; dark yellowish brown (10YR 4/2); saturated; no odor.
21							
23							
25							
27							
29							
31							
33							
35							
37							
39							
41							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-28**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 22.5 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 7.55 ft.
Screen: Dia 4 in. Length 15 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type stainless steel
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/26/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. Boring continuously cored from 5 to 22.5 ft. D1367

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2						SM	0-3', SILTY SAND (SM): 60% fine sand; 40% silt; poorly graded; loose; dark yellowish brown (10YR 4/2); moist; no odor.
4		47	28-4.5	6 6 7			4.5-6', SILTY SAND (SM): 60% fine sand; 40% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); wet; no hydrocarbon odor.
6		140	28-6	10 15 19		SP	6-7.5', POORLY GRADED SAND (SP): 90% fine, subrounded to subangular sand; 10% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; strong hydrocarbon odor.
8		18	28-7.5	4 7 9		SM	7.5-8.5', POORLY GRADED SAND (SP): 90% fine, subrounded to subangular sand; 10% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; faint hydrocarbon odor.
		11	28-9	7 8 13		SP	8.5-9', SILTY SAND (SM): 80% fine, subrounded to subangular sand; 20% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; no odor.
10		17	28-10.5	4 5 7		CL	9-10.5', POORLY GRADED SAND (SP): 90% fine sand; 10% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; no odor.
12		11	28-12	8 10 6		ML	10.5-12', POORLY GRADED SAND (SP): 95% fine, subrounded to subangular sand; 5% silt; poorly graded; loose; dark yellowish brown (10YR 4/2); saturated; no odor.
14		15	28-13.5	8 10 13		SM	12-13.5', LEAN CLAY (CL): 60% slightly plastic clay; 30% silt; 10% fine sand; very stiff; dark yellowish brown (10YR 4/2); saturated; no odor.
16		15	28-15	9 10 16		MH	13.5-15', SANDY SILT (ML), 80% silt; 20% fine, subrounded to subangular sand; poorly graded; dark yellowish brown (10YR 4/2); saturated; no odor.
		17	28-16.5	6 9 15			15-16.5', SILTY SAND (SM): 60% very fine, subrounded sand; 40% silt; poorly graded; very stiff; dark yellowish brown (10YR 4/2); saturated; no odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-28**

Project *NAS Fallon* Owner *US Navy*

Location *Fallon, NV* Proj. No. *830011068*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
17							16.5-18', ELASTIC SILT (MH): 70% silt; 30% slightly plastic clay; saturated; no odor.
		17	28-18	6 8 13		MH	18-19.5', ELASTIC SILT (MH): 60% silt; 30% nonplastic clay; 10% fine, subrounded sand; very stiff; dark yellowish brown (10YR 4/2); saturated; no odor.
19		16	28-19.5	7 11 14			19.5-20', ELASTIC SILT (MH): 60% silt; 40% slightly plastic clay; very stiff; dark yellowish brown (10YR 4/2); saturated; no odor.
							20-21', LEAN CLAY (CL): 80% slightly plastic clay; 20% silt; very stiff; greenish gray (5GY 6/1); saturated; no odor.
21		17	28-21	11 15 19		CL	21-22.5, LEAN CLAY (CL): 80% slightly plastic clay; 20% silt; very stiff; greenish gray (5GY 6/1); saturated; no odor.
23							
25							
27							
29							
31							
33							
35							
37							
39							
41							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-29**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 21 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 7.50 ft.
Screen: Dia 4 in. Length 15 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type stainless steel
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/25/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. DI382

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2							0-3.5', SILTY SAND (SM): 60% fine, subrounded to subangular sand; 40% silt; poorly graded; loose; dark yellowish brown (10YR 4/2); moist; no odor.
4						SM	
6		3	29-5	5 6 9			5', SILTY SAND (SM): 80% fine, subrounded to subangular sand; 20% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; moderate hydrocarbon odor.
8							
10		12	29-10	7 14 17		SP	10', POORLY GRADED SAND (SP): 90% fine, subrounded to subangular sand; 10% silt; medium dense; olive gray (5Y 4/1); saturated; moderate hydrocarbon odor.
12							
14		6	29-15	5 6 11			15', POORLY GRADED SAND (SP): 90% fine, subrounded to subangular sand; 10% silt; poorly graded; medium dense; olive gray (5Y 4/1); saturated; weak hydrocarbon odor.
16						SM	16', SILTY SAND (SM): 80% fine, rounded to subrounded to subangular sand; 20% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; weak hydrocarbon odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-29**

Project *NAS Fallon* Owner *US Navy*

Location *Fallon, NV* Proj. No. *830011068*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
17						SM	
19		2	29-20	6 7 11		MH	20', ELASTIC SILT (MH): 60% silt; 40% slightly plastic clay; stiff; olive gray (5Y 4/1); saturated; no odor.
21							
23							
25							
27							
29							
31							
33							
35							
37							
39							
41							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-3**

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL 01330

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 15 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 6 ft. Static 11.50 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 7 ft. Type SCH 40 PVC
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/19/95 Permit # N/A
Checked By License No.

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							All percentages are approximate.
0							
2							
4						SM	
		41	GTI3-5	4 4 7			5', SILTY SAND (SM): 60% fine, subrounded sand; 40% silt; poorly graded; loose; dark yellowish brown (10YR4/2); moist; strong hydrocarbon odor. Saturated at 6 ft.
6							
8							
10		151	GTI3-10	4 5 10		CL	10', LEAN CLAY WITH SAND (CL): 40% plastic clay; 30% silt; 30% fine, subrounded sand; stiff; olive gray (5Y4/1); saturated; strong hydrocarbon odor.
12							
14			GTI3-15	4 9 12			15', LEAN CLAY (CL): 65% plastic clay; 30% silt; 5% fine, subrounded sand; very stiff; dark yellowish brown (10YR4/2); saturated; strong hydrocarbon odor.
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-30**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 20.5 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 8.90 ft.
Screen: Dia 4 in. Length 15 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type stainless steel
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/25/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. DI383

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count / % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2						SM	0-4', SILTY SAND (SM): 60% fine; subrounded to subangular sand; 40% silt; poorly graded; loose; moderate yellowish brown (10YR5/4). Descriptions from augers.
4							
6		521	30-5	5 9 8		ML	5', SILT (ML): 90% silt; 10% fine sand; very stiff; dark yellowish brown (10YR 4/2); moist; strong hydrocarbon odor. Hydrocarbon contamination at 6 ft.
8							
10		34	30-10	6 7 9			10', SILTY SAND (SM): 80% fine, subrounded to subangular sand; 20% silt; poorly graded; medium dense; saturated; strong hydrocarbon odor.
12						SM	
14							
16			30-15	6 9 14			15', SILTY SAND (SM): 60% fine sand; 40% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; moderate hydrocarbon odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-30**

Project *NAS Fallon* Owner *US Navy*

Location *Fallon, NV* Proj. No. *830011068*

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
17						SM	
19		15	30-20	7 9 8		ML	20', SANDY SILT (ML): 60% silt; 40% fine, subrounded to subangular sand; poorly graded; very stiff; dark yellowish brown (10YR 4/2); saturated; faint hydrocarbon odor.
21							
23							
25							
27							
29							
31							
33							
35							
37							
39							
41							

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well **GTI-31**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 6.15 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/26/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

(Former well RW9A) DI359

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							SILTY SAND WITH GRAVEL: 50% fine sand; 30% fine to coarse gravel; 20% silt; asphalt fragments; moist; gypsm veins; faint hydrocarbon odor.
2						SM	
4							Alternating thin beds of LEAN CLAY and SILTY SAND --
						CL	LEAN CLAY: 70% plastic clay; 20% silt; 10% fine sand; stiff; brown; moist; no odor.
						SM	
						CL	SILTY SAND: 60% fine sand; 30% silt; 10% clay; loose; moist to saturated; no odor.
6							
						SM	ELASTIC SILT: 60% silt; 30% plastic clay; 10% fine sand; stiff; elastic; very moist to wet; no odor.
8							
10							
12						MH	ELASTIC SILT (MH): 70% silt; 30% plastic clay; medium stiff; saturated; no odor.
14							
16			31-15	5 6 8			

Drilling Log

GROUNDWATER TECHNOLOGY

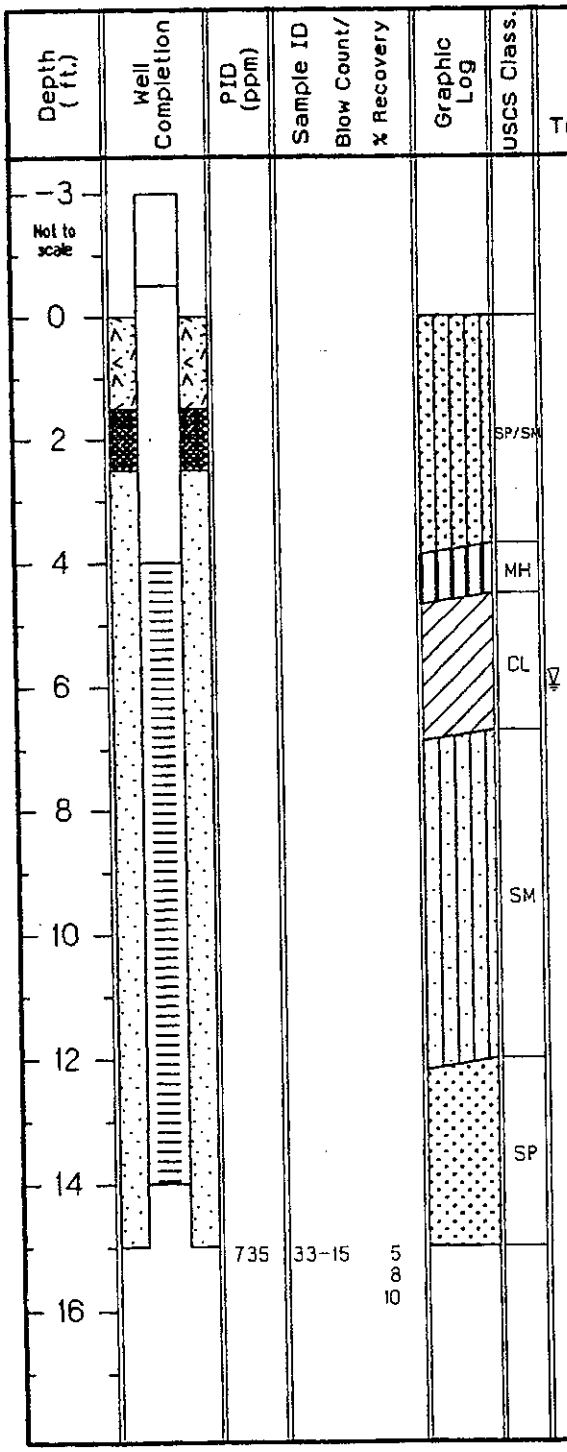
Monitoring Well **GTI-33**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 15 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 6 ft. Static -- ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 7 ft. Type SCH 40 PVC
Fill Material #IC sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 6/1/95 Permit # N/A
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

Monitoring well GTI-33 converted from 2-inch diameter exploration well RW-10B. Steel well monument installed. D1361



Description

(Color, Texture, Structure)

Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

All percentages are approximate.

POORLY GRADED SAND: 50% fine sand; 40% medium sand; 10% coarse sand; light gray-brown; moist; no odor.

ELASTIC SILT: 60% silt; 30% clay; 10% fine sand; medium stiff; brown; moist; no odor.

LEAN CLAY: 70% clay; 20% silt; 10% fine sand; stiff; gray; moist; moderate hydrocarbon odor.

SILTY SAND: 60% fine sand; 20% silt; 10% medium sand; 10% clay; medium dense; saturated; no odor.

POORLY GRADED SAND (SP): 60% fine sand; 40% medium sand; 5% silt; poorly graded; medium dense; pale yellowish brown (10YR 6/2); saturated; no odor. PID run twice on sample since there was a very high reading without any odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well **GTI-34**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 15 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 6.5 ft. Static 9.45 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 7 ft. Type SCH 40 PVC
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 6/1/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

Monitoring well GTI-34 converted from 2-inch diameter exploration well RW-10A. Steel well monument installed. D1362

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							All percentages are approximate.
0						SP/SM	POORLY GRADED SAND: 40% fine sand; 40% medium sand; 20% coarse sand; light brown; moist; no odor.
2						ML	SANDY SILT: 60% silt; 30% fine sand; 10% clay; stiff; olive-gray; moist; moderate to strong hydrocarbon odor.
4						CL	LEAN CLAY WITH SAND: 70% clay; 20% fine sand; 10% silt; stiff; olive-gray; moist; moderate hydrocarbon odor.
						SM	SILTY SAND: 60% fine sand; 30% silt; 10% clay; medium dense; olive-gray; very moist; moderate hydrocarbon odor.
6						MH	
8						SM	SILTY SAND: 70% fine sand; 25% silt; 5% clay; medium dense; gray-brown; saturated; no odor.
10							
12						SP	
14		1999+	34-15	5 8 10			POORLY GRADED SAND: 80% fine sand; 15% medium sand; 5% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; strong hydrocarbon odor.
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Monitoring Well **GTI-35**

Project *NAS Fallon* Owner *US Navy*
Location *Fallon, NV* Proj. No. *830011068*
Surface Elev. *-- ft.* Total Hole Depth *15 ft.* Diameter *10 in.*
Top of Casing *-- ft.* Water Level Initial *6.5 ft.* Static *12.50 ft.*
Screen: Dia *4 in.* Length *10 ft.* Type/Size *.010 in.*
Casing: Dia *4 in.* Length *7 ft.* Type *SCH 40 PVC*
Fill Material *#IC sand* Rig/Core *CME 75/split spoon*
Drill Co. *West Hazmat* Method *HSA*
Driller *Mike Barr* Log By *Bob Davis* Date *6/1/95* Permit # *N/A*
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

Monitoring well GTI-35 converted from 2-inch diameter exploration well RW-6B. Steel well monument installed. DI363

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							All percentages are approximate.
0						SM	SILTY SAND: 60% fine sand; 30% silt; 10% medium to coarse sand; brown; moist; no odor.
2							
4						MH	ELASTIC SILT WITH SAND: 50% silt; 30% plastic clay; 20% fine sand; stiff; brown; moist; faint hydrocarbon odor.
							ELASTIC SILT WITH SAND: Same as above, except very moist to wet.
						SM	SILTY SAND: 55% fine sand; 35% silt; 10% clay; medium dense; gray; wet; moderate hydrocarbon odor.
6						SC	CLAYEY SAND: 60% fine sand; 20% clay; 10% silt; 10% medium sand; medium dense; gray; very moist; moderate hydrocarbon odor.
8							
10						SP	POORLY GRADED SAND: 70% medium sand; 20% fine sand; 10% coarse sand; medium dense; light gray-brown; saturated; no hydrocarbon odor.
12							
14		1999+	35-15	5 9 10			POORLY GRADED SAND (SP): 60% fine sand, 35% medium, subrounded to subangular sand; 5% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; weak hydrocarbon odor.
16							

Drilling Log

GROUNDWATER TECHNOLOGY

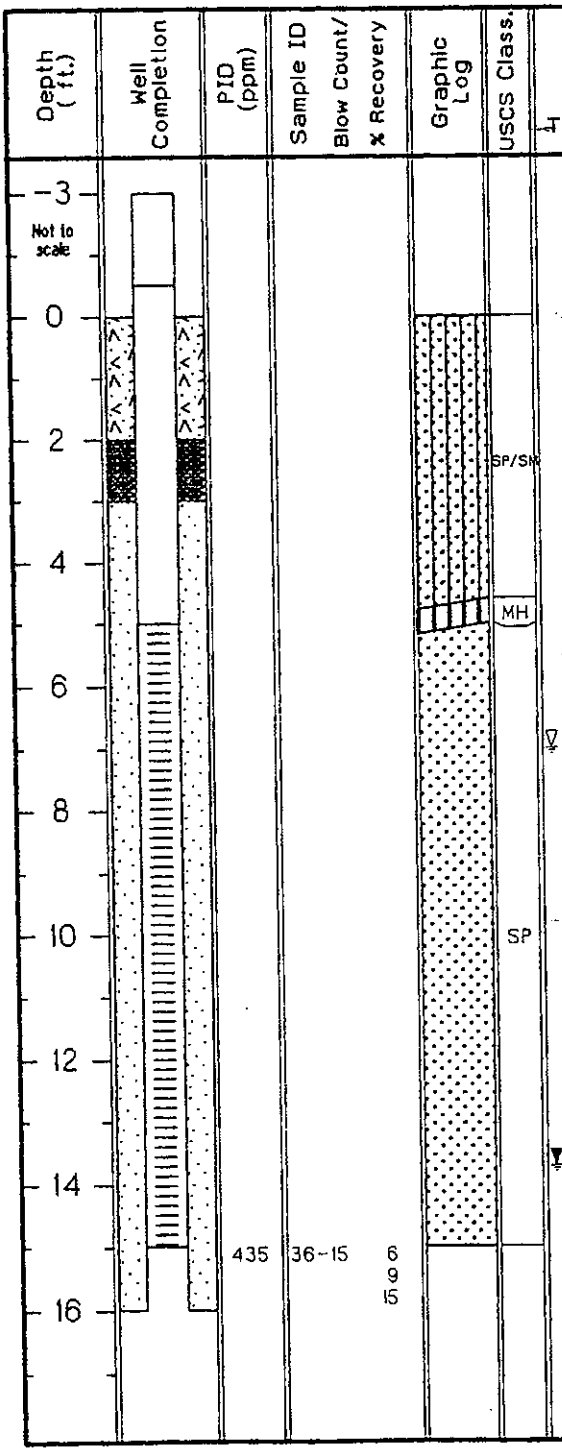
Monitoring Well **GTI-36**

Project *NAS Fallon* Owner *US Navy*
Location *Fallon, NV* Proj. No. *830011068*
Surface Elev. *-- ft.* Total Hole Depth *15 ft.* Diameter *10 in.*
Top of Casing *-- ft.* Water Level Initial *7 ft.* Static *13.71 ft.*
Screen: Dia *4 in.* Length *10 ft.* Type/Size *.010 in.*
Casing: Dia *4 in.* Length *8 ft.* Type *SCH 40 PVC*
Fill Material *#1C sand* Rig/Core *CME 75/split spoon*
Drill Co. *West Hazmat* Method *HSA*
Driller *Mike Barr* Log By *Bob Davis* Date *6/1/95* Permit # *N/A*
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

Monitoring well GTI-36 converted from exploration well RW-6A. Steel well monument installed. DI364



Description

(Color, Texture, Structure)

Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%

All percentages are approximate.

POORLY GRADED SAND WITH SILT: 60% fine sand; 20% medium sand; 10% silt; 10% coarse sand and fine gravel; light brown; moist; no odor.

ELASTIC SILT: 60% silt; 30% clay; 10% fine sand; medium stiff; brown; moist; faint hydrocarbon odor.

POORLY GRADED SAND: 50% medium sand; 40% fine sand; 10% coarse sand; light gray-brown; very moist to wet; loose; faint hydrocarbon odor.

POORLY GRADED SAND: 70% medium sand; 20% fine sand; 10% coarse sand; medium dense; light gray-brown; saturated; faint hydrocarbon odor.

POORLY GRADED SAND: 60% fine, subrounded to subangular sand; 35% medium sand; 5% silt; poorly graded; medium dense; dark yellowish brown (10YR 4/2); moderate hydrocarbon odor.

Drilling Log

GROUNDWATER TECHNOLOGY

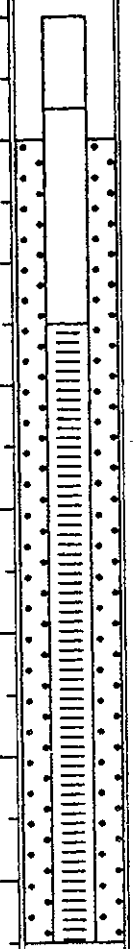
Extract. / Inject. Well **GTI-37**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 13 ft. Diameter N/A in.
Top of Casing -- ft. Water Level Initial 7 ft. Static -- ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .020 in.
Casing: Dia 4 in. Length 7 ft. Type SCH 40 PVC
Fill Material Pea Gravel Rig/Core N/A
Drill Co. West Hazmat Method N/A
Driller Mike Barr Log By N/A Date 6/2/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. Steel well monument installed. D1369

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-4 (Not to scale)							Well installed in open excavation and pea gravel filled around screen and casing. Installation witnessed by a licensed Nevada state driller.
0							
2							
4							
6							
8							
10							
12							
14							
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-4**

Project *NAS Fallon* Owner *US Navy*
Location *Fallon, NV* Proj. No. *830011068*
Surface Elev. *-- ft.* Total Hole Depth *16 ft.* Diameter *10 in.*
Top of Casing *-- ft.* Water Level Initial *7 ft.* Static *10.57 ft.*
Screen: Dia *4 in.* Length *10 ft.* Type/Size *.010 in.*
Casing: Dia *4 in.* Length *8 ft.* Type *SCH 40 PVC*
Fill Material *#IC sand* Rig/Core *CME 75/split spoon*
Drill Co. *West Hazmat* Method *HSA*
Driller *Mike Barr* Log By *Bob Davis* Date *5/23/95* Permit # *N/A*
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL Steel well monument installed. DI371

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							All percentages are approximate.
0							
2						SP/SM	
4			4-5	5 6 8			5', POORLY GRADED SAND WITH SILT (SP-SM): 85% fine, subrounded to subangular sand; 10% silt; 5% subrounded to subangular gravel, 5-20mm; poorly graded; medium dense; dark yellowish brown (10YR 4/2); saturated; strong hydrocarbon odor. Saturated sand due to localized perched zone.
6						CL	6-7', LEAN CLAY (CL): 60% nonplastic clay; 40% silt; dark yellowish brown (10YR 4/2); damp.
8							
10			4-10	7 7 8		ML	10', SILT (ML): 90% silt; 10% fine sand; stiff; dark yellowish brown (10YR 4/2); saturated; strong hydrocarbon odor.
12							
14						CH	15', FAT CLAY (CH): 80% plastic clay; 20% silt; very stiff; moderate yellowish brown (10YR 5/4); saturated; no hydrocarbon odor.
			1-15	8 14 20			
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-5**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 9.25 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/19/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location -

COMMENTS:

FREE PRODUCT RECOVERY WELL DI331

Depth (ft)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2						SM	0-4', SILTY SAND (SM): 70% fine, subrounded to subangular sand; 30% silt; poorly graded; loose; dark yellowish brown (10YR4/2); damp; moderate hydrocarbon odor. Sample from augers.
4							
6		5	GTI5-5	5 6 8		SP	5', POORLY GRADED SAND (SP): 95% fine, subrounded sand; 5% silt; poorly graded; moderately dense; pale yellowish brown (10YR6/2); damp; no odor.
8							
10		69	GTI5-10	7 11 13		SM	10', SILTY SAND (SM): 85% fine, subrounded to subangular sand; 15% silt; poorly graded; medium dense; saturated; moderate hydrocarbon odor.
12							
14							
16		24	GTI5-15	5 8 8		CL	15', LEAN CLAY (CL): 70% clay; 30% silt; very stiff; dark yellowish brown (10YR4/2); saturated; moderate hydrocarbon odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-6**

Project *NAS Fallon* Owner *US Navy*
Location *Fallon, NV* Proj. No. *830011068*
Surface Elev. *-- ft.* Total Hole Depth *16 ft.* Diameter *10 in.*
Top of Casing *-- ft.* Water Level Initial *7.5 ft.* Static *11.26 ft.*
Screen: Dia *4 in.* Length *10 ft.* Type/Size *.010 in.*
Casing: Dia *4 in.* Length *8 ft.* Type *SCH 40 PVC*
Fill Material *#IC sand* Rig/Core *CME 75/split spoon*
Drill Co. *West Hazmat* Method *HSA*
Driller *Mike Barr* Log By *Bob Davis* Date *5/19/95* Permit # *N/A*
Checked By _____ License No. _____

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL Installed 39" steel well monument. D1332

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-3 Not to scale							All percentages are approximate.
0						SM	0-3', SILTY SAND (SM): 75% fine sand; 25% silt; poorly graded; very loose; dark yellowish brown (10YR4/2); damp; no odor. Samples from augers.
2							
4							
6		17	GTI6-5	6 10 14			5', ELASTIC SILT (MH): 70% silt; 20% slightly plastic clay; 10% sand; very stiff; dark yellowish brown (10YR4/2); damp; strong hydrocarbon odor.
8							
10		98	GTI6-10	4 5 8		MH	10', ELASTIC SILT (MH): 70% silt; 30% slightly plastic clay; stiff; dark yellowish brown (10YR4/2); saturated; moderate hydrocarbon odor.
12							
14			GTI6-15	4 6 9			15', ELASTIC SILT (MH): 70% silt; 25% clay; 5% fine, subrounded sand; stiff; dark yellowish brown (10YR4/2); saturated; weak hydrocarbon odor.
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-7**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 8.07 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/23/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL D1372

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2							
4						SP	
6		1	7-5	5 8 12			5', POORLY GRADED SAND (SP): 60% fine sand, 35% medium sand, rounded to subrounded to subangular; 5% silt; poorly graded medium dense; grayish orange (10YR 7/4); moist; no odor.
8							
10		757	7-10	7 9 11		MH	10', ELASTIC SILT (MH): 60% silt; 40% slightly plastic clay; very stiff; olive gray (5Y 4/1); saturated; moderate hydrocarbon odor.
12							
14						CL	
16		20	7-15	3 4 6			15', LEAN CLAY (CL): 80% slightly plastic clay; 20% silt; dark yellowish brown (10YR 4/2); stiff; saturated; faint hydrocarbon odor.

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-8**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 7.68 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 10 ft. Type SCH 40 PVC
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/23/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL DI373

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2							
4						SP	
6		15	8-5	3 4 6			5', POORLY GRADED SAND (SP): 50% fine sand, 45% medium sand. rounded to subrounded to subangular; 5% silt; poorly graded; loose; pale yellowish brown (10YR 6/2); moist; no odor.
8							
10		900	8-10	8 9 16			10', SILT (ML): 90% silt; 10% nonplastic clay; poorly graded; medium dense; olive black (5Y 2/1); saturated; strong hydrocarbon odor.
12						ML	
14		1984	8-15	4 5 7			15', SILT (ML): 85% silt; 10% nonplastic clay; 5% sand; stiff; olive black (5Y 2/1); saturated; strong hydrocarbon odor.
16							

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI-9**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 7 ft. Static 9.10 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/18/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL D1333

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2						ML	0-6', SILT (ML): 75% silt; 15% clay; 10% fine sand; stiff; moderate yellowish brown (10YR5/4); dry; no odor.
4							
		0	GTI9-5	5 6 11			
6							6-6.5', ELASTIC SILT (MH): 75% silt; 25% nonplastic clay; stiff; dark yellowish brown (10YR4/2); dry; no odor.
8						MH	
10		12	GTI9-10	5 5 6			10', ELASTIC SILT WITH SAND (MH): 70% silt; 30% fine, subrounded to subangular sand; stiff; moderate yellowish brown (10YR5/4); saturated; strong hydrocarbon odor.
12							
14						CL	
		12	GTI9-15	6 10 13			15', LEAN CLAY (CL): 80% plastic clay; 20% silt; very stiff; dark yellowish brown (10YR4/2); saturated; strong hydrocarbon odor.
16							

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

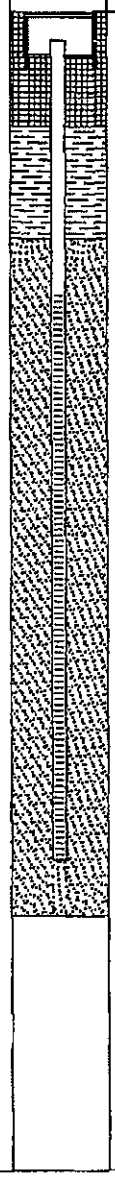
Prepared By: Bob Schlosser Date: 7/20/90 Page: 1 OF 1

Hole No.: MW13 Casing Elevation: 3937.91' Ground Elevation: 3937.88'

Total Depth: 16.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 2

Auger Size: 6" O.D. Sample Type: None

Project: NAS Fallon Date Verified By: David Smuin Date: 7/21/90

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					HOLE NOT LOGGERD SEE MW08 FOR LITHOLOGY
4					
6					
8					
10					
12					
14					SLOTTED SCREEN (0.010") 5.0'-15.0' FRAC SAND (8/12) 4.0'-15.0' BENTONITE PELLETS (1/4") 1.8'-4.0', HYDRATED WITH POTABLE WATER (2 GALLONS)
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

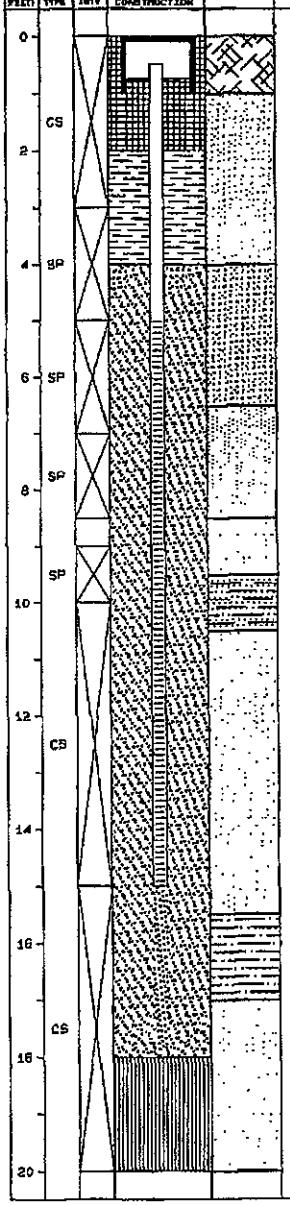
Prepared By: Bob Schlosser Date: 6/16/90 Page: 1 OF 1

Hole No.: MW01 Casing Elevation: 3935.18' Ground Elevation: 3935.30'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Transportation Yard

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2''Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 6/18/90



DESCRIPTION

FILL: silty gravel with sand and clay
READY-MIX CONCRETE, 0'-2' 6/19/90

SW SAND: pale brown (10YR6/3), fine to medium grained, subangular to subrounded, loosley consolidated, abundant feldspars

SW SAND: as above with increasingly more coarse grained, not calcareous, very arkosic, some pebbles to 2 mm

SW SAND: pale brown (10YR6/3), fine to medium grained, some scattered silt, angular, becoming coarser at 7.0', with pebbles to 5 mm, fairly well-graded throughout

SP SAND: color as above, predominantly medium grained, angular, wet at 7.5', grading to

SW SAND: brown (10YR5/3), fine to coarse grained well-graded, abundant feldspar and dark acc. minerals.

CL CLAY: grayish brown, moderately plastic, with some scattered fine grained sand.

SW SAND: grayish brown (10YR5/2) fine to medium grained (fU-mL), some scattered coarse grained, abundant feldspars and dark accessory minerals, arkosic, becoming very fine grained at 13.0', silty in part, micaceous, abundant dark minerals, slightly calcareous.

SLOTTED SCREEN (0.010") 5.0'-15.0'
FRAC SAND (8/12) 4.0'-18.0'
BENTONITE PELLETS (1/4") 1.8'-4.0', HYDRATED WITH POTABLE WATER (2 GALLONS)

CL CLAYEY SILT: damp, slightly plastic, some limonite staining, micaceous, grading to

SW SAND: very fine grained, silty in part, some root hairs, sand mottled dark blue gray.

COMPLETION AT 10 A.M. 6/17/90

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

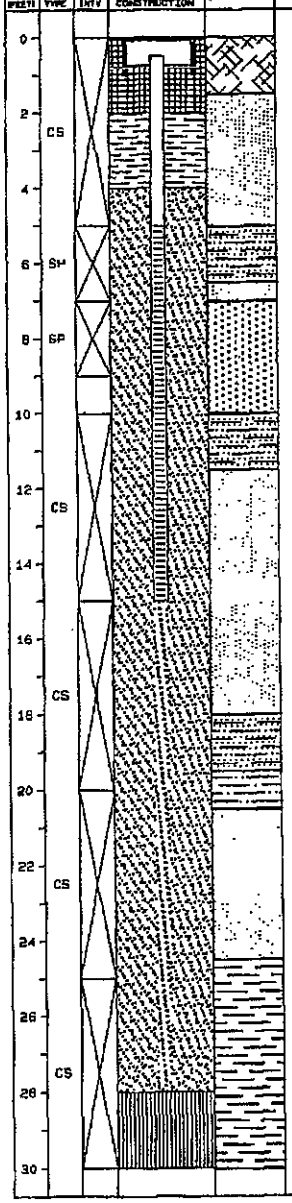
Prepared By: Bob Schlosser Date: 6/24/90 Page: 1 OF 1

Hole No.: MW10 Casing Elevation: 3934.84' Ground Elevation: 3934.85'

Total Depth: 30.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 1

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 6/25/90



DESCRIPTION

FILL: clayey silt mixed with sand and gravel.

CONCRETE, 0'-1.5'
SP SAND: brown (10YR5/3), fine to medium grained, subround to rounded.

CL CLAYEY SILT: dark grayish brown, sandy in part micaceous, dry, some root vessicles.

SP SAND: pale brown (10YR6/3), very fine grained (vfL), micaceous, abundant dark accessory minerals
SW SAND: well graded, fining downward to medium grained (vfUL-mL), saturated.
CL CLAYEY SILT: very sandy, micaceous.

SP SAND: color as above, very fine to medium grained, micaceous, abundant dark minerals.

SP SAND: as above, becomming very fine to fine (vfL-fL), micaceous, black organic bands.

CL CLAYEY SILT: very sandy locally, some iron staining.

SP SAND: clayey in part, very silty.

CL CLAYEY SILT: light brownish gray (2.5YR6/2), blocky, very fine grained sand (vfL) at 22.'& LAHONTAN LAKE contact.

CL CLAY: olive gray (5Y5/2) tight, blocky, dry.

CL CLAY: pale olive, (5Y6/3), mudcracks filled with olive gray (5Y5/3).
SLOTTED SCREEN (0.010") 5.0'-15.0'
FRAC SAND (8/12) 3.5'-21.0'
BENTONITE PELLETS (1/4") 1.5'-3.5', HYDRATED WITH POTABLE WATER (2 GALLONS)

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

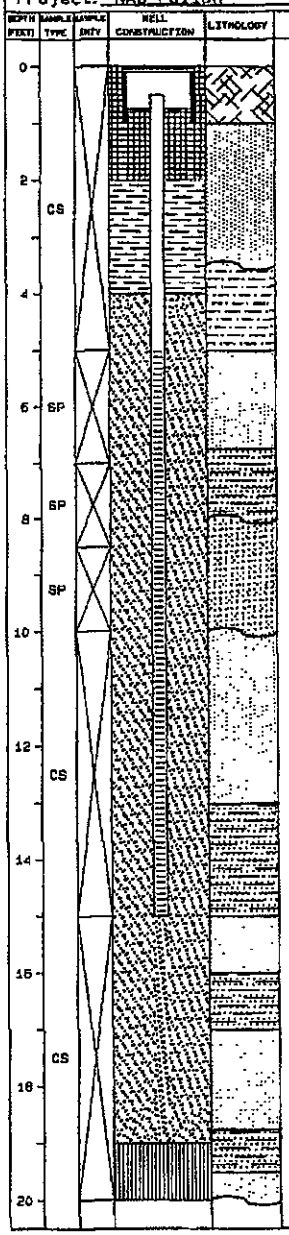
Prepared By: Bob Schlosser Date: 6/17/90 Page: 1 OF 1

Hole No.: MW02 Casing Elevation: 3933.76' Ground Elevation: 3935.95'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Transportation Yard

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smyth Date: 6/18/90



DESCRIPTION

FILL: 15mm gravel with sand.

READY-MIX CONCRETE, 0'-2' 6/19/90

SP SAND: pale brown (10YR6/3), fine to medium grained (fU-mL), some scattered coarse (cL), angular, micaceous, silty in part, some limonite staining

BENTONITE PELLETS (1/4"), 2.0'-4.0'

SP SAND: as above with increasing percentage of silt, grading to vfU-fL, some scattered feldspar and scattered limonite staining, moist

SP SAND: brown (10YR5/3), vfU-fL, increasing mica content

CL CLAYEY SILT: dark grayish brown (10YR4/2), some scattered vfU sand, root hairs locally, some black and limonite staining, micaceous, increasingly higher percent sand, grading to

SW SAND: color as above, medium to coarse grained (mL-vcL), subangular-rounded, arkosic, abundant potassium feldspar, dark accessory minerals

VPS: abundant cavings from previous splitspoons

SP SAND: arkosic, becoming very fine grained, silty in part, micaceous, abundant dark minerals, slightly calcareous.

SLOTTED SCREEN (0.010") 5.0'-15.0'
FRAC SAND (8/12) 4.0'-19.0'
BENTONITE PELLETS (1/4") 2.0'-4.0', HYDRATED WITH POTABLE WATER (2 GALLONS)

CL CLAYEY SILT: damp, slightly plastic

SP SAND: very fine grained, micaceous

CL CLAYEY SILT: high percent clay, scattered root hairs

SP SAND: as above, becoming fL-fU, rounded

NATIVE FILL 19.0'-20.0'

CL CLAYEY SILT: as above, some limonite staining

SP SAND: very fine grained, abundant black min.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

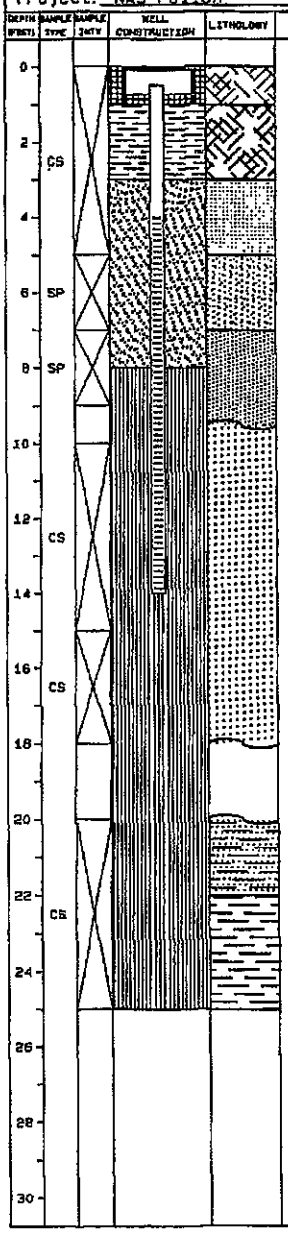
Prepared By: Bob Schlosser Date: 6/18/90 Page: 1 OF 1

Hole No.: MW04 Casing Elevation: 3934.02' Ground Elevation: 3934.23'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 2 Downgradient

Auger Size: 8" O.D. Sample Type: 3'x5' Continuous, 2.5'x2" Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 6/19/90



DESCRIPTION

FILL: large 3" boulders.
READY-MIX CONCRETE 0-1' 6/19/90

FILL: dark gray clayey silt

SP SAND: pale brown (10YR6/3), very fine to fine grained (vfU-fL), subangular to subrounded, some root hairs and clay.

SW SAND: fine to coarse grained (fU-cL) mostly medium (mU) grained, subangular to subrounded, abundant mica and dark minerals, becoming increasingly coarse downward.

SP SAND: pale brown (10YR6/3), predominantly subrounded to rounded, some limonite staining locally, silty occasionally

SAND SURGED, HOLE DRILLED TO 10.0'

SW SAND: pale brown (10YR6/3), medium to coarse grained (mL-vcU), rounded to well rounded, becoming coarser downward, saturated, abundant feldspar, mica, and accessory minerals, slightly arkosic. From 13'-14' abundant 3-4 mm dark accessory minerals. From 14'-17' cL-vcU, predominantly vcL, well graded throughout the interval from 10'-15', saturated, mostly translucent quartz
SLOTTED SCREEN (0.010") 4.0'-14.0'
FRAC SAND (8/12) 3.0'-8.0'
BENTONITE PELLETS (1/4") 1.0'-3.0'

LOST 18.0'-20.0' WASHED OUT

CL CLAY: olive (5Y4/3), hackly fractured, from 20' to 23', interbedded every 10 mm, very fine grained sand in 5-10 mm beds, strong limonite staining. (CARSON RIVER-LAHONTAN LAKE CONTACT)

CL CLAY: as above, becoming very tight

BENTONITE PELLETS HYDRATED WITH POTABLE WATER, (2 GALLONS)

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

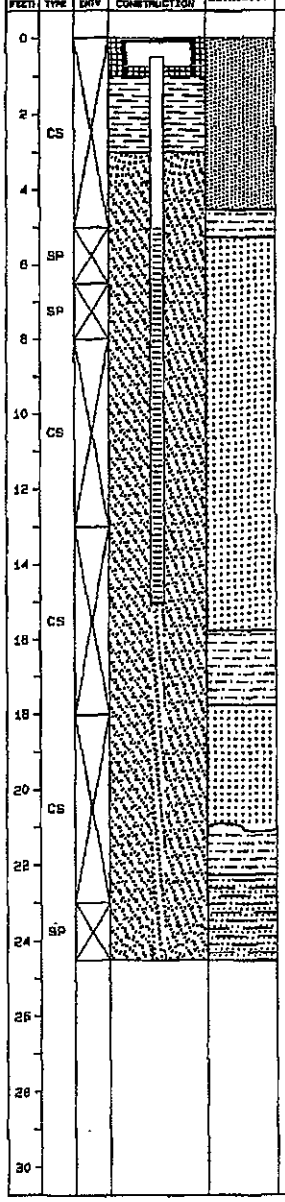
Prepared By: S.R. Sturm Date: 11/23/91 Page: 1 OF 1

Hole No.: MW59 Casing Elevation: 3933.83' Ground Elevation: 3933.94'

Total Depth: 24.5' No. of Compl.: 1 Rig Type: CME-75 Location: Site 2

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

SP SAND: brown (10YR4/3), fL-mL, subangular to subrounded, scattered pebbles, silty.

SM SILTY SAND: very drak grayish brown (10YR2/2), mottled by humus and Fe oxides.

SW SAND: brown (10YR4/3), fU-vcL, subrounded to rounded, pebbles 2-5mm, 50/50 clear and milky quartz, 5% dark minerals.

SW SAND: as above, becoming coarser, predominantly vcL, zones of Fe staining from pre-existing water table, saturated.

SM SILTY SAND: brown (10YR4/3), vfL, stiff, abundant fines, cohesive, saturated.

SW : as above, saturated.

SM SILTY SAND: olive (5Y5/4), MARKER BEDS at 22.5' and 23.0'.

SC SILTY CLAY: olive, vfL but increasing clay content causing hackley fracturing, becoming tight and dry.

CONCRETE 0-1'
BENTONITE PELLETS (3/8") 1.0'-3.0'
FRAC SAND (#2), 3.0'-24.5'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: Bob Schlosser Date: 6/19/90 Page: 1 OF 1

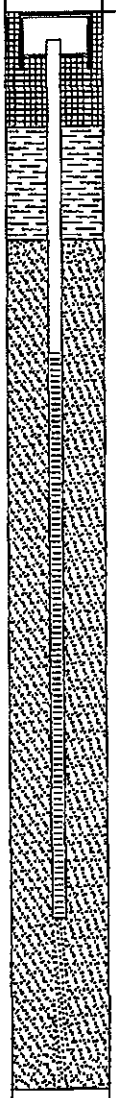
Hole No.: MW05U Casing Elevation: 3934.41' Ground Elevation: 3935.46'

Total Depth: 19.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 2

Auger Size: 8" O.D. Sample Type: None

Project: NAS Fallon Data Verified By: David Smuin Date: 6/20/90

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					HOLE NOT LOGGED. SEE MW05L
4					READY-MIX CONCRETE. 0'-2' 6/19/90
6					AUGER TO 19.0' SET CASING 16.0'
8					
10					
12					SLOTTED SCREEN (0.010") 6.0'-16.0' FRAC SAND (8/12) 4.0'-19.0' BENTONITE PELLETS (1/4") 2.0'-4.0', HYDRATED WITH POTABLE WATER (2 GALLONS)
14					
16					
18					
20					



Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

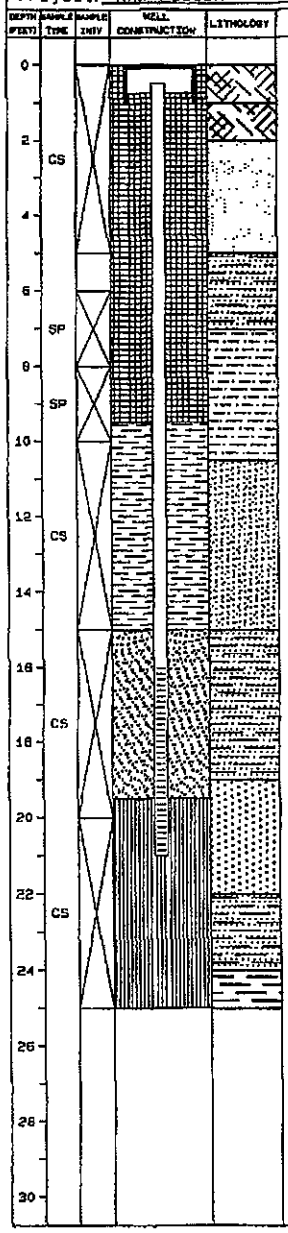
Prepared By: Bob Schlosser Date: 6/19/90 Page: 1 OF 1

Hole No.: MW05L Casing Elevation: 3934.49' Ground Elevation: 3934.46'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 2

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 6/20/90



DESCRIPTION

FILL: 8-15 mm gravel silty clay matrix

FILL: clayey silt, dark brown and olive

SP SAND: pale brown (10YR6/3), fine grained (fU) subangular to subrounded, calcareous locally micaceous, root hairs, well consolidated

CL CLAYEY SILT: very dark gray (10YR3/2), stiff, calcareous in part, abundant root hairs, micaceous

SP SAND: grayish brown (10YR5/2), mottled very dark gray (2.5N3/) occasionally, saturated at 7.5'.

SP SAND: color as above, very silty

SW SAND: grayish brown (10YR5/2), fine to medium grained (fL-mL) subrounded to rounded, some feldspars and dark accessory minerals, loosly consolidated, well-graded

SAND SURGED UP AUGER 2.0' DURING CONNECTION

CL CLAYEY SILT: brown (10YR5/3), very mottled and streak dark gray (5Y4/1), abundant limonite staining, root vesicles mottled dark gray, dry to moist, micaceous

SW SAND: pale brown (10YR6/3), fine to coarse grained (fU-vcL), dark reduced areas very obvious abundant root vesicles, saturated at 19.0'.

CL CLAYEY SILT: light olive brown (2.5Y5/4), with thick 2-5 mm strong limonite stained very fine grained sand beds 23'-24' CARSON RIVER-LAHONTON RIVER CONTACT

CL CLAY: olive (5Y4/3), blocky, very dry, mottled olive (5Y5/4)

SLOTTED SCREEN (0.010") 16.0'-21.0'
FRAC SAND (8/12) 15.0'-19.0'
BENTONITE PELLETS (1/4") 10.0'-15.0', HYDRATED WITH POTABLE WATER (2 GALLONS)

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: S.R. Sturm Date: 11/23/91 Page: 1 OF 1

Hole No.: MW60 Casing Elevation: 3933.52' Ground Elevation: 3933.92'

Total Depth: 23' No. of Compl.: 1 Rig Type: CME-75 Location: Site 2

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					FILL: road base.
					SP SAND: brown (10YR4/3), vfL-FL, silty, damp at
2	CS				LOST 2'-5'
4					
6	SP				SW SAND: light gray (10YR7/2), fL-vcU, subrounded, pebbles 2-5mm, clear and milky quartz, 1-2% mafics, damp.
	SP				
8					
10	CS				
12					SC SANDY CLAY: brown (10YR5/3), stiff, fat clay, tight, blocky structure with hackly fractures, concentric banded Fe oxide and limonite stains.
14					SM SILTY SAND: olive, abundate fines, saturated.
16	CS				
18					SM SILTY SAND: olive, vfL, increasing fines with depth, MARKER BED at 20.5'.
20	CS				
22					SC SANDY CLAY: olive, becoming dense and dry.
24					CONCRETE 0-2' BENTONITE PELLETS (3/8") 2.0'-4.0' FRAC SAND (#2), 4.0'-23' SLOTTED 2" PVC SCREEN (0.010") 5'-15'
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: S.R. Sturm Date: 11/23/91 Page: 1 OF 1

Hole No.: MW61 Casing Elevation: 3935.13' Ground Elevation: 3935.81'

Total Depth: 18' No. of Compl.: 1 Rig Type: CME-75 Location: Site 2

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					SP SAND: grayish brown (10YR5/2), vfL, frosted grains, eolian, becoming damp at 1.5'.
2	CS				SM SILTY SAND: brown (10YR4/3), vfL-vfU, abundant fines, roots, open pores, micaceous, abundant organic debris, subrounded.
4					
6	SP				SP SAND: brown (10YR4/3), fL-vcU, becoming coarser with depth to SW SAND, angular to round, <5% mafics, saturated.
8	SP				SM SILTY SAND: brown (10YR4/3), vfL-vfU, abundant fines, cohesive, firm.
10	CS				
12					SW SAND: light gray (10YR7/2), fL-vcU, subrounded, clear quartz, 10% mafics, pebbles to 2mm.
14					NO RECOVERY, 13'-18'. HEAVING SANDS. Most likely SW or SP SAND.
16	CS				
18					CONCRETE 0-1' BENTONITE PELLETS (3/8") 1.0'-3.0' FRAC SAND (#2) 3.0'-18.0' SLOTTED 2" PVC SCREEN (0.010") 5'-15'
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: S.R. Sturm Date: 11/24/91 Page: 1 OF 1

Hole No.: MW62 Casing Elevation: 3935.53' Ground Elevation: 3935.77'

Total Depth: 24.5' No. of Compl.: 1 Rig Type: CME-75 Location: Site 2

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV.	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					SP SAND: grayish brown (10YR5/2), vfL, silty, dry, clear quartz, becoming damp at 2.0'.
2	CS				
4					SM SILTY SAND: brown (10YR4/3), vfL-vfU, abundant fines, roots, open pores, with caliche infill, micaceous.
6	SP				SP SAND: light brownish gray (10YR6/2), vfL-vfU, subangular, 5% mafics, predominantly clear quartz, very few fines.
8	SP				SM SILTY SAND: color as above, wet.
10	CS				SW SAND: brown (10YR4/3), vfL-vcL, predominantly clear quartz, <5% mafics, saturated.
12					
14					SM SILTY SAND: as above, saturated.
16	CS				SW SAND: brown (10YR4/3), as above with fines, saturated.
18					SM SILTY SAND: brown (10YR4/3), as above, saturated
20	CS				SM SILTY SAND: olive, vfL, increasing fines, becoming less moist.
22					CS SILTY CLAY: olive, MARKER BEDS at 24.0'-24.2', blocky, dry.
24	SP				CONCRETE 0-.2' BENTONITE PELLETS (3/8") 0.2'-2.0' FRAC SAND (#2), 2.0'-24.5' SLOTTED 2" PVC SCREEN (0.010") 4'-14'
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

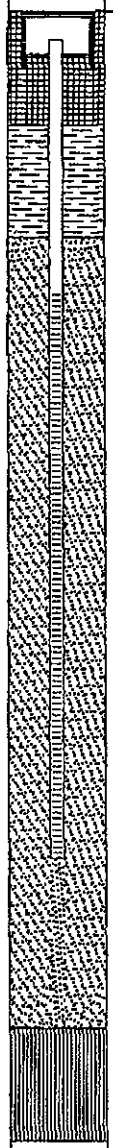
Prepared By: Bob Schlosser Date: 6/22/90 Page: 1 OF 1

Hole No.: MW06U Casing Elevation: 3935.75' Ground Elevation: 3935.58'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 2

Auger Size: 8" O.D. Sample Type: None

Project: NAS Fallon Data Verified By: David Smuin Date: 6/23/90

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					HOLE NOT LOGGED. SEE MW06L
4					CONCRETE SURFACE SEAL. 0'-2'
6					AUGER TO 20.0' SET CASING 15.0'
8					
10					
12					SLOTTED SCREEN (0.010") 5.0'-15.0' FRAC SAND (8/12) 4.0'-18.0' BENTONITE PELLETS (1/4") 2.0'-4.0', HYDRATED WITH POTABLE WATER (2 GALLONS)
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

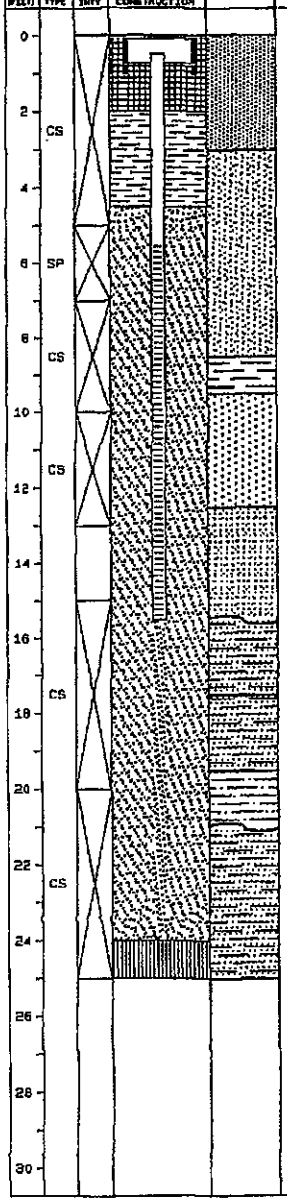
Prepared By: Bob Schlosser Date: 6/22/90 Page: 1 OF 1

Hole No.: MW07 Casing Elevation: 3935.09' Ground Elevation: 3935.09'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 2 downgradient

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 6/23/90



DESCRIPTION

SP SAND: very pale brown (10YR7/3), fine to medium grained (fL-mU), silty locally, wood debris, root vessicles

SW SAND: brown, (10YR5/3), fine to medium grained (fL-mU), predominantly subround, some limonite staining, at 6.0' becoming fU-cL, very well graded, saturated at 6.5', with black organics

CL CLAY: dark grayish brown (10YR4/2), silty in part mottled gray (2.5YRN/5), wood and roots

SW SAND: brown (10YR5/3), medium to coarse grained (mU-vcL), loosely consolidated with feldspar

SW SAND: dark grayish brown (10YR4/2), medium to coarse grained (mL-vcU), pebbles 2-10 mm, arkosic micaceous, abundant accessory minerals

LOST 13'-15' DURING RETRIEVAL

CL CLAYEY SILT: olive brown (2.5Y4/4), micaceous, with root vessicles and limonite staining.

CL CLAYEY SILT: as above, scattered sand

SP SAND: fine grained, heavy limonite staining, CARSON RIVER-LAHONTON LAKE MARKER BED

CL CLAYEY SILT: tight, becoming predominantly clay at 23.0', mottled dark greenish gray (5G4/1) throughout

SLOTTED SCREEN (0.010") 5.0'-15.0'
FRAC SAND (8/12) 4.5'-19.0'
BENTONITE PELLETS (1/4") 2.0'-4.5', HYDRATED WITH POTABLE WATER (2 GALLONS)
NATIVE FILL 19.0'-20.0'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: Bob Schlosser Date: 6/23/90 Page: 1 OF 1

Hole No.: MWD9 Casing Elevation: 3935.91' Ground Elevation: 3935.93'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 1

Auger Size: 8" O.D. Sample Type: 3"x5', Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 6/24/90

DEPTH FEET	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					FILL: gravelly clay
2	CS				CONCRETE, 0'-1.5' SP SAND: pale brown (10YR6/3), fine to medium grained, subangular to subrounded, some iron staining, silty in part, becoming predominantly medium grained downward
4					
6	SP				SP SAND: pale brown (10YR6/3), fine to medium grained, subangular to subrounded, some iron staining, very silty
8	SP				
10					SW SAND: grayish brown (10YR5/2), fine to coarse grained (fL-vcL), well graded, subangular to subrounded, abundant limonite staining on dark mineral surfaces.
12	CS				SP SAND: color as above, predominantly medium grained, micaceous, tight, well consolidated, some dark organic streaks bedded in 1mm layers, saturated
14					
16					SP SAND: as above, becomming medium to coarse (mL-cL), very micaceous, some limonite staining locally, saturated
18	CS				
20					SW SAND: medium to coarse grained (mL-vcL) subangular to subround, abundant 3-4 mm pebbles, arkosic, some dark accessory minerals, saturated
22					CL CLAYEY SILT: pale yellow (2.5YR7/6), very fine grained sand (vfL) at 22.5'&23.0' with very heavy limonite staining. CARSON RIVER-LAHONTON LAKE contact
24					
26					SLOTTED SCREEN (0.010") 5.0'-15.0' FRAC SAND (8/12) 3.5'-21.0' BENTONITE PELLETS (1/4") 1.5'-3.5', HYDRATED WITH POTABLE WATER (2 GALLONS)
28					
30					

DRILLING & LITHOLOGIC LOG

Well/Boring #OBS1

Project: RAC D.O. #4 NAS Fallon	Owner: NAS Fallon
Location: NAS Fallon, Nevada	Project Number: 830011068
Date Drilled: June 3, 1993	Total Depth of Boring (feet): 20 Diameter (inches): 8
Surface Elevation AMSL (feet): ~3934.00	Total Depth of Well (feet): 20
Depth-to-Water at Time of Drilling (feet): 7.5	24-Hour Water Level (feet): N/A
Screen Diameter (inches): 2	Length (feet): 15 Slot Size (inches): 0.02
Casing Diameter (inches): 2	Length (feet): 5below/3above GR Type: Schedule 40 PVC
Drilling Company: PC Exploration	Drilling Method: Hollow Stem Auger
Sample Type: Mod. CA Split Spoon (3-6" stainless steel rings)	Core Sample Diameter (inches): 2

Core Sample Condition Legend: Undisturbed, Disturbed, No Recovery

Elevation Symbols: Groundwater, Perched Water, Free Product

Driller: Randy Smith Log By: Doug Ford Checked By: M. Blundell

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
0							Grade		Open grade.
								SM	Silty SAND: Olive-brown, 55% fine Sand, 30% Silt, 10% Clay, 5% fine Gravel; moist, faint hydrocarbon odor.
								CL	Lean CLAY with Sand: Light gray, 50% Clay, 30% Silt, 20% fine Sand; moist, moderate hydrocarbon odor.
5			2300	OBS1-5		4, 2, 3		ML, SP	Sandy SILT: Gray, 60% Silt, 30% fine Sand, 10% Clay; stiff, moist. Poorly graded SAND: Mottled gray-black, 100% fine Sand; very strong hydrocarbon odor. Saturated with free product at 5 feet.
6.6						4		CL	Lean CLAY with Sand: Gray, same as above, free product present.
			900	OBS1-7		5, 6		SM	Silty SAND: Gray, 60% fine Sand, 20% Silt, 10% medium Sand, 10% Clay; groundwater at 7.5 feet, medium dense, very strong hydrocarbon odor.
10			180	OBS1-10		3, 7, 12		SP	Poorly graded SAND: Light gray-brown, 60% medium Sand, 40% fine Sand; medium dense, water saturated, faint hydrocarbon odor.
									Logged auger flights last 9 feet.
15								SP	Poorly graded SAND: As above.
17								CL	Lean CLAY: Light olive-gray, 60% Clay, 30% silt, 10% fine Sand; moist, stiff, plastic, no hydrocarbon odor.

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DRILLING & LITHOLOGIC LOG

Well/Boring #OBS1

Project: RAC D.O. #4 NAS Fallon

Owner: NAS Fallon

Location: NAS Fallon, Nevada

Project Number: 830011068

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
								CL	Lean CLAY: As above.
20									Ended drilling at 20 feet. Sampled to 10.5 feet. Soil cuttings placed in labeled 55-gallon drum, and sealed. Boring converted to groundwater monitoring well. All percentages are approximate.
25									
30									
35									
40									
45									

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September 3, 1993 | Drawn By: GTI (b) | Page: 2 of 2

DRILLING & LITHOLOGIC LOG

Well/Boring #OBS2

Project: RAC D.O. #4 NAS Fallon	Owner: NAS Fallon
Location: NAS Fallon, Nevada	Project Number: 830011068
Date Drilled: June 2, 1993	Total Depth of Boring (feet): 20.5 Diameter (inches): 8
Surface Elevation AMSL (feet): ~3937.00	Total Depth of Well (feet): 20
Depth-to-Water at Time of Drilling (feet): 10	24-Hour Water Level (feet): N/A
Screen Diameter (inches): 2	Length (feet): 15 Slot Size (inches): 0.02
Casing Diameter (inches): 2	Length (feet): 5 Type: Schedule 40 PVC
Drilling Company: PC Exploration	Drilling Method: Hollow Stem Auger
Sample Type: Mod. CA Split Spoon (3-6" stainless steel rings)	Core Sample Diameter (inches): 2

Core Sample Condition Legend: Undisturbed; Disturbed; No Recovery

Elevation Symbols: Groundwater; Perched Water; Free Product

Driller: Randy Smith Log By: Doug Ford Checked By: M. Blundell

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
0							Grade		Open grade.
								SM	Silty SAND: Brown, 60% fine Sand, 15% Silt, 10% medium Sand, 10% fine Gravel, 5% Clay; moist, no hydrocarbon odor.
5			5	OBS2-5		2 4 4		SM	Silty SAND: Brown, 80% fine Sand, 15% Silt, 5% medium Sand; moist, loose, no hydrocarbon odor.
6									water rose to this level
								SM	Silty SAND: Olive-gray, 70% fine Sand, 20% Silt, 10% medium Sand; very moist to saturated at 10 feet, medium dense, strong hydrocarbon odor.
10			700	OBS2-10		2 5 8		SP	Poorly graded SAND: Brown, 75% fine Sand, 20% medium Sand, 5% Silt; medium dense, water saturated, faint hydrocarbon odor.
15			32	OBS2-15		3 6 9		SP	Poorly graded SAND: Light gray-brown, 60% medium Sand, 30% fine Sand, 5% coarse Sand, 5% Silt; medium dense, water saturated, no hydrocarbon odor.
18								ML	

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DRILLING & LITHOLOGIC LOG

Well/Boring #OBS2

Project: RAC D.O. #4 NAS Fallon

Owner: NAS Fallon

Location: NAS Fallon, Nevada

Project Number: 830011068

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
20			5	OBS2-20		2 3 3		ML	SILT with Sand: Mottled light gray-brown, 60% Silt, 20% Clay, 20% fine Sand; wet to very moist, medium stiff, no hydrocarbon odor.
									Drilled and sampled to 20.5 feet. Boring converted to groundwater observation well. Drilled 6/2/93, well set 6/3/93. Soil cuttings placed in 55-gallon drums, sealed, and labeled. All percentages are approximate.
25									
30									
35									
40									
45									

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DRILLING & LITHOLOGIC LOG

Well/Boring #VT1

Project: RAC D.O. #4 NAS Fallon	Owner: NAS Fallon
Location: NAS Fallon, Nevada	Project Number: 830011068
Date Drilled: June 2, 1993	Total Depth of Boring (feet): 10.5 Diameter (inches): 8
Surface Elevation AMSL (feet): ~3934.00	Total Depth of Well (feet): 9
Depth-to-Water at Time of Drilling (feet): 6.5	24-Hour Water Level (feet): N/A
Screen Diameter (inches): 2	Length (feet): 5 Slot Size (inches): 0.020
Casing Diameter (inches): 2	Length (feet): 4below/3above GR Type: Schedule 40 PVC
Drilling Company: PC Exploration	Drilling Method: Hollow Stem Auger
Sample Type: Mod. CA Split Spoon (3-6" stainless steel rings)	Core Sample Diameter (inches): 2

Core Sample Condition Legend: Undisturbed; Disturbed; No Recovery

Elevation Symbols: Groundwater; Perched Water; Free Product

Driller: Randy Smith Log By: Doug Ford Checked By: [signature]

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
0							Grade		Open grade.
								SM	Silty SAND: Brown, 70% fine Sand, 20% Silt, 10% fine Gravel, 10% medium Sand; moist, faint hydrocarbon odor.
								GP	Poorly Graded GRAVEL: Dark gray, 90% fine-coarse Gravel, 10% medium to coarse Sand, strong hydrocarbon odor, water and oil saturated. (leach field)
5			500	VT1-5		3 2 3		MH	Sandy Elastic SILT: Olive-gray, 50% Silt, 30% fine Sand, 20% Clay; medium stiff, moist, water saturated at 6.5 feet, strong hydrocarbon odor.
								SM	Silty SAND: Brown to gray-brown, 60% fine Sand, 30% Silt, 10% Clay; water saturated, strong to moderate hydrocarbon odor.
10			16	VT1-10		5 8 10		CL	Lean CLAY: Brown, 70% Clay, 20% Silt, 10% fine Sand; moist, stiff, plastic, faint to no hydrocarbon odor.
15									Ended drilling and sampling at 10.5 feet. Soil cuttings placed in 55-gallon drum, sealed, and labeled. Boring converted to vapor observation well. All percentages are approximate.

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DRILLING & LITHOLOGIC LOG

Well/Boring #VT1

Project: RAC D.O. #4 NAS Fallon	Owner: NAS Fallon
Location: NAS Fallon, Nevada	Project Number: 830011068
Date Drilled: June 2, 1993	Total Depth of Boring (feet): 10.5 Diameter (inches): 8
Surface Elevation AMSL (feet): ~3934.00	Total Depth of Well (feet): 9
Depth-to-Water at Time of Drilling (feet): 6.5	24-Hour Water Level (feet): N/A
Screen Diameter (inches): 2	Length (feet): 5 Slot Size (inches): 0.020
Casing Diameter (inches): 2	Length (feet): 4below/3above GR Type: Schedule 40 PVC
Drilling Company: PC Exploration	Drilling Method: Hollow Stem Auger
Sample Type: Mod. CA Split Spoon (3-6" stainless steel rings)	Core Sample Diameter (inches): 2

Core Sample Condition Legend: Undisturbed; Disturbed; No Recovery

Elevation Symbols: Groundwater; Perched Water; Free Product

Driller: Randy Smith Log By: Doug Ford Checked By: J.M. Blundell

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
0							Grade		Open grade.
								SM	Silty SAND: Brown, 70% fine Sand, 20% Silt, 10% fine Gravel, 10% medium Sand; moist, faint hydrocarbon odor.
								GP	Poorly Graded GRAVEL: Dark gray, 90% fine-coarse Gravel, 10% medium to coarse Sand, strong hydrocarbon odor, water and oil saturated. (leach field)
5			500	VT1-5		3 2 3		MH	Sandy Elastic SILT: Olive-gray, 50% Silt, 30% fine Sand, 20% Clay; medium stiff, moist, water saturated at 6.5 feet, strong hydrocarbon odor.
								SM	Silty SAND: Brown to gray-brown, 60% fine Sand, 30% Silt, 10% Clay; water saturated, strong to moderate hydrocarbon odor.
10			16	VT1-10		5 6 10		CL	Lean CLAY: Brown, 70% Clay, 20% Silt, 10% fine Sand; moist, stiff, plastic, faint to no hydrocarbon odor.
15									Ended drilling and sampling at 10.5 feet. Soil cuttings placed in 55-gallon drum, sealed, and labeled. Boring converted to vapor observation well. All percentages are approximate.

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DRILLING & LITHOLOGIC LOG

Well/Boring #VT2

Project: RAC D.O. #4 NAS Fallon	Owner: NAS Fallon
Location: NAS Fallon, Nevada	Project Number: 830011068
Date Drilled: June 2, 1993	Total Depth of Boring (feet): 10.5 Diameter (inches): 8
Surface Elevation AMSL (feet): ~3934.00	Total Depth of Well (feet): 9
Depth-to-Water at Time of Drilling (feet): 6.5	24-Hour Water Level (feet): N/A
Screen Diameter (inches): 2	Length (feet): 5 Slot Size (inches): 0.020
Casing Diameter (inches): 2	Length (feet): 4below/3above GR Type: Schedule 40 PVC
Drilling Company: PC Exploration	Drilling Method: Hollow Stem Auger
Sample Type: Mod. CA Split Spoon (3-6" stainless steel rings)	Core Sample Diameter (inches): 2

Core Sample Condition Legend: Undisturbed, Disturbed, No Recovery

Elevation Symbols: Groundwater, Perched Water, Free Product

Driller: Randy Smith Log By: Doug Ford Checked By: M. Blundell

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
0							Grade		Open grade.
								SM	Silty SAND: Brown, 60% fine Sand, 20% Silt, 10% fine Gravel, 5% medium Sand, 5% Clay; moist, moderate hydrocarbon odor at 2 feet.
								SC	Clayey SAND: Olive gray, 70% fine Sand, 30% Clay; moist, loose, moderate hydrocarbon odor.
5			150	VT2-5		3 4 3 2		SM	Silty SAND: Olive gray, 60% fine Sand, 30% Silt, 10% Clay; loose, strong hydrocarbon odor, very moist at 6 feet, wet to water-saturated at 6.5 feet, product saturated at 7 feet.
			500	VT2-7		4 4		SM	Silty SAND: Gray-black, same as above. Free product with groundwater.
10			30	VT2-10		2 4 5		ML	Clayey SILT: Mottled gray-black to olive brown from 8 to 9.5 feet, brown at 10.5 feet, 60% Silt, 30% Clay, 10% fine Sand; moderate hydrocarbon odor at 9 feet, faint hydrocarbon odor at 10.5 feet, moist at 10 feet.
15									Ended drilling and sampling at 10.5 feet. Soil cuttings placed in 55-gallon drum, labeled, and sealed. Boring converted to vapor observation well. All percentages are approximate.

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DRILLING & LITHOLOGIC LOG

Well/Boring #VT2

Project: RAC D.O. #4 NAS Fallon	Owner: NAS Fallon
Location: NAS Fallon, Nevada	Project Number: 830011068
Date Drilled: June 2, 1993	Total Depth of Boring (feet): 10.5 Diameter (inches): 8
Surface Elevation AMSL (feet): ~3934.00	Total Depth of Well (feet): 9
Depth-to-Water at Time of Drilling (feet): 6.5	24-Hour Water Level (feet): N/A
Screen Diameter (inches): 2	Length (feet): 5 Slot Size (inches): 0.020
Casing Diameter (inches): 2	Length (feet): 4below/3above GR Type: Schedule 40 PVC
Drilling Company: PC Exploration	Drilling Method: Hollow Stem Auger
Sample Type: Mod. CA Split Spoon (3-6" stainless steel rings)	Core Sample Diameter (inches): 2

Core Sample Condition Legend: Undisturbed; Disturbed; No Recovery

Elevation Symbols: Groundwater; Perched Water; Free Product

Driller: Randy Smith Log By: Doug Ford Checked By: M. Blundell

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
							Grade		Open grade.
0								SM	Silty SAND: Brown, 60% fine Sand, 20% Silt, 10% fine Gravel, 5% medium Sand, 5% Clay; moist, moderate hydrocarbon odor at 2 feet.
								SC	Clayey SAND: Olive gray, 70% fine Sand, 30% Clay; moist, loose, moderate hydrocarbon odor.
5			150	VT2-5		3 4 3 2		SM	Silty SAND: Olive gray, 60% fine Sand, 30% Silt, 10% Clay; loose, strong hydrocarbon odor, very moist at 6 feet, wet to water-saturated at 6.5 feet, product saturated at 7 feet.
			500	VT2-7		4 4		SM	Silty SAND: Gray-black, same as above. Free product with groundwater.
10			30	VT2-10		2 4 5		ML	Clayey SILT: Mottled gray-black to olive brown from 8 to 9.5 feet, brown at 10.5 feet, 60% Silt, 30% Clay, 10% fine Sand; moderate hydrocarbon odor at 9 feet, faint hydrocarbon odor at 10.5 feet, moist at 10 feet.
15									Ended drilling and sampling at 10.5 feet. Soil cuttings placed in 55-gallon drum, labeled, and sealed. Boring converted to vapor observation well. All percentages are approximate.

GROUNDWATER TECHNOLOGY, INC.
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September 3, 1993	Drawn By: GTI (b)	Page: 1 of 1

GROUNDWATER TECHNOLOGY, INC.

DRILLING & LITHOLOGIC LOG

Well/Boring #VT3

Project: RAC D.O. #4 NAS Fallon	Owner: NAS Fallon
Location: NAS Fallon, Nevada	Project Number: 830011068
Date Drilled: June 3, 1993	Total Depth of Boring (feet): 11 Diameter (inches): 8
Surface Elevation AMSL (feet): ~3936.00	Total Depth of Well (feet): 9
Depth-to-Water at Time of Drilling (feet): 8	24-Hour Water Level (feet): N/A
Screen Diameter (inches): 2	Length (feet): 5 Slot Size (inches): 0.02
Casing Diameter (inches): 2	Length (feet): 4below/3above GR Type: Schedule 40 PVC
Drilling Company: PC Exploration	Drilling Method: Hollow Stem Auger
Sample Type: Mod. CA Split Spoon (3-6" stainless steel rings)	Core Sample Diameter (inches): 2

Core Sample Condition Legend: Undisturbed, Disturbed, No Recovery

Elevation Symbols: Groundwater, Perched Water, Free Product

Driller: Randy Smith Log By: Doug Ford Checked By: M. Blundell

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
0							Grade		Open grade.
								SM	Silty SAND: Brown, 60% fine Sand, 20% Silt, 10% Clay, 5% fine to coarse Gravel, 5% medium Sand; slightly moist to moist, no hydrocarbon odor.
5			50	VT3-5		2 1 4		SM	Silty SAND: Brown, 60% fine Sand, 20% medium Sand, 15% Silt, 5% Clay; faint to moderate hydrocarbon odor. Very moist at 5.5 feet. Free product present. Clay percentage increases to 20% at 7 feet.
									Water saturated at 8 feet.
10			2000	VT3-10		3 4 3		SP	Poorly graded SAND: Dark gray-black, 40% fine Sand, 40% medium Sand, 15% coarse Sand, 5% Silt; oily sheen of product, sand stained black, sharp hydrocarbon odor.
15									Sampled and drilled to 11 feet. Soil cuttings placed in 55-gallon drum, sealed, and labeled. Boring converted to vapor observation well. All percentages are approximate.

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GROUNDWATER TECHNOLOGY, INC.

September 3, 1993	Drawn By: GTI (b)	Page: 1 of 1

DRILLING & LITHOLOGIC LOG

Well/Boring #VT3

Project: RAC D.O. #4 NAS Fallon	Owner: NAS Fallon
Location: NAS Fallon, Nevada	Project Number: 830011068
Date Drilled: June 3, 1993	Total Depth of Boring (feet): 11 Diameter (inches): 8
Surface Elevation AMSL (feet): ~3936.00	Total Depth of Well (feet): 9
Depth-to-Water at Time of Drilling (feet): 8	24-Hour Water Level (feet): N/A
Screen Diameter (inches): 2	Length (feet): 5 Slot Size (inches): 0.02
Casing Diameter (inches): 2	Length (feet): 4below/3above GR Type: Schedule 40 PVC
Drilling Company: PC Exploration	Drilling Method: Hollow Stem Auger
Sample Type: Mod. CA Split Spoon (3-6" stainless steel rings)	Core Sample Diameter (inches): 2

Core Sample Condition Legend: Undisturbed; Disturbed; No Recovery

Elevation Symbols: Groundwater; Perched Water; Free Product

Driller: Randy Smith Log By: Doug Ford Checked By: M. Blundell

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
0							Grade		Open grade.
								SM	Silty SAND: Brown, 60% fine Sand, 20% Silt, 10% Clay, 5% fine to coarse Gravel, 5% medium Sand; slightly moist to moist, no hydrocarbon odor.
5			50	VT3-5		2 1 4		SM	Silty SAND: Brown, 60% fine Sand, 20% medium Sand, 15% Silt, 5% Clay; faint to moderate hydrocarbon odor. Very moist at 5.5 feet. Free product present. Clay percentage increases to 20% at 7 feet.
									Water saturated at 8 feet.
10			2000	VT3-10		3 4 3		SP	Poorly graded SAND: Dark gray-black, 40% fine Sand, 40% medium Sand, 15% coarse Sand, 5% Silt; oily sheen of product, sand stained black, sharp hydrocarbon odor.
15									Sampled and drilled to 11 feet. Soil cuttings placed in 55-gallon drum, sealed, and labeled. Boring converted to vapor observation well. All percentages are approximate.

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GROUNDWATER TECHNOLOGY, INC.

September 3, 1993 | Drawn By: GTI (b) | Page: 1 of 1

DRILLING & LITHOLOGIC LOG

Well/Boring #VT4

Project: RAC D.O. #4 NAS Fallon	Owner: NAS Fallon
Location: NAS Fallon, Nevada	Project Number: 830011068
Date Drilled: June 3, 1993	Total Depth of Boring (feet): 11 Diameter (inches): 8
Surface Elevation AMSL (feet): ~3936.00	Total Depth of Well (feet): 10
Depth-to-Water at Time of Drilling (feet): 8	24-Hour Water Level (feet): N/A
Screen Diameter (inches): 2	Length (feet): 5 Slot Size (inches): 0.02
Casing Diameter (inches): 2	Length (feet): 5below/3above GR Type: Schedule 40 PVC
Drilling Company: PC Exploration	Drilling Method: Hollow Stem Auger
Sample Type: Mod. CA Split Spoon (3-6" stainless steel rings)	Core Sample Diameter (inches): 2

Core Sample Condition Legend: Undisturbed; Disturbed; No Recovery

Elevation Symbols: Groundwater; Perched Water; Free Product

Driller: Randy Smith Log By: Doug Ford Checked By: M. Blindell

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
0							Grade		Open grade.
								SM	Silty SAND: Brown, 70% fine Sand, 20% Silt, 10% medium Sand; slightly moist to moist, no hydrocarbon odor.
			40	VT4-5		5 8 6		CL	Sandy Lean CLAY: Brown, mottled dark brown, 50% Clay, 30% fine Sand, 20% Silt; moist, stiff, plastic, no hydrocarbon odor.
5						3 5 8		ML	Poor recovery at 7 feet. Sandy SILT: Brown, 50% Silt, 40% fine Sand, 10% Clay; very moist at 7 feet, faint hydrocarbon odor. Groundwater encountered at 8 feet.
			-	VT4-7					
10			40	VT4-10		2 5 6		SP	Poorly graded SAND: Light gray-brown, 50% fine Sand, 40% medium Sand, 10% coarse Sand; medium dense, saturated with water, faint to no hydrocarbon odor.
15									Ended drilling and sampling at 11 feet. Soil cuttings placed in 55-gallon drum, sealed, and labeled. Boring converted to vapor observation well. All percentages are approximate.

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GROUNDWATER TECHNOLOGY, INC.

September 3, 1993	Drawn By: GTI (b)	Page: 1 of 1

DRILLING & LITHOLOGIC LOG

Well/Boring #VT4

Project: RAC D.O. #4 NAS Fallon	Owner: NAS Fallon
Location: NAS Fallon, Nevada	Project Number: 830011068
Date Drilled: June 3, 1993	Total Depth of Boring (feet): 11 Diameter (inches): 8
Surface Elevation AMSL (feet): ~3936.00	Total Depth of Well (feet): 10
Depth-to-Water at Time of Drilling (feet): 8	24-Hour Water Level (feet): N/A
Screen Diameter (inches): 2	Length (feet): 5 Slot Size (inches): 0.02
Casing Diameter (inches): 2	Length (feet): 5below/3above GR Type: Schedule 40 PVC
Drilling Company: PC Exploration	Drilling Method: Hollow Stem Auger
Sample Type: Mod. CA Split Spoon (3-6" stainless steel rings)	Core Sample Diameter (inches): 2

Core Sample Condition Legend: Undisturbed, Disturbed, No Recovery

Elevation Symbols: Groundwater, Perched Water, Free Product

Driller: Randy Smith Log By: Doug Ford Checked By: M. Blumell

Depth (Feet)	Well Const. Pipe	Well Const. Fill	OVA (PPM)	Samples Number	Samples Condition	Samples Blows	Graphic Log	USCS Symbol	Description
0							Grade		Open grade.
								SM	Silty SAND: Brown, 70% fine Sand, 20% Silt, 10% medium Sand; slightly moist to moist, no hydrocarbon odor.
5			40	VT4-5		5 6 6		CL	Sandy Lean CLAY: Brown, mottled dark brown, 50% Clay, 30% fine Sand, 20% Silt; moist, stiff, plastic, no hydrocarbon odor.
			-	VT4-7		3 5 8		ML	Poor recovery at 7 feet. Sandy SILT: Brown, 50% Silt, 40% fine Sand, 10% Clay; very moist at 7 feet, faint hydrocarbon odor. Groundwater encountered at 8 feet.
10			40	VT4-10		2 5 6		SP	Poorly graded SAND: Light gray-brown, 50% fine Sand, 40% medium Sand, 10% coarse Sand; medium dense, saturated with water, faint to no hydrocarbon odor.
15									Ended drilling and sampling at 11 feet. Soil cuttings placed in 55-gallon drum, sealed, and labeled. Boring converted to vapor observation well. All percentages are approximate.

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GROUNDWATER TECHNOLOGY, INC.

September 3, 1993 | Drawn By: GTI (b) | Page: 1 of 1

Installation: NAS Fallon
CTO:
BORING ID: ——
MW ID: TTO2-MW01

DATE: 10/31/07
LOGGED BY: J. Vaughn

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0809								SM	Sand, silty, brown (10YR 5/3), heterolithic, poorly sorted, loose, dry	7	10	40	10	40
									1							
									2							
									3							
									4							
	↓	0813					0.0		5	CL	clay, silty, dark brown (10YR 3/3), stiff, moderate plasticity, damp.				5	95
									6							
							0.0		▽	SM	Sand, silty, clayey, brown (10YR 5/3), soft, ~~pre~~ heterolithic, moderately sorted, wet to saturated.		5	5	65	25
									7							
	↓	0815							8							
									9							
									10							
									11							
	↓	0819							12							
									13							
									14							
									15							
	↓	0821							16							
									17	SW	sand, yellowish brown (10YR 5/4), heterolithic, well-sorted, saturated			85	10	5
									18							
	↓	0825							TD 19		TD at 18.5					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT02-MW01
PROJECT: NAS Fallon Drill+Install
SITE: 2
BOREHOLE NO.: ——
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.29'

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10/31/07 TIME: 0809
WELL INSTALLATION BEGAN:
DATE: 10/31/07 TIME: 0826
WELL INSTALLATION FINISHED:
DATE: 10/31/07 TIME: 0920
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Rhino HSA
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4 1/4" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: 80# pvc monitor pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 4.8'

WELL SCREEN

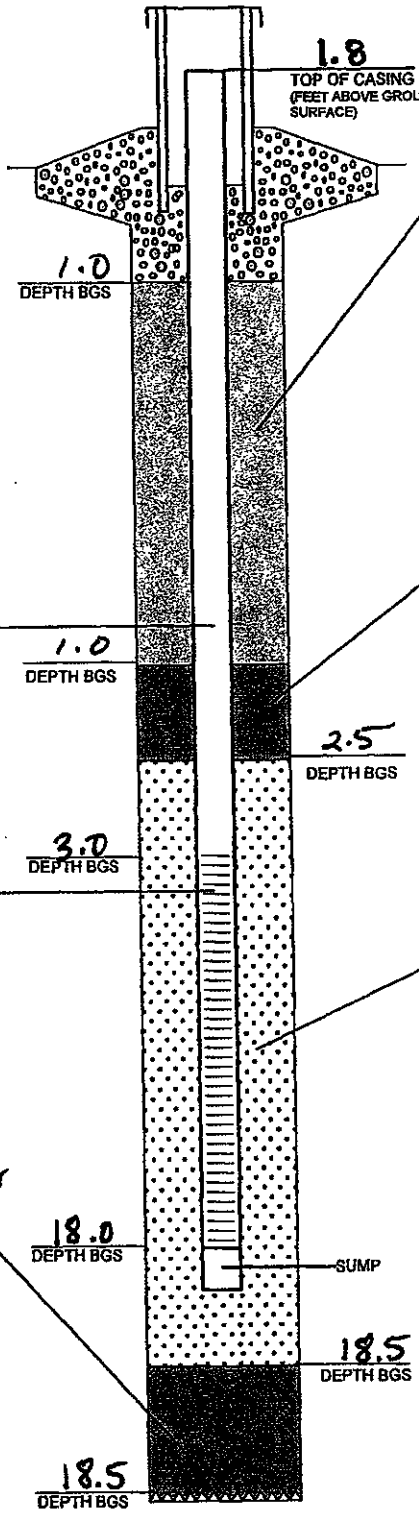
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: pvc monitor screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15 ft

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED: N/A
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND ~~WITH BUMPER POST~~
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☑ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 0.5 ft³
AMOUNT USED: 0.5 ft³
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: medium
☐ OTHER:
PRODUCT: medium bentonite chips
MFG. BY: Pure Gold
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 3 gal.

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 5.1 ft³
AMOUNT USED: 4 ft³
☑ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 10.10' @ 1054 on 10/31
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

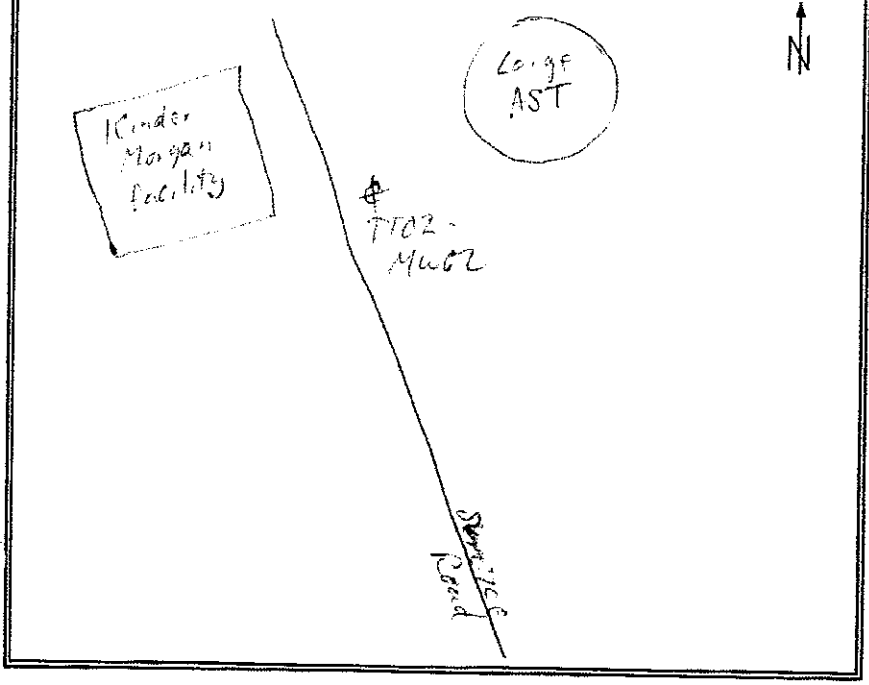
☐ YES ☑ NO; placed inside auge
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TTC2-MW02	
Project Number:	Project Name: RI Addendum
Client: US Navy	
Site: 2	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg	
Drill Rig Type/Method: Mari MST / Hollow stem auger	
Sampler Type: NA	
Borehole Diameter (inches): 8	to: 18 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 11-9-07	Drill Start Time: 1258
Drill Finish Date: 11-9-07	Drill Finish Time:
Total Borehole Depth (feet bgs): 18	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 7	Date: 11-9-07 Time: 1302
Depth to Other Water-Bearing Zones (feet bgs):	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-9-07	Well Completion Time:
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Overdrill of existing well GTI-32
No samples collected
Strong odor noted and black staining
Casing pulled from old well before redrill.

MONITORING WELL COMPLETION RECORD

TETRATECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT02-MW04
PROJECT: NAS Fallon
SITE: 2
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: ~~20.5~~ 22.3

DRILLING INFORMATION

DRILLING BEGAN.
DATE: 3-14-08 TIME: 0756
WELL INSTALLATION BEGAN:
DATE: 3-14-08 TIME: 0820
WELL INSTALLATION FINISHED:
DATE: 3-14-08 TIME: 0916
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2928
DRILL RIG: Mari M5 Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 6.8'

WELL SCREEN

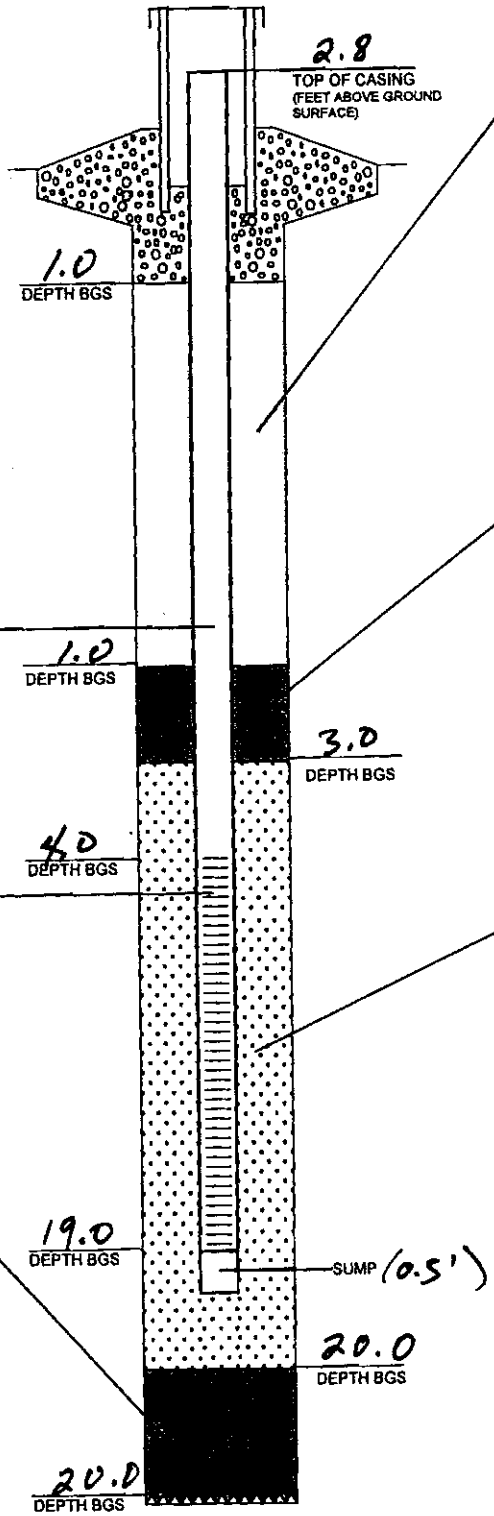
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST (2)
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING.
DATE SURVEYED:
SURVEY CO..

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER

BENTONITE SEAL

VOLUME CALCULATED: 2.6 ft³
AMOUNT USED: ½ x 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8 bentonite
☐ OTHER:
PRODUCT: Holeplug Bentonite
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 22.1 ft³
AMOUNT USED: 6 x 100 lb sacks
☐ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 9.7' bgs
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO: installed in augers
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTM2-MW03
PROJECT: RI Addendum
SITE: 2
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.8

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-9-07 TIME: 1040
WELL INSTALLATION BEGAN:
DATE: 11-9-07 TIME: 1050
WELL INSTALLATION FINISHED:
DATE: 11-9-07 TIME:
DRILLING CO.: Gregg
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mari M5T
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: ~~2.067~~ 4.25 OD: ~~2.375~~ 8

WELL CASING

☐ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor Pipe
MFG. BY: Beart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 4.8

WELL SCREEN

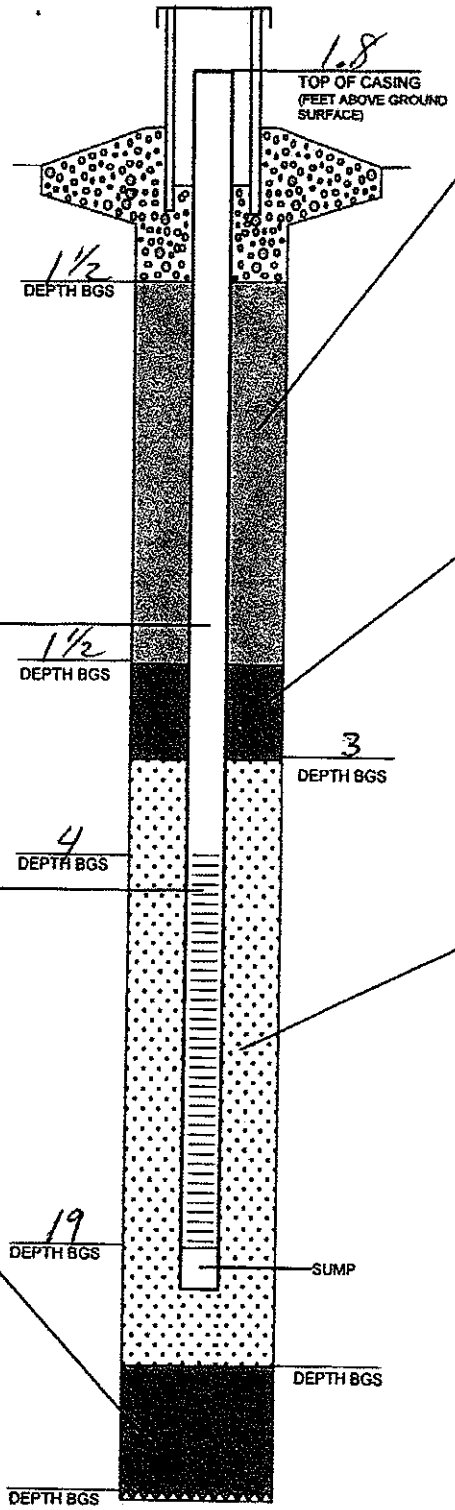
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor Screen
MFG. BY: Beart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND ~~WITH BUMPER POST~~ 2
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Holeplug
MFG. BY: Baroid
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 500 lb
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

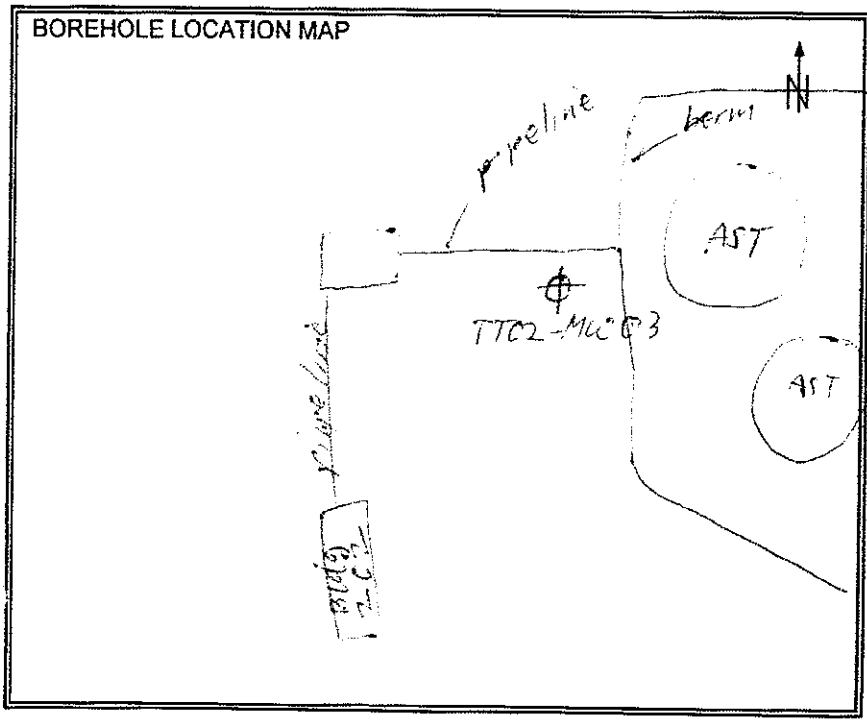
☐ YES ☒ NO:
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT02-MW03	
Project Number: I43C2300	Project Name: P.I Addendum
Client: US Navy	
Site: 2	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg	
Drill Rig Type/Method: Mark MST	
Sampler Type: NA	
Borehole Diameter (inches): 8	to: 19 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 11-9-07	Drill Start Time: 1040
Drill Finish Date: 11-9-07	Drill Finish Time: 1048
Total Borehole Depth (feet bgs): 19	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 9	Date: 11-9-07 Time: 1043
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-9-07	Well Completion Time:
Screen Interval (feet bgs): 4-19	Total Well Depth (feet bgs): 19
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 8.8	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Overdrill of existing well EW-27
No sampling conducted
Casing pulled from old well before redrilling

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT02-MW04
PROJECT: NAS Fallon
SITE: 2
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: ~~20.5~~ 22.3

DRILLING INFORMATION

DRILLING BEGAN.
DATE: 3-14-08 TIME: 0756
WELL INSTALLATION BEGAN:
DATE: 3-14-08 TIME: 0820
WELL INSTALLATION FINISHED:
DATE: 3-14-08 TIME: 0916
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 8¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 6.8'

WELL SCREEN

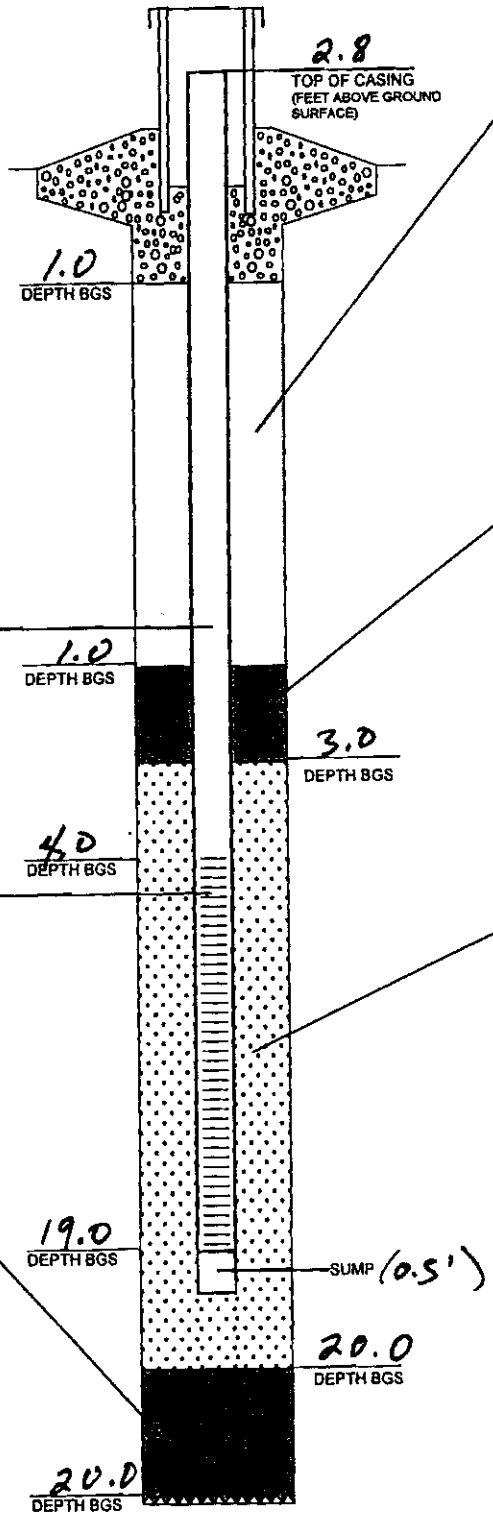
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST (2)
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER

BENTONITE SEAL

VOLUME CALCULATED: 2.6 ft³
AMOUNT USED: ½ x 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8 bentonite
☐ OTHER:
PRODUCT: Holeplug Bentonite
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 22.1 ft³
AMOUNT USED: 6 x 100 lb sacks
☐ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 9.7' bgs
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO: installed in augers
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Installation:
CTO: NAS Fallon
BORING ID: ——

MW ID: TT04-MW01

DATE: 10/31/07
LOGGED BY: J. Vaughn

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0950									gravel fill at surface					
									1							
									2	SM	sand, silty, clayey, brown (10YR 4/3), soft, heterolithic, moderately sorted, damp.			10	65	25
									3							
									4							
	↓	0951					0.0		5							
									6							
							0.0		7							
	↓	0952							8	SC	sand, clayey, silty, dark grayish brown (10YR 4/2), wet.				70	30
									9							
									10	CL	clay, brown (10YR 4/3), dense, moderate plasticity, damp					100
									11							
	↓	0956							12							
							39.1		13	SW	sand, grayish brown (10YR 5/2), heterolithic, well sorted, saturated, minor staining, no free product expected.			15	80	5
									14	SC	sand, clayey, silty, brown (10YR 4/3), heterolithic, moderately sorted, saturated				70	30
									15							
	↓	0959							16							
									17	SW	sand, dark grayish brown (10YR 4/2), heterolithic, well-sorted, saturated.			10	85	5
									18		sand, yellowish brown (10YR 5/4), heterolithic, well-sorted, saturated	~~95~~	90	10		
	↓	1003							19		TDof 19.0					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT04-MW01
PROJECT: NAS Fallon Drill + Install
SITE: 4
BOREHOLE NO.: —
WELL PERMIT NO.: D4302.300.04.03
TOC TO BOTTOM OF WELL: 20.40'

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10/31/07 TIME: 0950
WELL INSTALLATION BEGAN:
DATE: 10/31/07 TIME: 1005
WELL INSTALLATION FINISHED:
DATE: 10/31/07 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Rhino HSA
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 2.067" OD: 2.375

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: pvc monitor pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 4.4'

WELL SCREEN

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: ~~Boart Longyear~~ pvc monitor screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

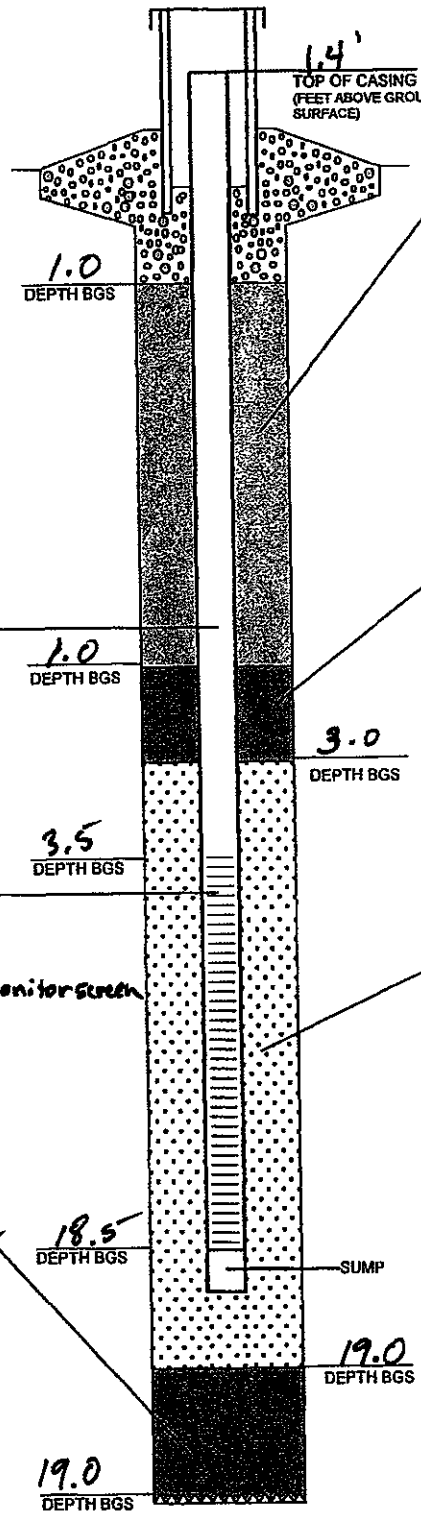
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

N/A 10/31/07

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST (3)
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

N/A 10/31/07

BENTONITE SEAL

VOLUME CALCULATED: 0.6 ft³
AMOUNT USED: 0.6 ft³
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: medium
☐ OTHER:
PRODUCT: medium bentonite chips
MFG. BY: Pure Gold
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 3 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 5.1 ft³
AMOUNT USED: 5 ft³
☑ SAND, SIZE: #2/16
PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 10.37 @ 11:18 on 10/3
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

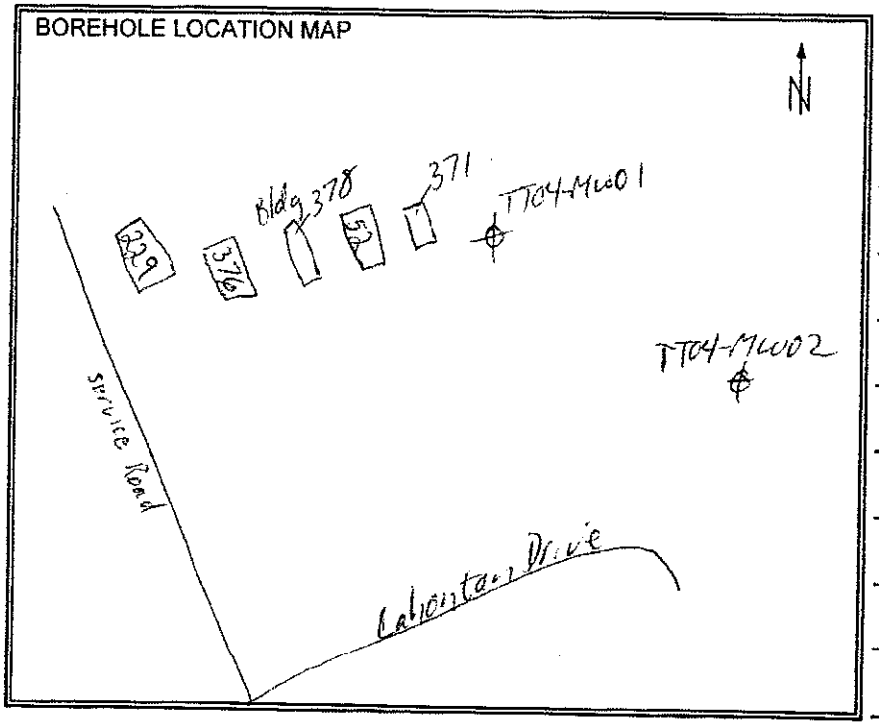
☐ YES ☑ NO; completed thru augers
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT04-MW02	
Project Number: I4302300	Project Name: RI Addendum
Client: US Navy	
Site: 4	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg	
Drill Rig Type/Method: Mail MST / Hollow Stem auger	
Sampler Type: Hand auger to 5', acetate sleeves to TD	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 11-11-07	Drill Start Time: 0830
Drill Finish Date: 11-11-07	Drill Finish Time: 0900
Total Borehole Depth (feet bgs): 18	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 7	Date: / Time:
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-11-07	Well Completion Time:
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 6.9	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation:
CTO:
BORING ID:

DATE: 11-4-01
LOGGED BY: R. Knapp

MW ID: JT04-MW02

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
									1							
									2							
		835								SP	Sand, dark yellowish brown (10YR 5/4), loose, dry			15	85	
									3							
									4	CL						
		838								~~ML~~	Clay, silty, dark grayish brown (10YR 4/2), sl. plastic, med stiff, dry				1	99
									5							
		842								ML	Silt, clayey, dark yellowish brown (10YR 4/4), sl plastic soft, moist				5	95
							2.2		6							
									7		Becomes wet					
		854					1.4		8	~~ML~~ SM	~~Silt, as above~~ Sand, silty, dark yellowish brown (10YR 4/4), loose, wet			2	~~5~~ 68	~~95~~ 30
							1.5		9							

Installation: TT04 Fuel

DATE: [illegible]

CTO:

LOGGED BY: R Knapp

BORING ID:

MW ID: TT04-MW02

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
										CL	Clay, dark yellowish brown (10YR 4/4), sl plastic, med stiff, damp					100
									11	ML	Silt, sandy, yellowish brown (10YR 5/4), med stiff, wet, micaceous				35	65
	✓						1.7									
		0857	36/36						12	SP	Sand, dark grayish brown (10YR 4/2), med dense, wet, micaceous			40	60	
									13							
							2.2									
									14							
	✓								15		Sampler refusal at 15', No samples from 15-18'					
									16							
									17							
									18		TD = 18'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT04-MW02
PROJECT: RI Addendum
SITE: 4
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-11-07 TIME: 0836
WELL INSTALLATION BEGAN:
DATE: 11-11-07 TIME: 0900
WELL INSTALLATION FINISHED:
DATE: 11-11-07 TIME: 1000
DRILLING CO.: Gregg
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mori MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT:
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 5.3

WELL SCREEN

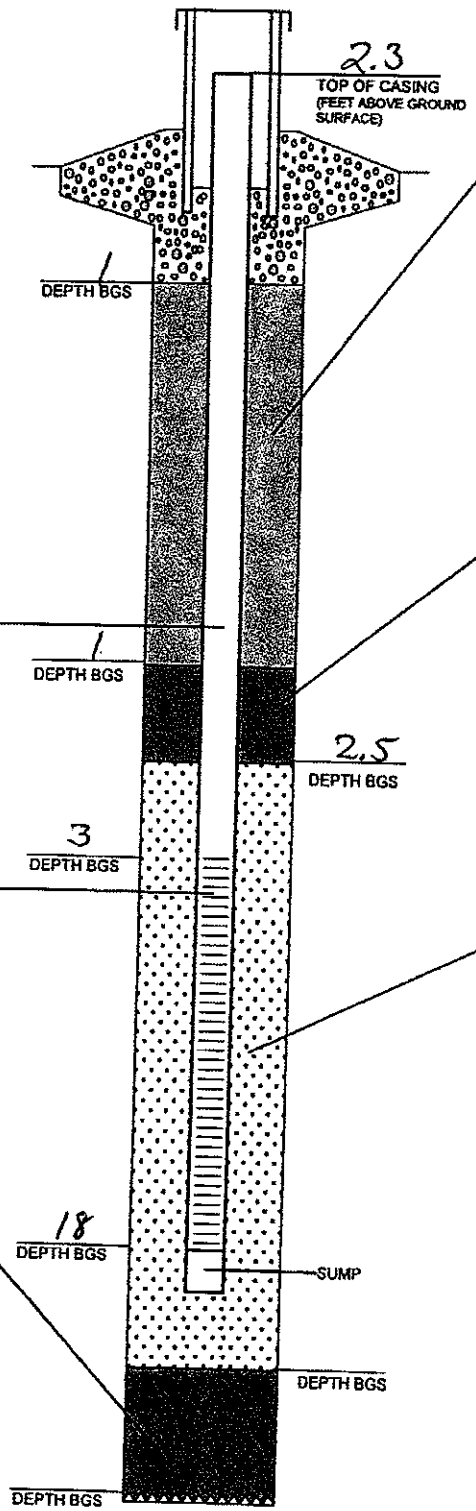
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Holeplug
MFG. BY: Baroid
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED:

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED:
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Pennex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL: 9.2
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO:
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Site 3

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: W.H. Burke Date: 3/14/91 Page: 1 OF 1

Hole No.: MW39L Casing Elevation: 3933.23' Ground Elevation: 3933.49'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 9

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5'x2''Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					CONCRETE
					FILL: gravel
2	CS				SP SAND: dark gray (10YR4/1), mU-mL, subangular, some scattered feldspar
4					SM SILTY SAND: dark yellowish brown (10YR4/4), mL-fU damp
6	SP				SP SAND: brown (10YR5/3), vcU, subangular
8	SP				SM SILTY SAND: yellowish brown (10YR5/4), vfU, damp, micaceous, damp
10					AUGER 9'-10' SM SILTY SAND: brown (10YR5/3), vfU, vfL
12	CS				SM SILTY SAND: as above, dark carbonaceous banding
14					CL CLAY: (10YR4/2), some laminar bedded dark carbonaceous and oxidized banding
16					CL CLAY: as above
					SP SAND: as above
18	CS				SM SILTY SAND: brown (10YR5/3), vfU-vfL
20					SP SAND: brown (10YR5/3), mL-fU, subrounded
22	CS				SM SILTY SAND: brown (10YR5/3), fU-fL, subangular strong Fe stained zone at 23.5', MARKER BED
24					NEAT CEMENT 0'-12' BENTONITE PELLETS (3/8") 12'-14' FRAC SAND (8/20) 14'-23' SLOTTED 2" PVC SCREEN (0.010") 14.5'-19.5' NATIVE SAND 23'-25'
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

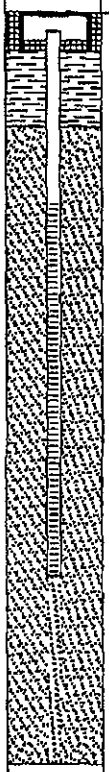
Prepared By: W.H. Burke Date: 3/14/91 Page: 1 OF 1

Hole No.: MW39U Casing Elevation: 3933.28' Ground Elevation: 3933.49'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 3

Auger Size: 8" O.D. Sample Type: None

Project: NAS Fallon Data Verified By: David Smulin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					NO SAMPLES TAKEN, SEE MW39L FOR LITHOLOGY
4					AUGER TO 20'
6					
8					
10					NEAT CEMENT (6/1) 0'-1' SLOTTED 2" PVC SCREEN (0.010"), 5'-15' BENTONITE PELLETS (3/8"), 1'-3.0' FRAC SAND (8/20), 3'-20'
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

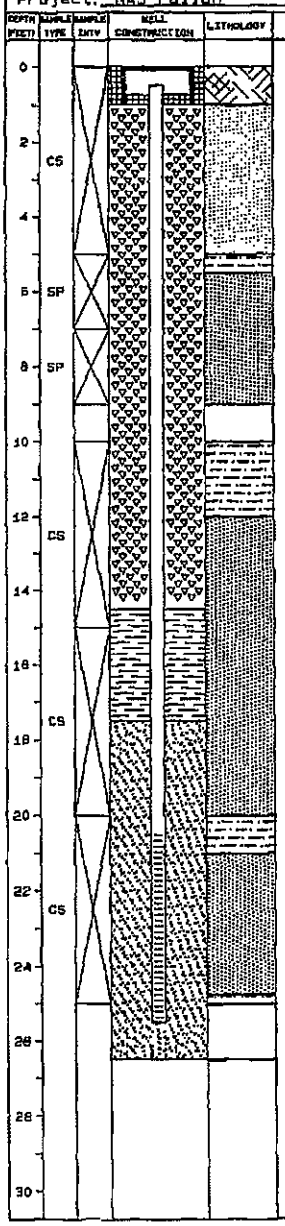
Prepared By: W.H. Burke Date: 3/14/91 Page: 1 OF 1

Hole No.: MW41L Casing Elevation: 3931.71' Ground Elevation: 3932.13'

Total Depth: 26.5' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 3

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91



DESCRIPTION

FILL: gravel and sand

SP SAND: dark yellowish brown (10YR4/4), fL, subangular to subround, micaceous, some feldspar, basalt

SM SILTY SAND: grayish brown (10YR5/2)), vfL

SP SAND: yellowish brown (10YR5/4), cL-mUc subangular to rounded, micaceous, wet

AUGER 9'-10'

SM SILTY SAND: grayish brown (10YR5/2), vfU

SP SAND: brown (10YR5/3), mU-mL, subangular to subrounded, silty in part

SM SILTY SAND: grayish brown (10YR5/2), vfU

SP SAND: color as above, vfU-fL, silty in part, becoming coarser with depth

SM SILTY SAND: light brownish gray (2.5Y6/2), vfU, subangular to subround, some Fe stained clay stringers

NO SAMPLE 25'-26.5'
NEAT CEMENTE 0'-14.5'
BENTONITE PELLETS (3/8") 14.5'-17.5'
FRAC SAND (8/20), 17.5'-26.5'
SLOTTED 2" PVC SCREEN (0.010") 20.5'-25.5'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

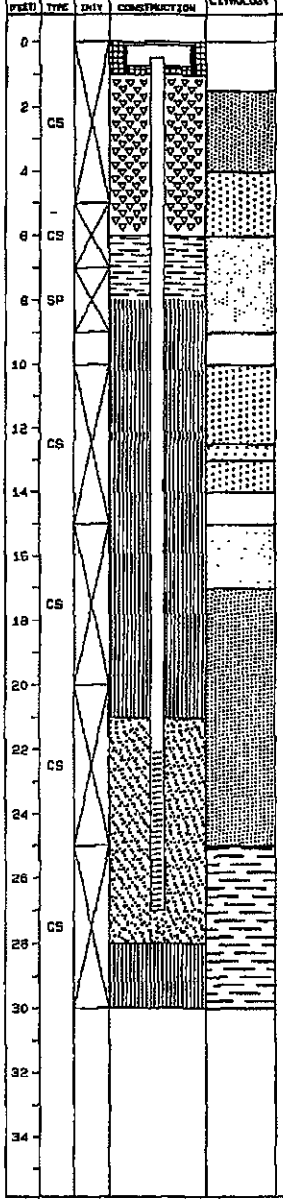
Prepared By: Bob Schlosser Date: 3/15/91 Page: 1 OF 1

Hole No.: MW42L Casing Elevation: 3934.69' Ground Elevation: 3934.95'

Total Depth: 30.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 3

Auger Size: 8" O.D. Sample Type: 3'x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91



DESCRIPTION

CONCRETE

SP SAND: dark yellowish brown (10YR3/4), fU-mL, sub-angular-subround, dark accessory minerals

SW SAND: color as above, vfU-vcL, scattered 2-3 mm pebbles, arkosic

SP SAND: light yellowish brown (10YR6/4), predominantly fL, very poorly graded

SP SAND: as above, becoming grayish brown (10YR5/2)
AUGER FROM 9'-10'
AUGER 9'-10'

SW SAND: light yellowish brown (10YR6/4), cL-vcU, some pebbles to 3 mm

SP SAND: as above, vcU
SW SAND: as above, abundant pebbles 4-5 mm

LOST 14'-15'

SW SAND: color as above, becoming smaller grained

SP SAND: medium brown, tight, silty in part

SP SAND: dark yellowish brown (10YR4/4), wet, loose

SP SAND: as above

CL CLAY: olive gray, silty in part, strong oxidized sand lenses at 26' and 28.5', MARKER BEDS

CL CLAY: olive, silty in part, blocky at 29.5'

NEAT CEMENT 0'-6'
BENTONITE PELLETS (3/8") 17'-18'
FRAC SAND (8/20) 18'-30'
SLOTTED 2" PVC SCREEN (0.010") 20.5'-25.5'
NATIVE FILL 10'-17'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

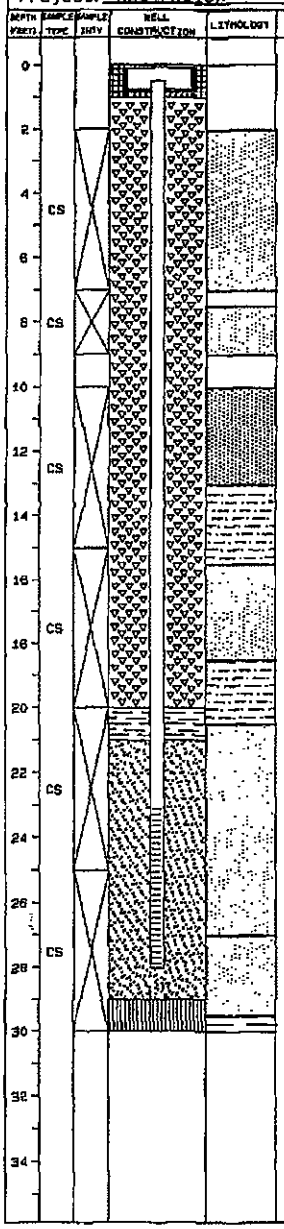
Prepared By: Bob Schlosser Date: 3/16/91 Page: 1 OF 1

Hole No.: MW43 Casing Elevation: 3935.22' Ground Elevation: 3935.52'

Total Depth: 30.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 3

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91



DESCRIPTION
CONCRETE
SP SAND: yellowish brown (10YR5/6), vfU-fL, sub-angular-subround, dark acccessory minerals
SP SAND: color as above, becoming coarser, slightly calcareous
LOST 7'-7.5'
SP SAND: brown (10YR4/3), calcareous in part
AUGER FROM 9'-10'
SP SAND: dark brown (10YR3/3), abundant root hairs and organics, micaceous, silty in lower part, grading to
SM SILTY SAND: dark brown (10YR4/6), sand vfL
SP SAND: yellowish brown (10YR5/4), vfL-fL, silty in part, micaceous, abundant Fe staining, predominantly clear and milky quartz, some dark accessory minerals
SM SILTY SAND: dark gray brown (10YR3/2), mottled very dark gray (2.5YN3/) locally
SP SAND: color as above, vfL, wet, micaceous, non calcareous
SP SAND: as above
SP SAND: olive, some dark sand beds, strong Fe staining at 29.5', MARKER BED
CL CLAY: olive (5Y5/3), stiff, silty in part
NEAT CEMENT 0'-20' BENTONITE PELLETS (3/8") 20'-21' FRAC SAND (8/20), 21-29' SLOTTED 2" PVC SCREEN (0.010") 23'-28' NATIVE FILL 29'-30'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: Bob Schlosser Date: 3/16/91 Page: 1 OF 1

Hole No.: MW43U Casing Elevation: 3935.29' Ground Elevation: 3935.52'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 3

Auger Size: 8" O.D. Sample Type: NONE

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					NO SAMPLES TAKEN, SEE MW43L FOR LITHOLOGY
4					AUGER TO 20'
6					
8					
10					CONCRETE 0'-3' SLOTTED 2" PVC SCREEN (0.010") 7'-17' BENTONITE PELLETS (3/8") 3'-5' FRAC SAND (8/20) 5'-14' NATIVE FILL 14'-20'
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

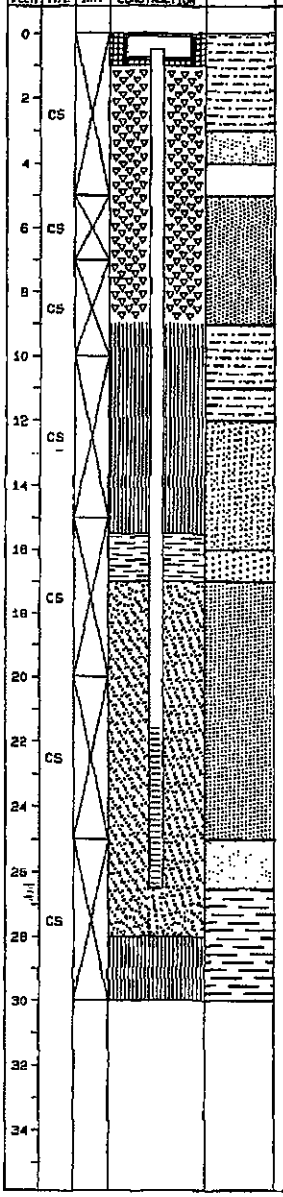
Prepared By: Bob Schlosser Date: 3/16/91 Page: 1 OF 1

Hole No.: MW44L Casing Elevation: 3932.37' Ground Elevation: 3932.60'

Total Depth: 30.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 3

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91



DESCRIPTION
SM SANDY SILT: dark yellow brown (10YR4/4) fL-fU sand, grading to
SP SAND: color as above, micaceous, some feldspar, dark accessory minerals LOST 4'-5'
SP SAND: dark yellow brown (10YR4/3) mL-cL, clear and milky quartz, loosly consolidated, saturated, micaceous, abundant dark accessory minerals
SM SANDY SILT: dark brown (10YR3/3), damp, stiff
SM SILTY SAND: color as above
SW SAND: yellowish brown (10YR5/4), upper vfL-mU, from 14' fU-vcL, very well graded, micaceous, slightly calcareous locally
SW SAND: as above, very well graded, fL-vcU with abundant 3-5 mm pebbles, predominantly clear and milky quartz, subangular to subround SP SAND: brown (10YR4/3), calcareous in part
SP SAND: yellow brown fU-mL, subangular to subround very calcareous
SP SAND: as above, very micaceous, arkosic
SP SAND: light yellowish gray, micaceous, very calcareous, vfL sand at 26', strong Fe staining MARKER BED
CL CLAY: olive, tight, dry
NEAT CEMENT 0'-9' BENTONITE PELLETS (3/8") 15.5'-17' FRAC SAND (8/20), 17-28' SLOTTED 2" PVC SCREEN (0.010") 21.5'-26.5' NATIVE FILL 28'-30'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

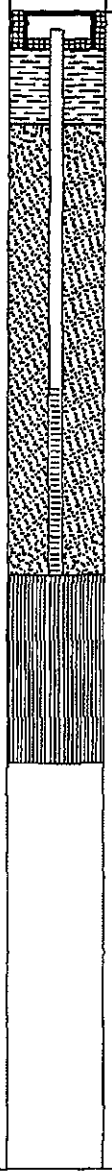
Prepared By: Bob Schlosser Date: 3/17/91 Page: 1 OF 1

Hole No.: MW44U Casing Elevation: 3935.29' Ground Elevation: 3935.52'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 3

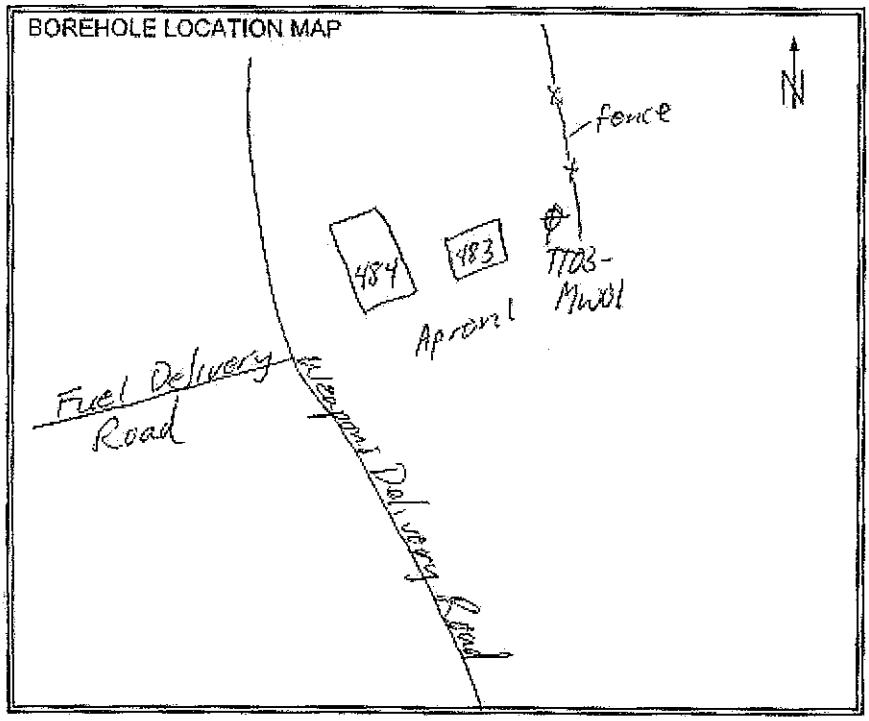
Auger Size: 8" O.D. Sample Type: None

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE ENTRY	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					NO SAMPLES TAKEN, SEE MW44L FOR LITHOLOGY AUGER TO 20' NEAT CEMENT (6/1) 0'-1' SLOTTED 2" PVC SCREEN (0.010"), 5'-15' BENTONITE PELLETS (3/8"), 1'-3.0' FRAC SAND (8/20), 3'-15' NATIVE FILL 15'-20'
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Boring ID:	
Monitoring Well ID: TT03-MW01	
Project Number: I4302	Project Name:
Client: US Navy	
Site: 3	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mari MST All Terrain	
Sampler Type: Hand auger to 5', continuous core with acetate sleeves to TD	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 10-11-07	Drill Start Time: 0800
Drill Finish Date: 10-11-07	Drill Finish Time: 0828
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date:	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 11	Date: 10-11-07 Time: 0820
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-11-07	Well Completion Time:
Screen Interval (feet bgs):	Total Well Depth (feet bgs):
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
Hand Auger											Hand auger to 5 feet					
									1							
		0810								SP	Sand, yellowish brown (10YR 5/4) loose, dry, calc			10	90	
									2							
									3							
									4							
Split spoon		0813	30/30						5	ML	Silt, sandy, dark greyish brown (10YR 4/2), soft, moist, calc				10	90
									6	CL	Clay, silty dark yellowish brown (10YR 4/4), calc, med stiff				3	97
									7							
		0820	48/48						8	CL	Clay (brown (10YR 5/3), sandy, silty, moist, calc, stiff				10	90
									9							

BORING ID: MW ID: 7105-MW01 PAGE 3 OF 2

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
SS										CL	Clay dark greyish brown (10YR 4/2) plastic, non calc, very stiff, very moist				1	99
									11							
									12	SM	Silty sand yellowish brown (10YR 5/4) med dense, wet, sl plastic				75	25
									13							
									14							
									15	SP	Sand Greenish grey (GLEY 1 5/1) loose, wet, non calc			20	80	
									16	SM	Silty sand dark greenish grey (GLEY 4/1) med dense, wet, non calc			10	70	20
									17							
									18							
									19	SP	Sand dark greenish grey (GLEY 1 4/1), wet, loose, non calc			40	60	
										CL	Clay, brown (7.5YR 5/3) hard, moist, non calc, sl plastic					100

Screen 5-20

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TØ3-MW01
PROJECT: RI for Active SAS (14302)
SITE: 3
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT

SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-11-07 TIME: 0800
WELL INSTALLATION BEGAN:
DATE: 10-11-07 TIME: 0832
WELL INSTALLATION FINISHED:
DATE: 10-11-07 TIME: 0950
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mari MST All-Terrain
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25" OD: 8"

WELL CASING

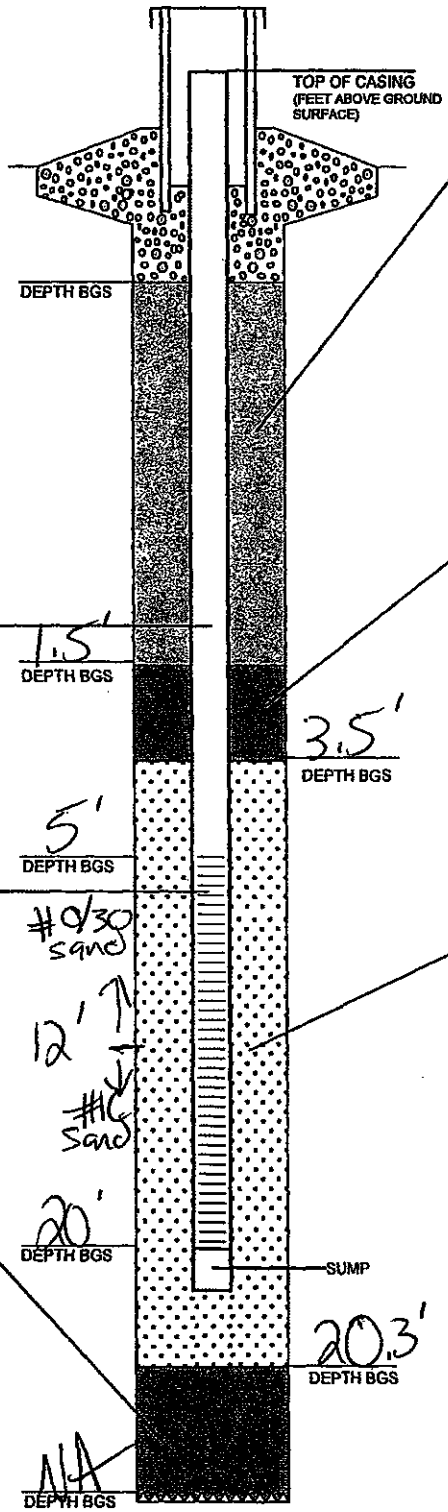
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING:

WELL SCREEN

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15'

BOREHOLE BACKFILL

AMOUNT CALCULATED: NA
AMOUNT USED: NA
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT: NA
MFG. BY: NA
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:



ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 7 1/3 FT3
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☒ PREPARED MIX
PRODUCT: Sakrete
MFG. BY:
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 50 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: Medium
☐ OTHER:
PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 59 gallons

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: NA
AMOUNT USED: 300 lb ; 450 lb ; 150 L
☒ SAND, SIZE: #1C ; #0/30
PRODUCT: Lapis Lustre ; Lapis Lustre
MFG. BY: RMC ; RMC
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

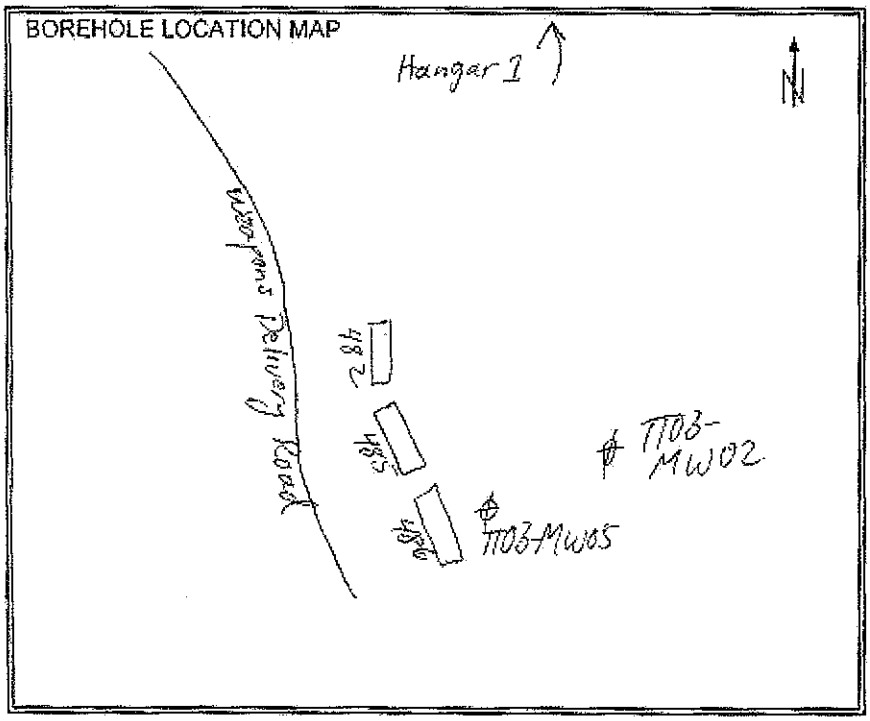
☐ YES ☒ NO;
CENTRALIZER DEPTHS: X

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT03-MW02	
Project Number: I4302300	Project Name: RI Addendum
Client: US Navy	
Site: 3	
Borehole Location (Township, Range, Section):	
Logged By: Not logged (See remarks)	
Reviewed By:	Review Date:
Drilling Contractor: Gregg	
Drill Rig Type/Method: Mari MST All terrain	
Sampler Type: N/A	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 10-11-07	Drill Start Time: 1010
Drill Finish Date: 10-11-07	Drill Finish Time: 1023
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date: N/A	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs):	Date: / Time:
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-11-07	Well Completion Time: 1140
Screen Interval (feet bgs): 5-20	Total Well Depth (feet bgs): 20
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

1" dia PVC piezometer previously installed at this location. Overdrilled piezometer to install monitoring well. No samples collected during installation since wouldn't be representative of natural conditions

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT03-MW02
PROJECT: 1) for Active Sites (T4302)
SITE: 3
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3'

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-11-07 TIME: 1014
WELL INSTALLATION BEGAN:
DATE: 10-11-07 TIME: 1023
WELL INSTALLATION FINISHED:
DATE: 10-11-07 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M23328
DRILL RIG: Mobil MST All-Terrain
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4.25" OD: 8"

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 20.3'

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15'

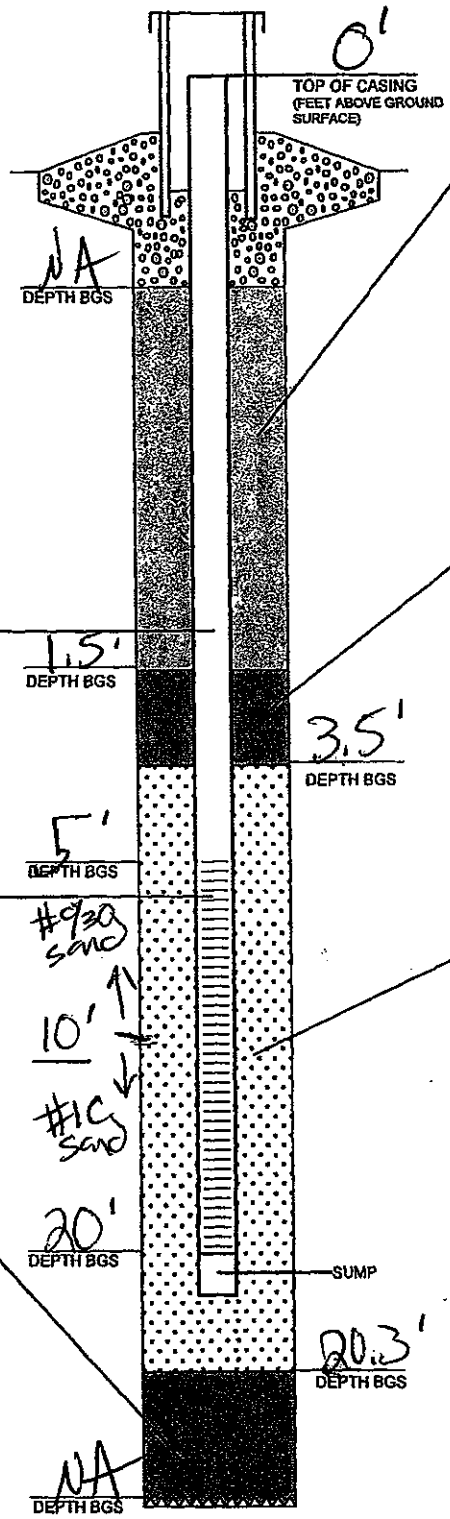
BOREHOLE BACKFILL

AMOUNT CALCULATED: NA
AMOUNT USED: NA
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT: NA
MFG. BY: NA
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [x] FLUSH MOUNT
- [ ] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 6 ft³
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [x] PREPARED MIX
  - PRODUCT: Sakrete
  - MFG. BY:

METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 37 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: Medium
- [ ] OTHER:

PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 3 gallons

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED: NA
AMOUNT USED: 300 lb ; 200 lb
- [x] SAND, SIZE: #1C ; #10/30

PRODUCT: Lapis Lustre
MFG. BY: KMC
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

CENTRALIZER DEPTHS:

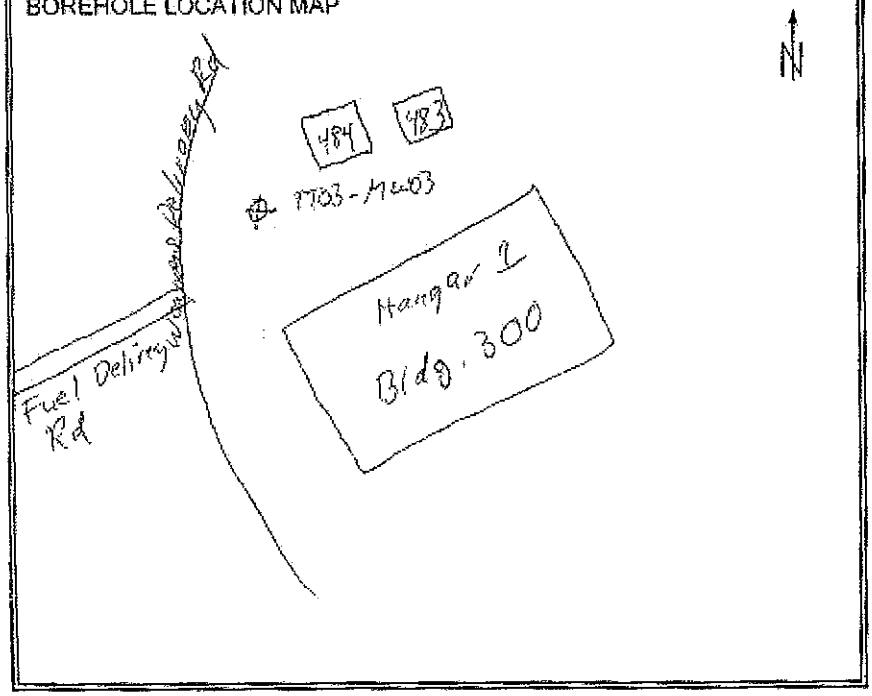
LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

IT

Boring ID:	
Monitoring Well ID: TT03-MW03	
Project Number: I4302	Project Name:
Client: US Navy	
Site: 3	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mail MST. All terrain	
Sampler Type: Hand auger to 5', split spoon to Total Depth	
Borehole Diameter (inches): 8 inches	to: feet bgs
Overdrilled Diameter (inches):	to: feet bgs
Drill Start Date: 10-9-07	Drill Start Time: 1335
Drill Finish Date: 10-9-07	Drill Finish Time: 1418
Total Borehole Depth (feet bgs): 18	
Soil Boring Backfill Date:	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 9	Date: 10-9-07 Time: 1403
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date:	Well Completion Time:
Screen Interval (feet bgs): 6-16	Total Well Depth (feet bgs):
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BORING ID: MW ID: 7/00-7(W00)

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
Hand auger		1335	NA	NA						SP	Sand, brown (10YR 4/3), loose, nonplastic, dry Hand auger to 5'		1	5	84	10
									1							
									2							
		1340							3	CL	Clay, dark brown (7.5YR 3/2), silty platies, moist, noncalc, sl. micaceous, soft, moist				1	99
									4							
SS		1350	18/18						5	ML	Silt, very dark brown (7.5YR 2.5/1) sl clayey, med stiff, calc, sl micaceous, moist				5	95
SS		1353	18/18						6	CL	Clay, dark brown (7.5YR 3/2) silty, stiff, calc, moist				2	98
									7							
Split spoon		1403	24/24						8							
								▽	9	SM	Silty sand, brown (7.5YR 4/3) med dense, wet, noncalc, micaceous				85	15

BORING ID: MW ID: MW-19WW

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1406	18/18	NA	NA	NA				SM	Silty sand, reddish brown (5YR 4/3), wet, micaceous, calc, med dense			3	72	25
split spoon									11							
		1410	18/18						12							
									13							
		1413	24/24													
									14							
										CL	Clay, silty, dark reddish grey (5YR 4/2), calc, med stiff, sl micaceous				2	98
									15	SM	Silty sand, dark brown (7.5YR 3/2), calc, sl micaceous, dense				10	90
		1417	18/18													
									16	CL	Clay, sl silty, dark brown (7.5YR 3/2), calc, wet, stiff				1	99
		1418	18/18													
									17							
											Screen 6-16					
											Pushed sampler from 16.5 to 18					
									18		but did not drill down					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: IT03-MW03
PROJECT: RI of Active Sites (TM302)
SITE: 3
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 18.63

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-09-07 TIME: 1335
WELL INSTALLATION BEGAN:
DATE: 10-09-07 TIME: 1433
WELL INSTALLATION FINISHED:
DATE: 10-09-07 TIME: 1640
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mari MST All Terrain
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 9.25" OD: 8"

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375"
LENGTH OF CASING: 18.63

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375"
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 10 ft.

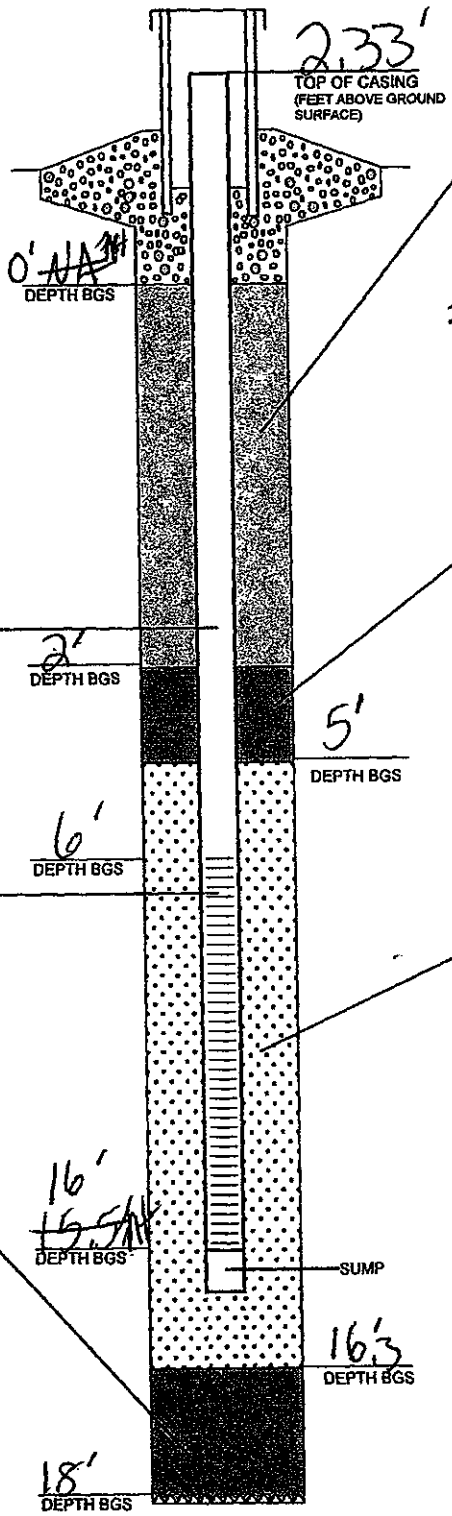
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [x] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 1/3 ft3
- [x] GROUT FORMULA (PERCENTAGES)

PORTLAND CEMENT:
BENTONITE:
WATER:
- [x] PREPARED MIX

PRODUCT: ~~Sakrete~~ Neat Cement
MFG. BY: ~~Basalite~~
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 75 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: Medium
- [ ] OTHER:

PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 7.5 gallon

FILTER PACK

- [x] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED: 350 lb
- [x] SAND, SIZE: #1C

PRODUCT: Lapis Lustre
MFG. BY: RMC
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

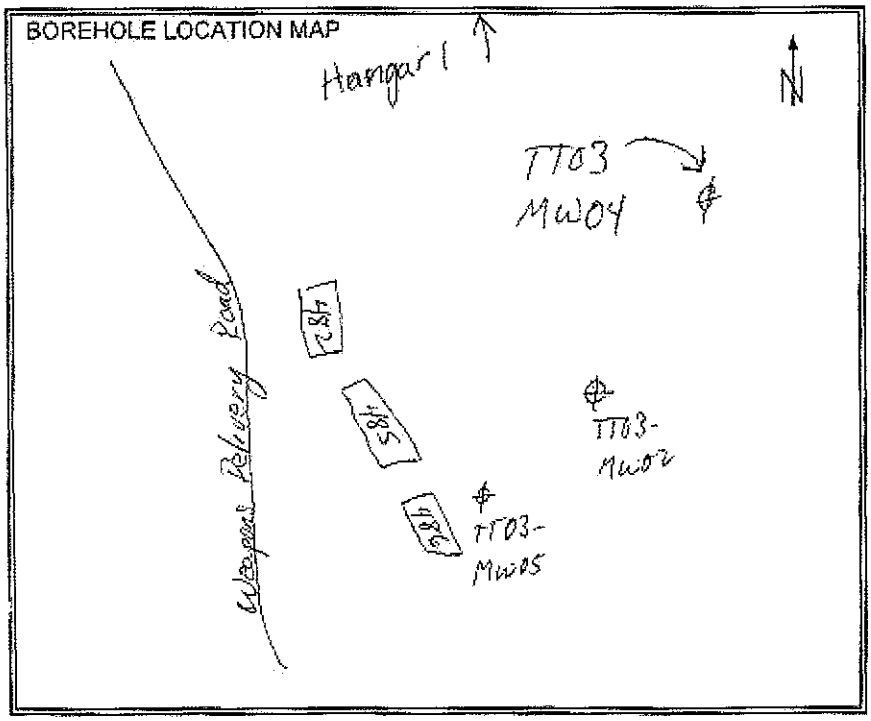
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT03 - MW04	
Project Number: I4302.300	Project Name: RI Addendum
Client: US Navy	
Site: 3	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mdl M5T All Terrain	
Sampler Type: Hand auger to 5'; continuous sampler with acetate sleeves to TD	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 10-10-07	Drill Start Time: 1030
Drill Finish Date: 10-10-07	Drill Finish Time:
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date:	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 11	Date: 10-10-07 / Time: 1092
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-10-07	Well Completion Time:
Screen Interval (feet bgs): 5-20	Total Well Depth (feet bgs): 20
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BORING ID: MW ID: 1105-MW04 11

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											15" concrete					
											Hand auger 10.5 feet					
									1							
									2							
									3							
		1033								SP	Sand, dark grey, sl brown (10YR 4/2) loose, sl moist, non plastic, mostly quartz, non calc.			10	90	
									4							
									5							
		1037	32/36							SP	Sand, dark greenish gray (GLEY1 4/5G) loose, sl. moist, non plastic, sl micaceous, calc.			20	80	
									6							
									7	SP	Sand, brown (10YR 5/3) loose, sl moist, non plastic sl. micaceous, non calc			5	90	5
		1042							8	SP	As above					
									9							

BORING ID: MW ID: TTDS-MW04

Sampler Type	Sample Interval	Time	Recovered/Driven (in/in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
								▽	11	SM	Silty sand, very dark greyish brown (10YR 3/2) micaceous, non calc, med dense				70	30
		1045	24/48						12	SW	Sand, wet, loose, sl micaceous, non calc			20	70	10
									13							
									14	CL	Clay, silty, dark greyish brown (10YR 4/2), micaceous, noncalc, stiff, very moist				5	95
									15							
		1100	48/48						16							
									17	SP	Sand, very dark greyish brown (10YR 3/2), loose, sl micaceous, calc, wet			30	60	10
									18	ML	Silt, dark greyish brown (2.5Y 4/2), med stiff, noncalc sl micaceous, wet				2	98
									19							
											TD = 20 feet					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT03-MW04
PROJECT: KI for Active Sites (TT3002)
SITE: 3
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-10-07 TIME: 1030
WELL INSTALLATION BEGAN:
DATE: 10-10-07 TIME: 1100
WELL INSTALLATION FINISHED:
DATE: 10-10-07 TIME: 1142
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mari MST All-Terrain
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4.25" OD: 8"

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 20.3

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15'

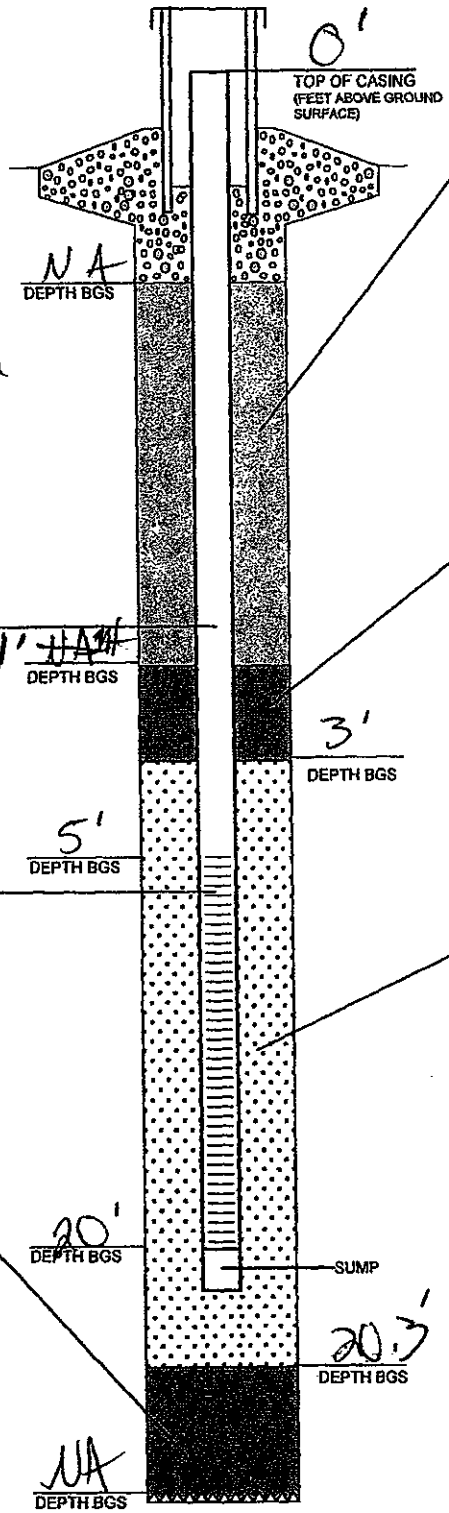
BOREHOLE BACKFILL

AMOUNT CALCULATED: NA
AMOUNT USED: NA
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT: NA
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [x] FLUSH MOUNT
- [ ] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 4 ft3
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [x] PREPARED MIX
  - PRODUCT: Sakrete
  - MFG. BY:

METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 25 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: Medium
- [ ] OTHER:

PRODUCT: pure gold
MFG. BY: CETCO
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 2.5 gallons

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED: NA
AMOUNT USED: 450 lb
- [x] SAND, SIZE: #1C

PRODUCT: Lapis Lustre
MFG. BY: RMC
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

CENTRALIZER DEPTHS:

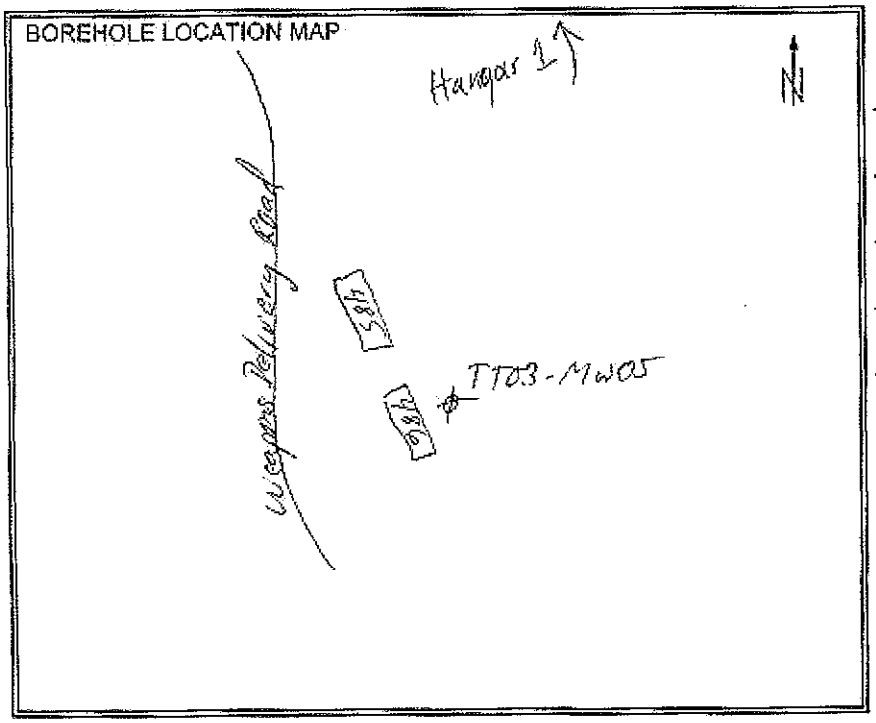
LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

IT

Boring ID:	
Monitoring Well ID: TT03-MW05	
Project Number: I4302300	Project Name: RI Addendum
Client: US Navy	
Site: 3	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mail MST All Terrain	
Sampler Type: Hand auger to 5 feet, continuous sampler with acetate sleeves to TD	
Borehole Diameter (inches): 8	to: 20 feet bgs
Overdrilled Diameter (inches): N/A	to: feet bgs
Drill Start Date: 10-10-07	Drill Start Time:
Drill Finish Date: 10-10-07	Drill Finish Time:
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date:	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 11.5	Date: 10-10-07 Time: 1244
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-10-07	Well Completion Time:
Screen Interval (feet bgs): 5-20	Total Well Depth (feet bgs): 20
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BORING ID: MW ID: 1V 03-17WMS

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											15" concrete					
											Hand auger to 5'					
									1							
									2							
									3							
									4							
									5							
		1240	32/36							SP	Sand light olive brown (2.5Y 5/3) loose, dry, non calc			20	80	
									6							
									7	SP	Sand, brown (10YR 5/3) loose, sl moist, slimicaceous non calc			5	95	
									8							
		1244								SP	Sand as above					
									9							

BORING ID: MW ID: 1105-MW05

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
									11	ML	Silt, sandy, dark greyish brown (10YR 4/2), micaceous, noncalc med stiff, wet @ 11.5				5	95
		1250	48/48						12	SP	Sand, dark greyish brown (10YR 4/2) med dense, micaceous, noncalc wet				95	5
									13							
									14		Becomes coarser			10	90	
									15	SM	Silty sand, greyish brown (10YR 5/2), dense, s/micaceous, noncalc, wet				60	40
		1255	48/48						16	SP	Sand, dark greyish brown (2.5Y 4/2), loose, wet, subang-sub rnd mostly quartz and K-spar			65	35	
									17							
									18	ML	Silt, greyish brown (2.5Y 5/2), stiff, micaceous, some reddish mottling, wet, noncalc				1	99
									19							
											TD = 20'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT03-MW05
PROJECT: RI for Active Sites (T4312)
SITE: 3
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3'

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-10-07 TIME: 1235
WELL INSTALLATION BEGAN:
DATE: 10-10-07 TIME: 1302
WELL INSTALLATION FINISHED:
DATE: 10-10-07 TIME: 1344
DRILLING CO.: ~~Dart~~ Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mort MST All-Terrain
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4.25" OD: 8"

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 20.3'

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15'

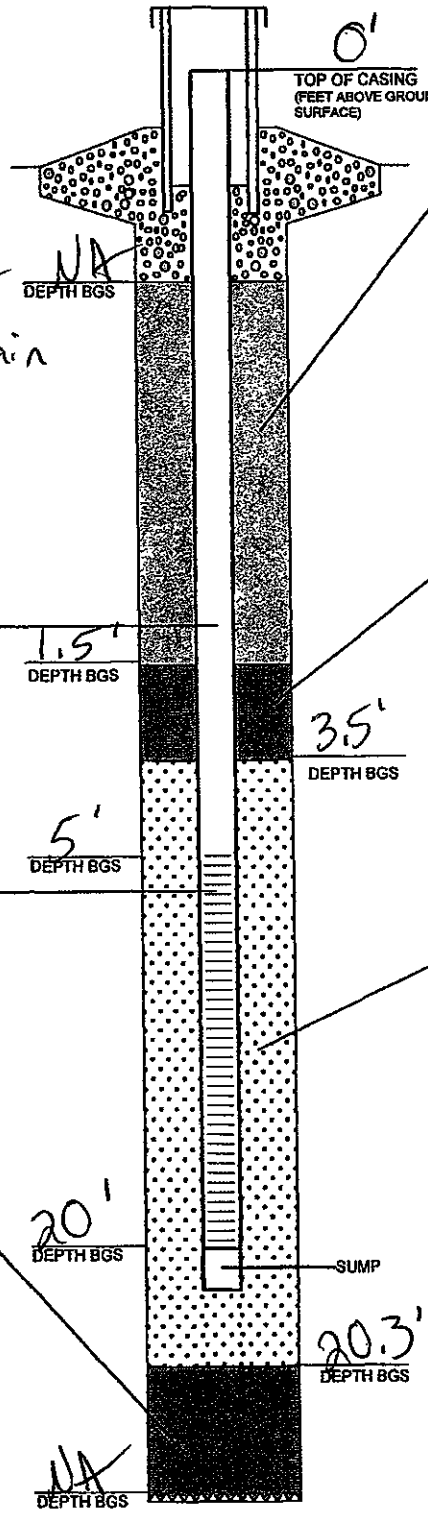
BOREHOLE BACKFILL

AMOUNT CALCULATED: NA
AMOUNT USED: NA
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT: NA
MFG. BY: NA
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [x] FLUSH MOUNT
- [ ] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 4 ft³
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [x] PREPARED MIX

PRODUCT: Sakrete
MFG. BY:
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 25 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: Medium
- [ ] OTHER:

PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 2.5 gallons

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED: NA
AMOUNT USED: 475 lb
- [x] SAND, SIZE: #1C

PRODUCT: Lapis Lustre
MFG. BY: KMC
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

CENTRALIZER DEPTHS:

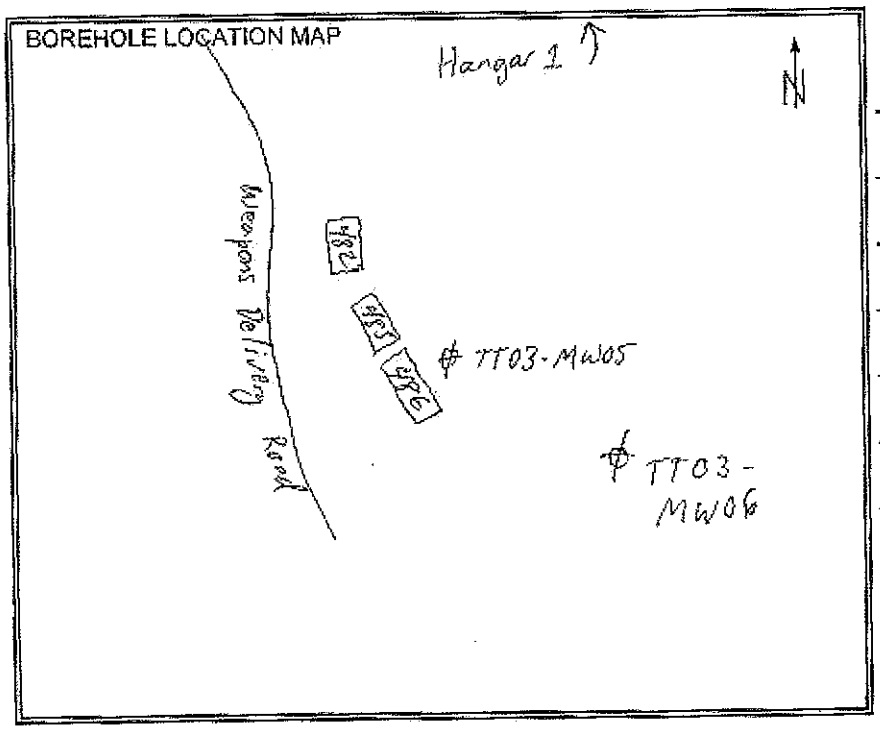
LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

lt

Boring ID:	
Monitoring Well ID: TT03-MW06	
Project Number: I4302300	Project Name: C.T. Addendum
Client: US Navy	
Site: 3	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mark MST All Terrain	
Sampler Type: Hand auger to 5 feet, continuous sampler with acetate sleeves to TD	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): N/A	to: feet bgs
Drill Start Date: 10-10-07	Drill Start Time: 0825
Drill Finish Date: 10-10-07	Drill Finish Time:
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date:	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 10	Date: 10-10-07 Time: 0840
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-10-07	Well Completion Time:
Screen Interval (feet bgs): 5-20	Total Well Depth (feet bgs): 20
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BORING ID: MW ID: T103-MW010

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											0-15" concrete					
											Hand auger 15" to 5 feet					
									1							
									2							
									3							
		0830								SW	Sand, dark yellowish brown (10YR 4/4), loose, nonplastic, moist, noncalc			5	90	5
									4							
									5							
		0836	36/36													
									6	SM	Silty sand, dark yellowish brown (10YR 4/4), med dense, nonplastic, moist, non cal			5	75	20
									7							
	✓								8							
		0840	40/48							SM	Silty sand brown (10YR 4/3), med dense, sl. calc, moist, sl calc, moist			5	75	20
									9							

BORING ID: MW ID: 7105-MW06

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
								▽		ML	Silt, sandy, dark yellowish brown (10YR 4/4), med stiff, sl plastic, moist, noncalc				5	95
									11							
	✓								12							
		0818	18/18							SP	Sand, brown (10YR 4/3), loose, sl micaceous, wet, noncalc			30	65	5
									13							
									14							
									15							
										ML	Silt, sandy, brown (10YR 4/3) med stiff, wet, sl calc				25	75
	✓								16							
		0855	14/18													
									17							
									18							
									19							
	✓										TD = 20'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT03-MW06
PROJECT: RI for Active Sites (TT3P2)
SITE: 3
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3'

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-10-07 TIME: 0837
WELL INSTALLATION BEGAN:
DATE: 10-10-07 TIME: 0920
WELL INSTALLATION FINISHED:
DATE: 10-10-07 TIME: 1015
DRILLING CO.: Gregg Drilling
DRILLER: J. Duff
LICENSE: M2328
DRILL RIG: Mobil MSI All-Terrain
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25" OD: 8"

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Pipe
MFG. BY: Beart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 20.3'

WELL SCREEN

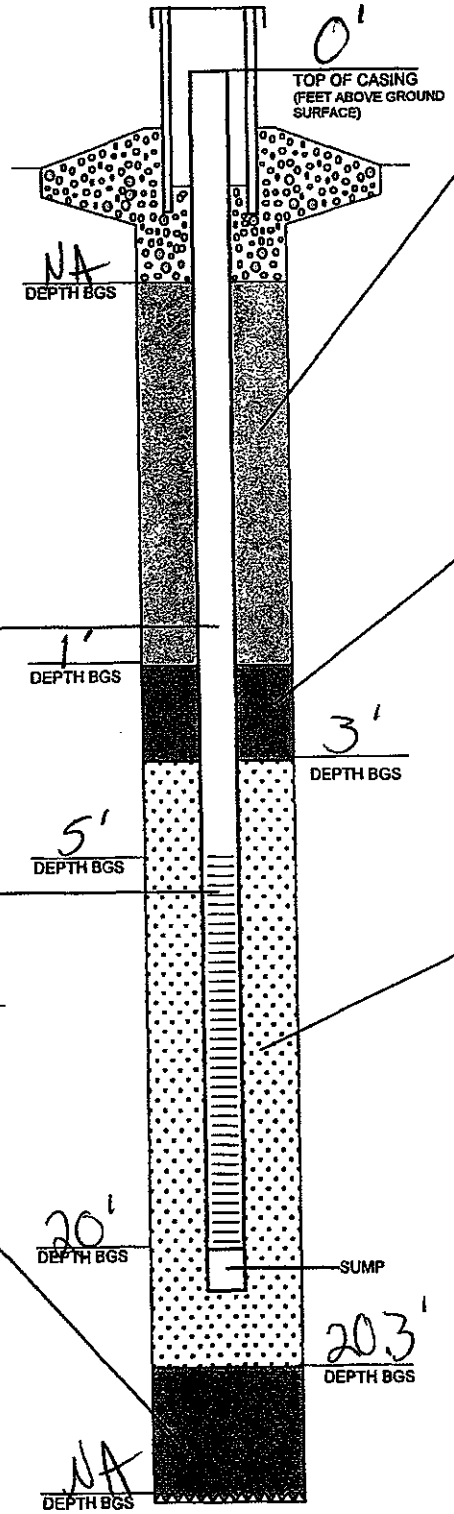
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Screen
MFG. BY: Beart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15'

BOREHOLE BACKFILL

AMOUNT CALCULATED: NA
AMOUNT USED: NA
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT: NA
MFG. BY: NA
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☒ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 4 2/3 ft³
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☒ PREPARED MIX
PRODUCT: Sakrete
MFG. BY:
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: NA
AMOUNT USED: 50 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: Medium
☐ OTHER:
PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 5 gal.

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: NA
AMOUNT USED: 500 lb
☒ SAND, SIZE: #1C
PRODUCT: Lapis Lustre
MFG. BY: RMC
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

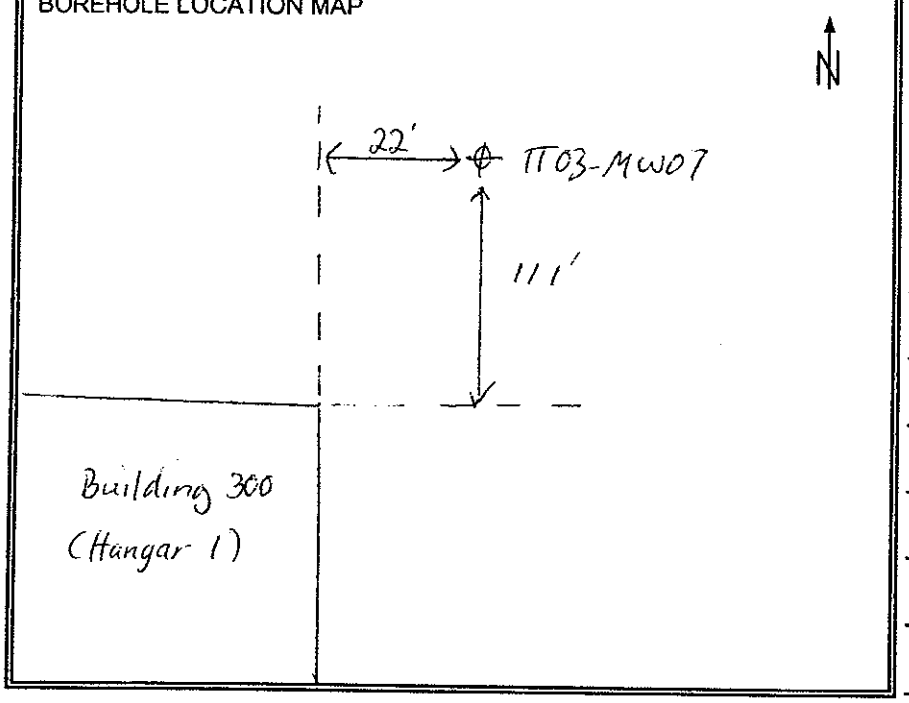
☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT03-MW07	
Project Number: 103DT4302.3001301	Project Name: RI Addendum
Client: US Navy	
Site: 3	
Borehole Location (Township, Range, Section): T18N R29E Sec 15	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mobile B61 / HSA	
Sampler Type: Split Spoon and macrocore (acetate sleeve)	
Borehole Diameter (inches): 8	to: 19 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 3-10-09	Drill Start Time: 1420
Drill Finish Date: 3-10-09	Drill Finish Time: 1501
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 7.5	Date: 3-10-09 / Time: 1440
Depth to Other Water-Bearing Zones (feet bgs):	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 3-10-09	Well Completion Time: 1700
Screen Interval (feet bgs): 4-19	Total Well Depth (feet bgs): 19
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											0 - 1.7 feet concrete					
									1							
Hand Auger																
		1420							2	SW	Sand, brown (10YR 4/3), loose, dry		5	70	25	
									3							
									4							
		1425								CL	Clay, dark yellowish brown (10YR 4/4), stiff, sl plastic, moist				2	98
									5							
SS		1437	9/18	4			8.3			SW	Sand, dark grayish brown (10YR 4/2), loose, moist	5	10	75	10	
				3												
				5					6							
macrocore		1440	16/42				0.1		7	SP	Sand, brown (10YR 4/3) med dense, wet (interval probably represents deeper part of sampler push)				90	10
										CL	Clay, dark yellowish brown (10YR 3/4), stiff, sl plastic, damp				1	99
									8							
									9							

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
SS		1448	6/18	3						SW	Sand, dark yellowish brown (10YR 3/4), loose, wet	1	5	70	24	
				4												
				6			0.2		11	CL	Clay, dark yellowish brown (10YR 4/4), very stiff, plastic, damp					100
		1451	42/48							SP	Sand, grayish brown (10YR 5/2), loose, wet			10	90	
									12							
macrocore									13	SP	Sand, dark grayish brown (10YR 4/2), med dense, sl micaceous, wet		2	60	38	
									14							
SS		1455	18/18	3					15							
				4						CL	Clay, dark grayish brown (2.5Y 4/2), stiff, sl plastic, damp				2	98
				5					16							
macrocore		1501	42/42				0.4		17	CL	Clay, silty, dark grayish brown (2.5Y 4/2), med stiff, sl plastic, micaceous				3	97
									18	CL	Clay, dark grayish brown (2.5Y 4/2), stiff, plastic, damp					100
									19							
											Screen 4-19					

MONITORING WELL COMPLETION RECORD

TETRATECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT03-MW07
PROJECT: RI Addendum
SITE: 3
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 18.75

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-10-09 TIME: 1420
WELL INSTALLATION BEGAN:
DATE: 3-10-09 TIME: ~~1420~~ 1600
WELL INSTALLATION FINISHED:
DATE: 3-10-09 TIME: 1715
DRILLING CO.: Gregg
DRILLER: Robert Gregurras
LICENSE: M2322
DRILL RIG: Mobil B61
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: OD: 2
LENGTH OF CASING: 18.75

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

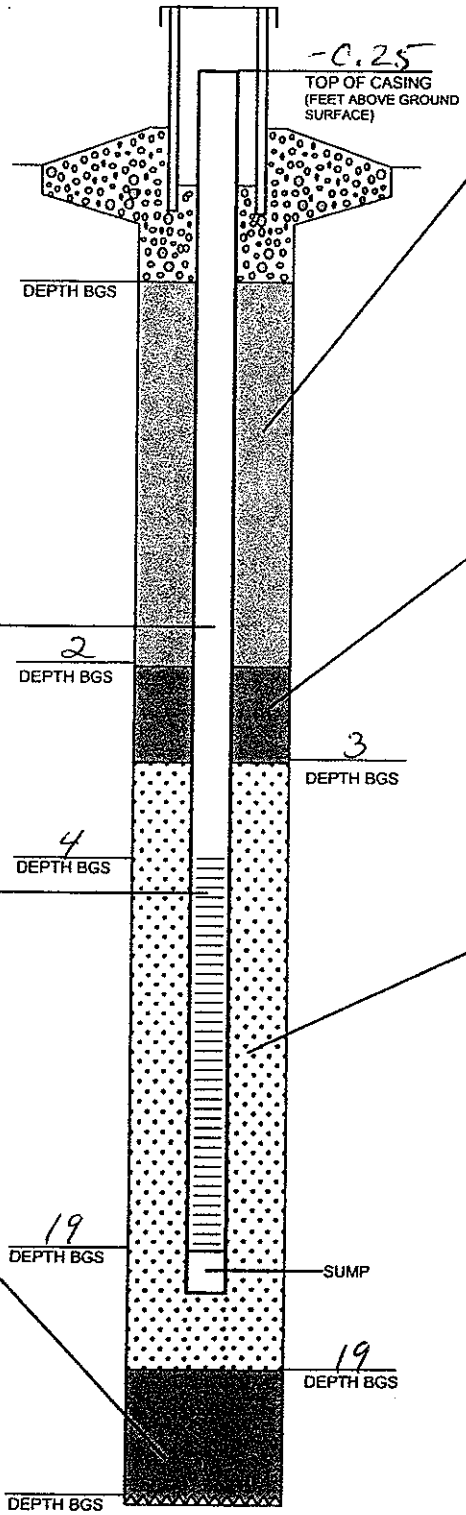
BOREHOLE BACKFILL

AMOUNT CALCULATED: NA
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [x] FLUSH MOUNT
- [ ] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [ ] PREPARED MIX
  - PRODUCT:
  - MFG. BY:

METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
- [x] PELLETS, SIZE: 3/8
- [ ] CHIPS, SIZE:
- [ ] OTHER:

PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 1 gal

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED: 500 lb
- [x] SAND, SIZE: 2/16

PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL: 8.44
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

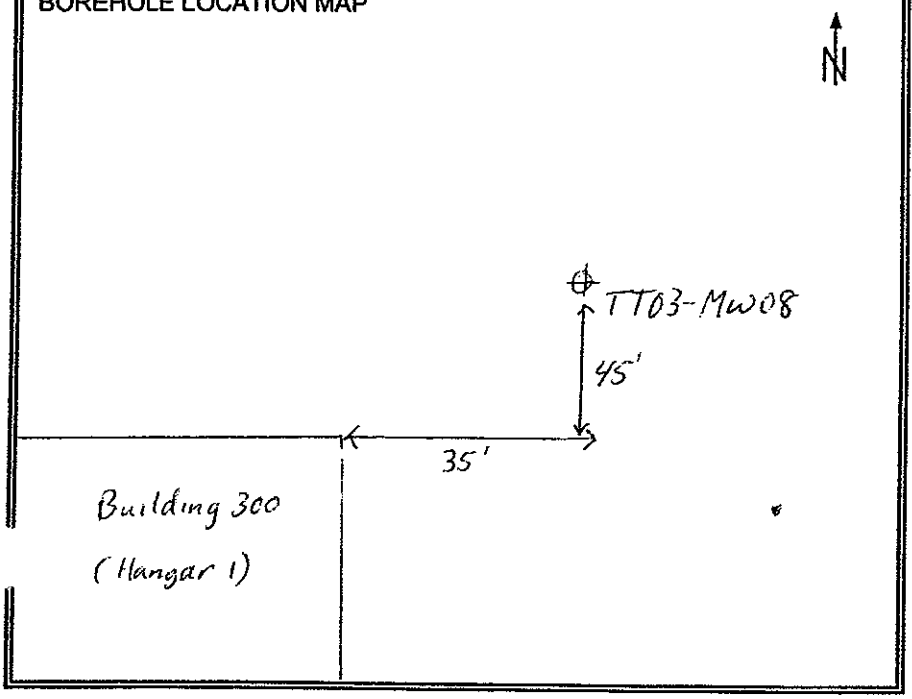
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT03-MW08	
Project Number: 103DI4302.3001301	Project Name: RI Addendum
Client: US Navy	
Site: 3	
Borehole Location (Township, Range, Section): T18N R29E Sec 15	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mobile B61 / HSA	
Sampler Type: Split spoon and macrocore (acetate sleeve)	
Borehole Diameter (inches): 8	to: 20 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 3-10-09	Drill Start Time: 1141
Drill Finish Date: 3-10-09	Drill Finish Time: 1222
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 7.5	Date: 3-10-09 / Time: 1204
Depth to Other Water-Bearing Zones (feet bgs):	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 3-10-09	Well Completion Time: 1330
Screen Interval (feet bgs): 5-20	Total Well Depth (feet bgs): 20
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											0-1.25 feet concrete					
									1							
Hand Auger																
		1141							2	SW	Sand, brown (10YR 4/3), loose, dry		10	60	30	
		1143							3	SW	As above except coarser grained		20	70	10	
		1145							4	SP	Sand, dark yellowish brown (10YR 4/4), loose, moist			60	40	
		1149				1				CL	Clay, dark yellowish brown (10YR 4/4) very stiff, plastic, sl moist				2	98
5		1201	14/18	3 4 8					5	SM	Sand, silty, brown (10YR 4/3), med dense, moist			40 5	60 60	55
macrocore		1204	33/42						6	SP	Sand (light grayish brown (10YR 6/2), loose, damp, sl micaceous		70		30	
									7							
						0.2			8	SP	Sand, grayish brown (10YR 5/2), loose, wet		33	65	5	
									9							
										CL	Clay, dark yellowish brown (10YR 3/4), some orange mottles, stiff, plastic, damp			1	99	

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
SS		1212		4			0.3		10	CL	Clay, as above					
				4												
				5					11							
Macrocore		1215	40/42						12	SM	Silty sand, light olive brown (2.5Y 3/3) dense, wet			75	25	
									13							
									14							
										CL	Clay, silty, olive brown (2.5Y 4/2), med stiff, sl plastic, micaceous, wet			3	97	
SS		1218	15/18	2					15	CL	As above					
				4												
				6			0.2		16							
Macrocore		1222	32/42							CL	As above					
									17							
									18	CL	Clay, brown (10YR 4/3), hard, sl plastic, sl micaceous, moist			1	99	
									19	SP	Sand, light olive brown (2.5Y 5/3) med dense, wet			90	10	
										CL	Clay, light olive brown (2.5Y 5/3) silty, stiff, sl plastic, damp			3	97	

MONITORING WELL COMPLETION RECORD

TETRATECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT03-MW08
PROJECT: RI Addendum
SITE: 3
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 19.75

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-10-09 TIME: 1141
WELL INSTALLATION BEGAN:
DATE: 3-10-09 TIME: 1220
WELL INSTALLATION FINISHED:
DATE: 3-10-09 TIME: 1330
DRILLING CO.: Gregg
DRILLER: Robert Geguras
LICENSE: M2322
DRILL RIG: Mobil B61
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING:

WELL SCREEN

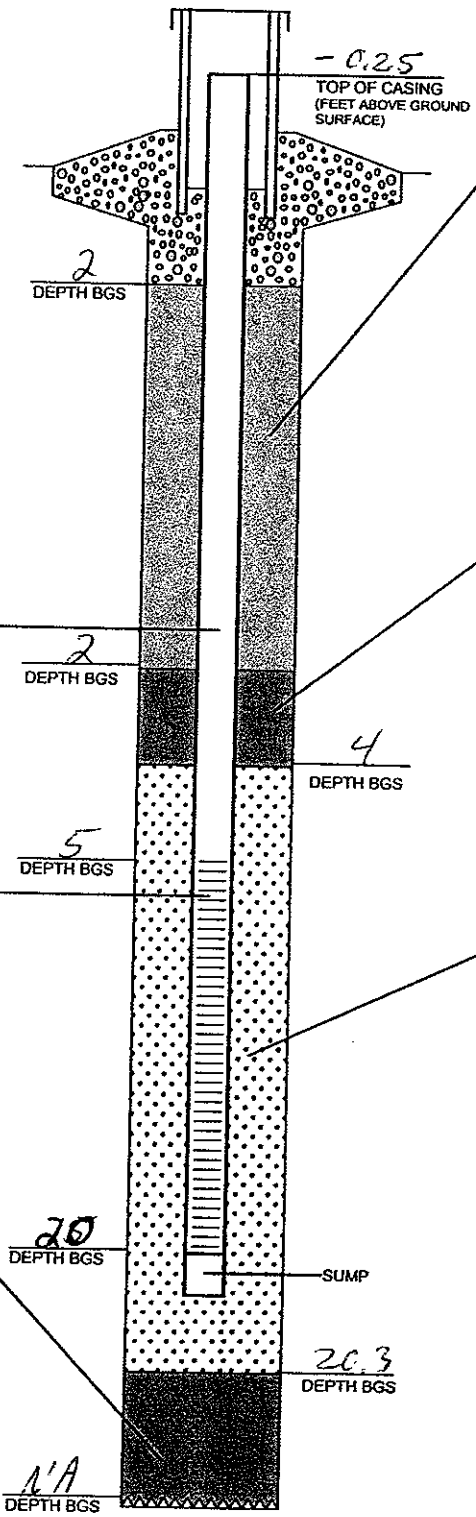
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED: NA
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☒ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☒ PELLETS, SIZE: 3/8
☐ CHIPS, SIZE:
☐ OTHER:
PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 1 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 550 lb
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL: 8.65
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO:
CENTRALIZER DEPTHS:

LEGEND

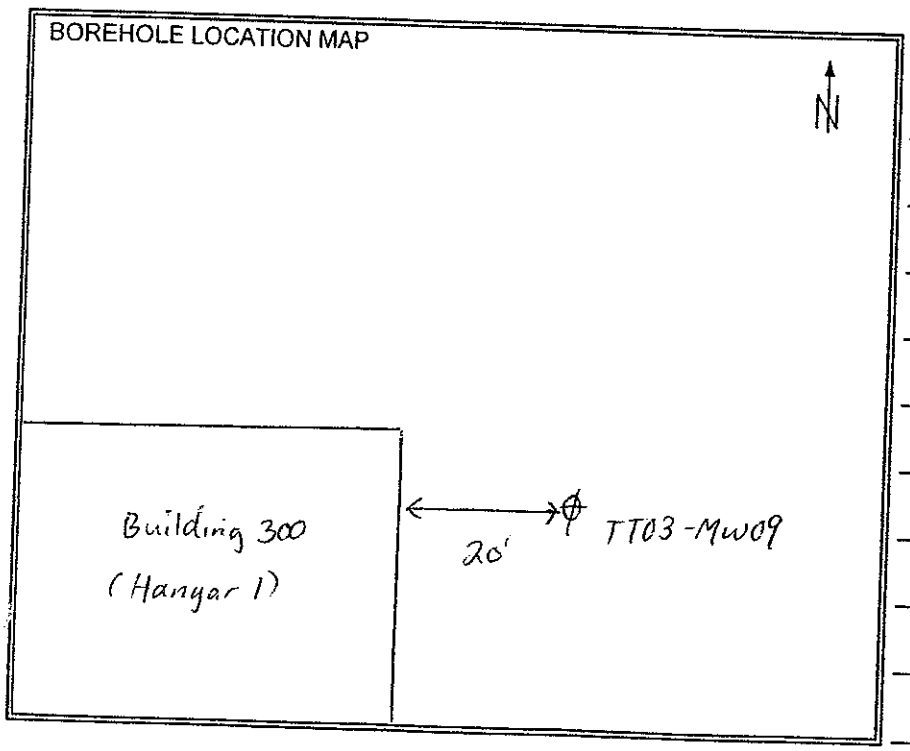
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID:	
Monitoring Well ID: TT03-MW09	
Project Number: 103DT4302300 1301	Project Name: RI Addendum
Client: US Navy	
Site: 3	
Borehole Location (Township, Range, Section): T18N R29E Sec 15	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mobile B61	
Sampler Type: Split Spoon and macrocore	
Borehole Diameter (inches): 8	to: 20 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 3-10-08	Drill Start Time: 0850
Drill Finish Date: 3-10-08	Drill Finish Time: 1015
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6.5	Date: 3-10-09 Time: 942
Depth to Other Water-Bearing Zones (feet bgs):	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 3-10-09	Well Completion Time: 1130
Screen Interval (feet bgs): 4-19	Total Well Depth (feet bgs):
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											0-1.5 Concrete					
									1							
Hand Auger		0850							2	SW	Sand, dark yellowish brown (10YR 4/4), loose, dry		5	30	60	5
		858							3	ML	Silt, clayey, dark yellowish brown (10YR 4/6), soft, moist, sl plastic				5	95
		905				0			4	CL	Clay, silty, dark yellowish brown (10YR 4/6), soft, micaceous				1	99
SS		938	18/18	4					5	CL	As above					
				6												
		~~942~~		7		0			6	SP	Sand, greyish brown (10YR 5/2), loose, damp		5	90	5	
		942	27/12							SW	Sand, greyish brown (10YR 5/2), loose, wet	30	50	20		
macrocore									7							
										SP	Sand, brown (10YR 5/3), med dense, wet			90	10	
									8							
		~~957~~							9	CL	Clay, dark brown (10YR 3/3), very stiff, sl plastic, sl micaceous, damp				100	

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
SS		0951	18/18	2			0		10	CL	Clay, as above					
				4												
				5					11							
macrocore		959	42/42						12							
									13	SP	Sand, brown (10YR 4/3), mod dense, sl micaceous, wet			5	90	5
									14							
SS		1008	18/18	2					15	ML	Silt, dark yellowish brown (10YR 3/4), med stiff, sl plastic, wet			10	90	
				4			0		16							
				5												
macrocore		1015	42/42						17							
									18	ML	Silt, dark brown (10YR 3/3), sandy, soft, wet			30	70	
									19	CL	Clay, light olive brown (2.5Y 5/3) few orange mottles, sl plastic, damp				100	

MONITORING WELL COMPLETION RECORD

TETRATECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT03-MW09
PROJECT: RI Addendum
SITE: 3
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-10-09 TIME: 0850
WELL INSTALLATION BEGAN:
DATE: 3-10-09 TIME: 1015
WELL INSTALLATION FINISHED:
DATE: 3-10-09 TIME: 1130
DRILLING CO.: Gregg
DRILLER: Robert Gregurras
LICENSE: M2322
DRILL RIG: Mobil B61
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 18.65

WELL SCREEN

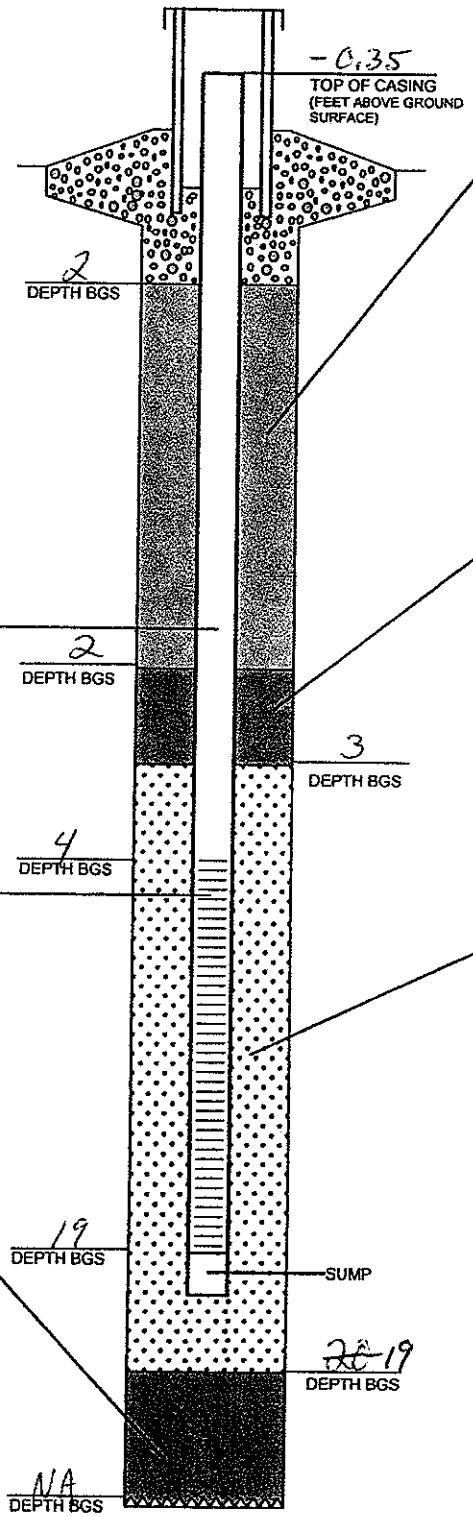
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED: NA
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☒ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☒ PELLETS, SIZE: 3/8
☐ CHIPS, SIZE:
☐ OTHER:
PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 1 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 500 lb
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL: 7.86
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO:
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Site 6

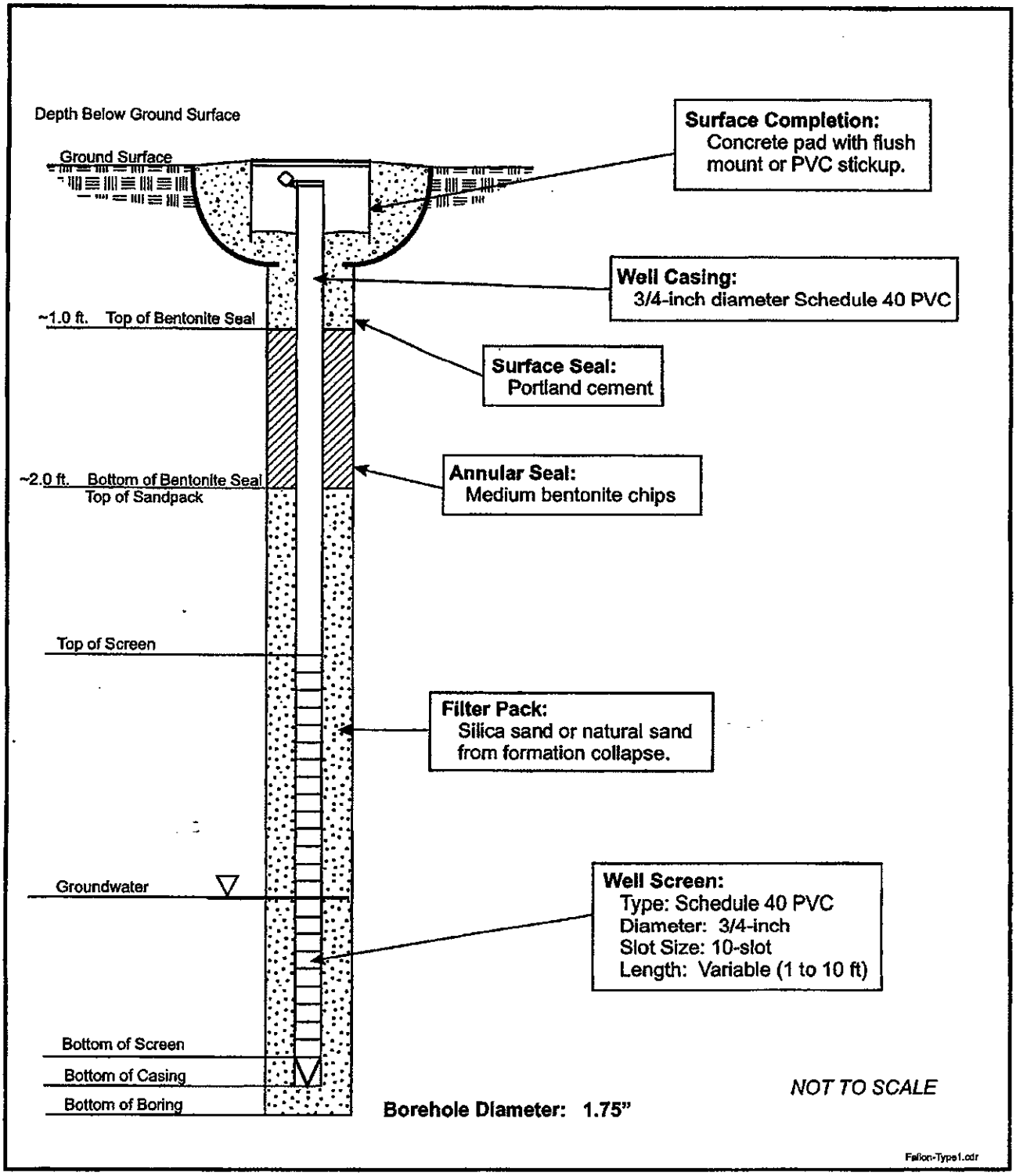
Notes & Comments:

Well BAT-6-H is of the construction shown on either of the next two pages, Figure G-1 or G-2. Specific well details are listed in the table (G.1-1) that immediately follows the above figures.

Battelle
. . . Putting Technology To Work

Figure G-1

WELL COMPLETION DIAGRAM SILICA/NATURAL SAND PACK[a]



a) Note: all wells installed in September 1997 were constructed in this manner.

Battelle
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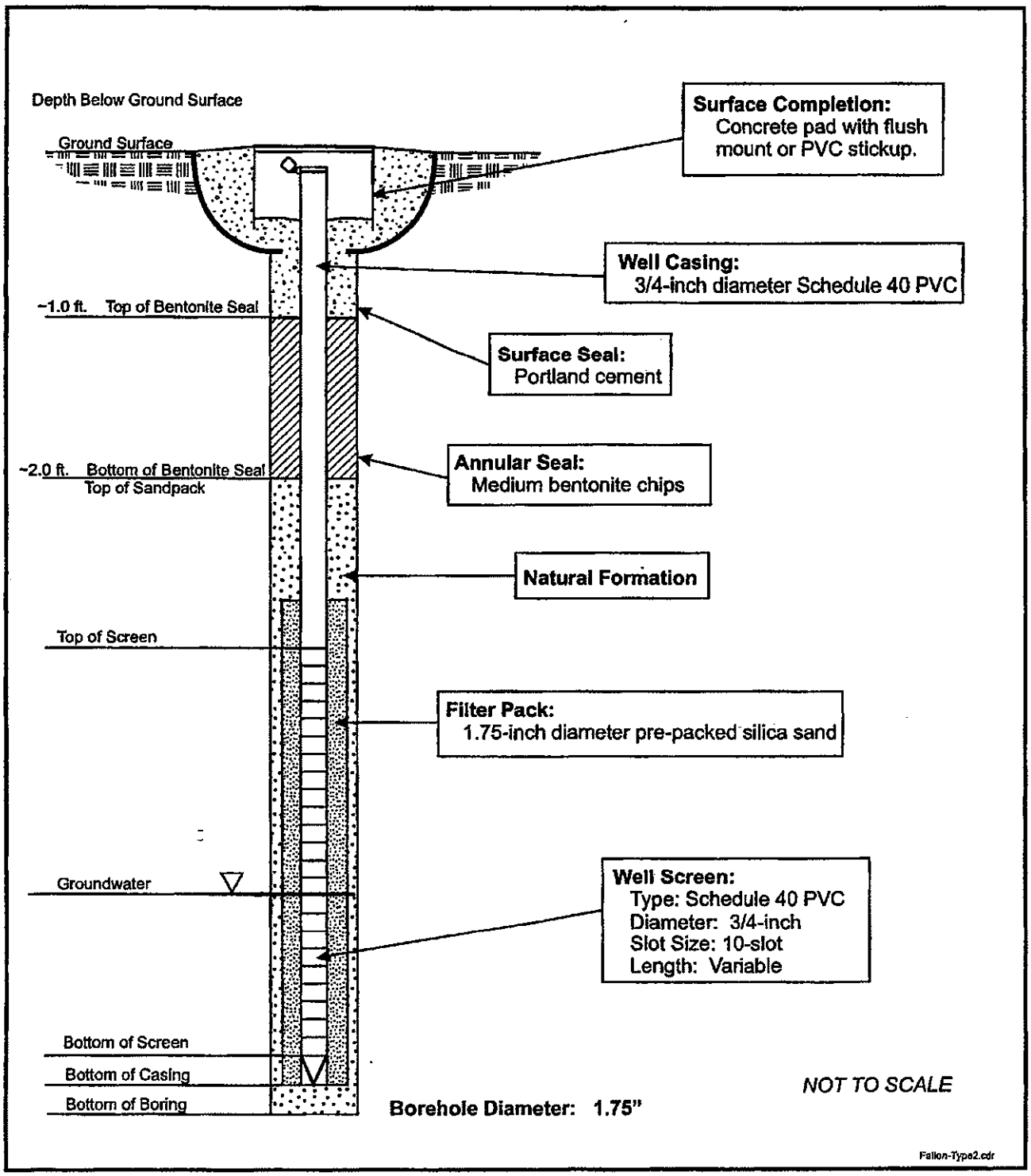
Figure G-2

WELL COMPLETION DIAGRAM PRE-PACKED SCREEN[a]



a) Note: all wells installed after September 1997 were constructed in this manner.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: Bob Schlosser Date: 3/17/91 Page: 1 OF 1

Hole No.: MW45 Casing Elevation: 3932.69' Ground Elevation: 3933.23'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Group II Sites

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5'x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV.	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	CS				SP SAND: light yellowish brown (10YR6/4), vcL-vcU, abundant dark accessory minerals
4					LOST 4'-5'
6	SP				SP SAND: as above, fU-mL
8	SP				SM SANDY SILT: very dark gray brown (10YR3/2)
10	SP				SP SAND: grayish brown (10YR5/2), fU-mL, poorly graded, subangular to subround
12	CS				CL CLAYEY SILT: olive brown (10YR4/4), some occasional organics
14					SM SANDY SILT: vfL sand with strong Fe staining in beds of 10-15 mm 14.5' and 14.75'
16	CS				CL CLAY: olive brown (10YR4/4) mottled grayish green (5G4/2), blocky, tight, abundant root hairs, some large roots, gray green around roots
18					CL CLAY: as above with Fe stained vfU sand at 19.5'
20					CONCRETE 0'-1' BENTONITE PELLETS (3/8") 1.'-3.' FRAC SAND (8/20), 3'-20' SLOTTED 2" PVC SCREEN (0.010") 5'-15'
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

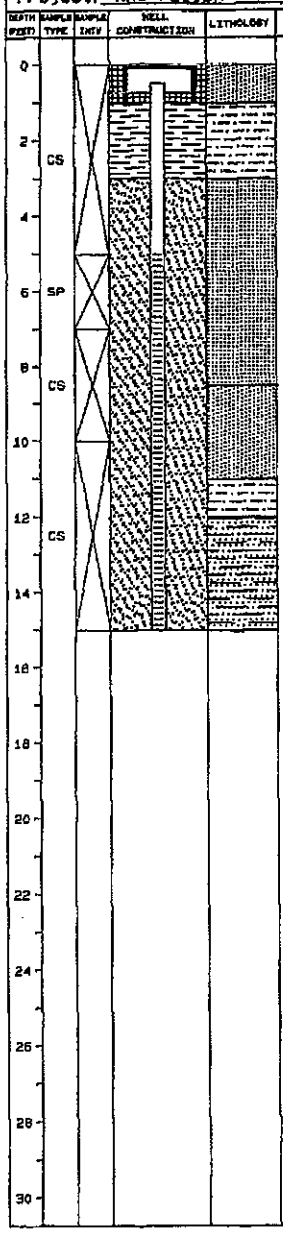
Prepared By: Bob Schlosser Date: 3/18/91 Page: 1 OF 1

Hole No.: MW48 Casing Elevation: 3924.54' Ground Elevation: 3924.67'

Total Depth: 15.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Group II Sites

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smith Date: 3/22/91



DESCRIPTION

SP SAND: yellowish brown

SM SANDY SILT: dark grayish brown (10YR4/2), abun- root hairs, some dark organics. HNU=3 ppm

SP SAND: grayish brown (10YR5/2), mL-mU, loosely consolidated, subangular to subround, abundant dark accessory minerals, arkosic

SP SAND: as above, becoming fU-vcL, predominantly cL, poor to fair grading

SP SAND: light yellowish brown (2.5Y6/4), strong Fe staining at 10', grading to

SM SANDY SILT: greenish gray (5G5/1)

CS CLAYEY SILT: greenish gray (5G5/1), very silty at contact, becoming blocky and less silty with depth, some Fe staining from 12.5'-14'

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20) 3'-15'
SLOTTED 2" PVC SCREEN (0.010") 4'-14'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: Bob Schlosser Date: 3/18/91 Page: 1 OF 1

Hole No.: MW49 Casing Elevation: 3927.68' Ground Elevation: 3927.62'

Total Depth: 16.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Group II Sites

Auger Size: 6" O.D. Sample Type: 3"x5' Continuous, 2.5'x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					SP SAND: yellowish brown (10YR5/4), predominantly mU-cL, angular to subrouwnd, abundant dark accessory minerals, arkosic
2	CS				
4					SP SAND: as above, becoming fL-mU
6	SP				
8	SP				SP SAND: as above, predominantly mL
					SW SAND: yellowish brown (10YR5/4), fU to 3-4 mm pebbles, predominantly cL, suround, arkosic, saturated
10					AUGER 9'-10'
12	CS				CS CLAYEY SILT: greenish gray (5G5/1), strong Fe staining at 12.5' & 13' of VfU sand stringers, becoming less silty with depth, some dark olive mottling around root vessicles, some vfL sand in upper contact
14					CONCRETE 0'-3' BENTONITE PELLETS (3/8") 3'-5' FRAC SAND (8/20) 5'-16' SLOTTED 2" PVC SCREEN (0.010") 6'-16'
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

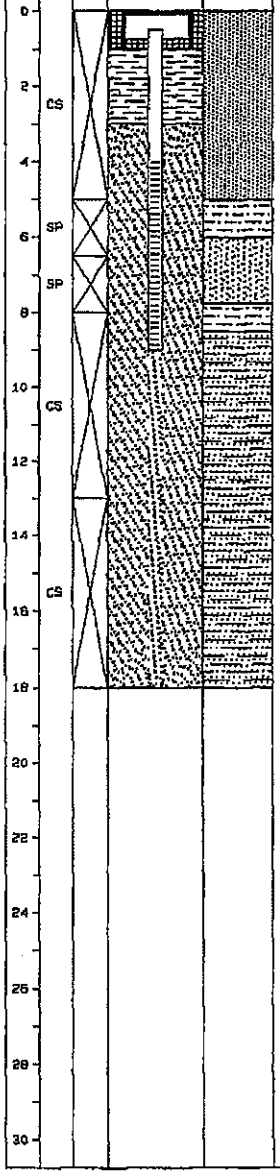
Prepared By: S.R. Sturm Date: 11/22/91 Page: 1 OF 1

Hole No.: MW56 Casing Elevation: 3926.49' Ground Elevation: 3926.45'

Total Depth: 18' No. of Compl.: 1 Rig Type: CME-75 Location: Site 6

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

SP SAND: brown (10YR4/3), fL-mL, subangular to sub-rounded, predominantly clear quartz, 15% mafics, very few fines.

SM SILTY SAND: olive (5Y5/2), micaceous, vfL, silty

SW SAND: brown (10YR4/3), vfU-vcU, angular, 15% mafics.

SM SILTY SAND : as above.

CS SILTY CLAY: olive, mottled by greenish gray, very homogeneous, blocky. Fe stained marker beds at 9.8' and 9.9'. LAHONTON LAKE-CARSON RIVER CONTACT.

CS SILTY CLAY: as above, increasing clay content.

CS SILTY CLSY: as above, slightly lighter color, few wavy discontinuous parallel laminae.

CONCRETE 0-1'
BENTONITE PELLETS (3/8") 1.0'-3.0'
FRAC SAND (#2) 3.0'-18'
SLOTTED 2" PVC SCREEN (0.010") 4'-9'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

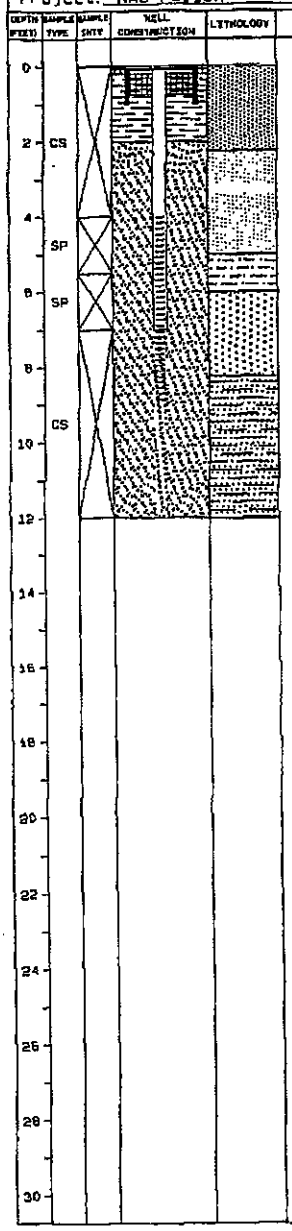
Prepared By: S.R. Sturm Date: 11/22/91 Page: 1 OF 1

Hole No.: MW5B Casing Elevation: 3927.61' Ground Elevation: 3927.72'

Total Depth: 12' No. of Compl.: 1 Rig Type: CME-75 Location: Site 6

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

SP SAND: brown (10YR4/3), vfL-fL, subangular to subrounded, eloian, dry.

SP SAND: brown (10YR4/3), vfU, subrounded, predominantly clear quartz, <5% mafics, moist, becoming coarser with depth.

SC SILTY SAND: dark brown (10YR3/3), micaceous.

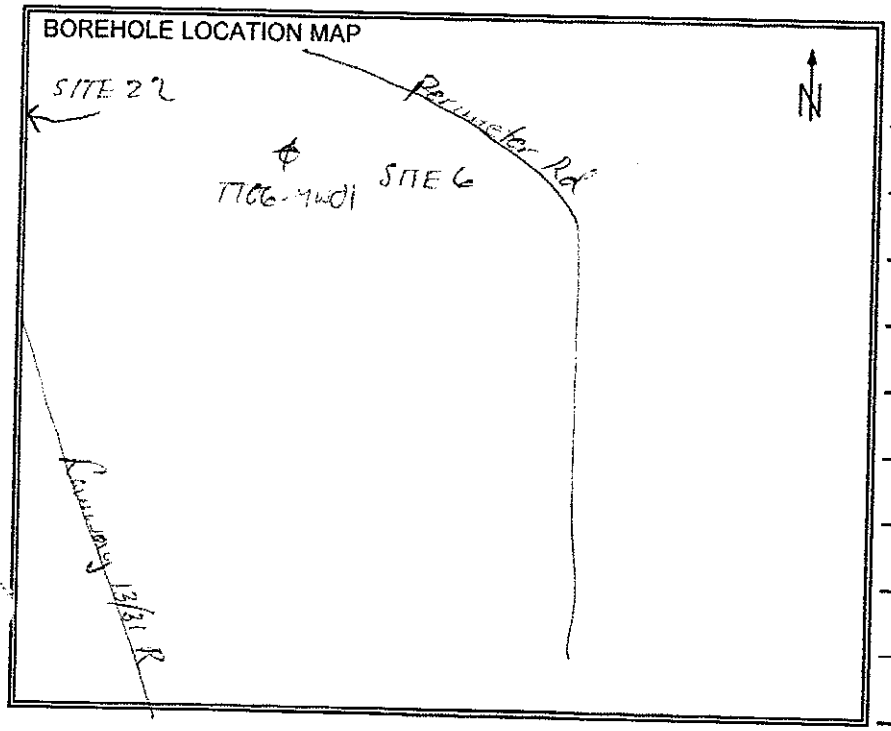
SW SAND: fL-cU, subangular to rounded, <5% mafics, occasional pebble 2-3mm, grain size increasing with depth, saturated.

CS SILTY CLAY: olive, very homogeneous, becoming blocky and dry, micaceous, at 11.7', MARKER BED, SP SAND:, vfL-fL, subangular to subrounded, predominantly clear quartz with Fe oxide staining.

CONCRETE 0-.2'
BENTONITE PELLETS (3/8") 0.2'-2.0'
FRAC SAND (#2), 2.0'-13'
SLOTTED 2" PVC SCREEN (0.010") 4'-9'

Boring ID:	
Monitoring Well ID: TTCG-MW01	
Project Number: I4302300	Project Name: CI Addendum
Client: US Navy	
Site: 6	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mud	
Sampler Type: Hand auger to 5 feet, acetate sleeves to TD	
Borehole Diameter (inches):	to: feet bgs
Overdrilled Diameter (inches):	to: feet bgs
Drill Start Date: 11-7-07	Drill Start Time: 0830
Drill Finish Date: 11-7-07	Drill Finish Time: 0853
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time: NA
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6	Date: 11-7-07 Time: 0840
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs): ~~5.4 feet~~ RK	
Well Completion Date: 11-7-07	Well Completion Time: 1010
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 5.4	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: [illegible]
CTO:
BORING ID:

MW ID: TT06-MW01

DATE: 11-7-07
LOGGED BY: Richard Knapp

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		08:30									Surface is loose soil					
										ML	Silt, sandy, pale brown (10YR 6/3), very soft, dry				20	80
Hand auger									1		Hand auger to 5 feet					
									2							
									3	SM	Silty sand, yellowish brown (10YR 5/4), loose, dry				75	25
									4							
		08:40	39/36				1.7		5	SP	Sand, very dark greyish brown, loose, moist (10YR 3/2)			35	65	
									6 ▽		As above, except wet					
							3.2		7							
After test pit		08:45	40/48						8	SP	as above					
							3.8		9	SW-SP	Sand, very dark greyish brown (10YR 3/2), loose, wet	25	55	20		

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-7-07
LOGGED BY: R Knapp

MW ID: TTCG-MW01

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
										~~CL~~ ML	Silt, clayey, olive brown (2.5Y 4/3), soft, wet, sl micaceous				10	90
							2.9									
									11							
									12							
	✓	0848	48/48							ML	As above					
									13	SP	Sand with ~5% gravel, dark greyish brown (2.5Y 4/2) loose, wet, subrounded, mostly quartz, feldspar, few black rock frags. Abrupt contact with silt above	5	75	20		
									14							
									15							
							6.6									
	✓	0853	42/48						16	SP	as above					
									17							
									18							
									19							
							5.2			CL	Clay, light olive brown (2.5Y 5/3) very stiff, moist, plastic. TD = 20'					100
	✓															

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT06-MW01
PROJECT: RI Addendum
SITE: 6
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-7-07 TIME: 0830
WELL INSTALLATION BEGAN:
DATE: 11-7-07 TIME: 0905
WELL INSTALLATION FINISHED:
DATE: 11-7-07 TIME: 1010
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2378
DRILL RIG: Mari M5T
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4 1/4" OD: 8"

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: PVC Monitor pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 20.3'

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: PVC Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

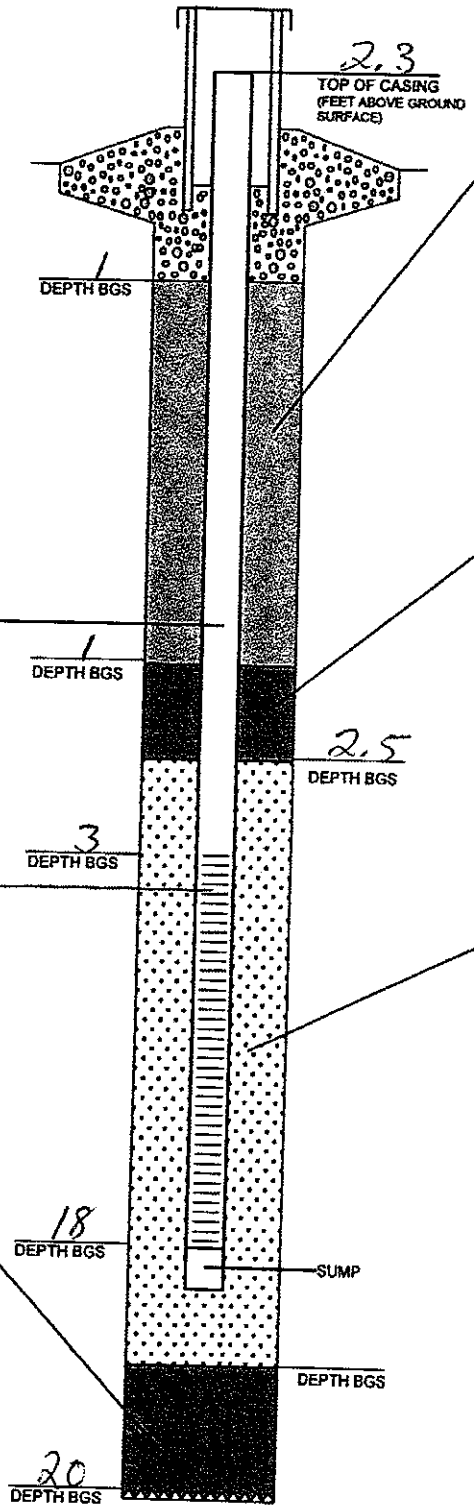
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [x] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
ETHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)

PORTLAND CEMENT:
BENTONITE:
WATER:
- [ ] PREPARED MIX

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

N/A

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: medium
- [ ] OTHER:

PRODUCT: Bentonite chips
MFG. BY: Pure Gold
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED:
- [x] SAND, SIZE: 2/16

PRODUCT: Lapis lustre
MFG. BY: Cemex
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL: 7.7
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO:

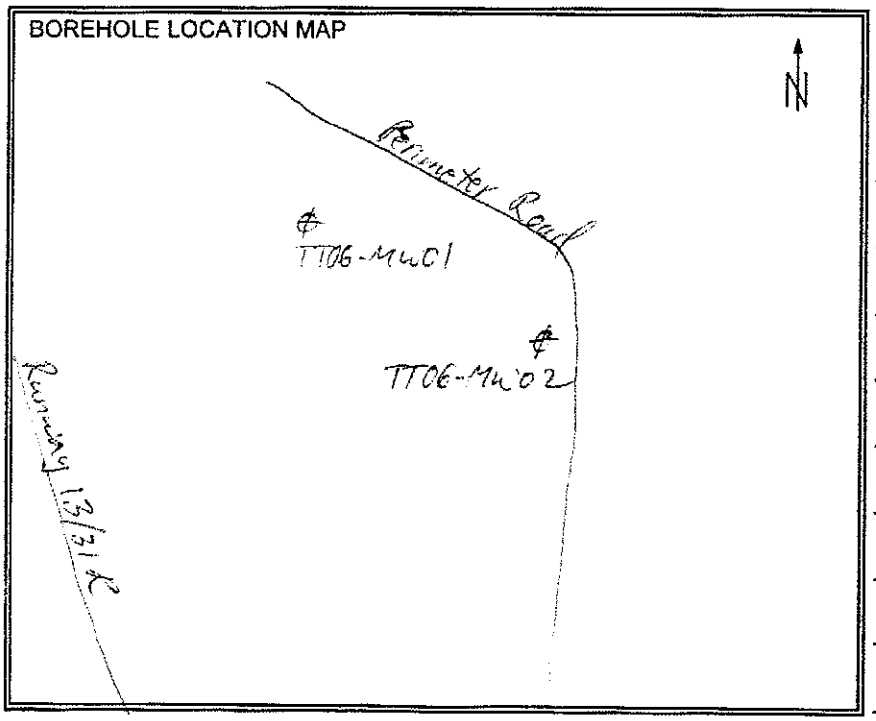
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT06-MW02	
Project Number: I4302300	Project Name: RI Addendum
Client: U.S. Navy	
Site: 6	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mobil M5-7 All Terrain	
Sampler Type: Hand auger to 5 feet, acetate sleeves to TD	
Borehole Diameter (inches):	to: feet bgs
Overdrilled Diameter (inches):	to: feet bgs
Drill Start Date: 11-7-07	Drill Start Time: 1015
Drill Finish Date: 11-7-07	Drill Finish Time: 1039
Total Borehole Depth (feet bgs): 20'	
Soil Boring Backfill Date: 11-7-07	Soil Boring Backfill Time: N/A
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 7	Date: / Time:
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-7-07	Well Completion Time: 1205
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 7.1	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: N. Atlanta
CTO:
BORING ID: TTO6-MW02
MW ID: TTC8-MW02
DATE: 11-1-01
LOGGED BY: R Knapp

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Surface loose soil					
										ML	Silt, sandy, pale brown (10YR 6/3), very soft, dry				20	80
Hand Auger									1		Hand auger to 5 feet					
									2							
									3							
		1020								SM	Silty sand, yellowish brown (10YR 5/4), loose, dry, micaceous				60	40
									4							
		1030	30/36						5	SM	As above					
Acetate Sleeves									6							
									7	ML	Silt, light olive brown (2.5Y 5/4), plastic, wet, sl micaceous, med stiff			8	92	
		1031				8.5			8							
									9	CL	Clay, sandy, light olive brown (2.5Y 5/4), sl plastic, damp micaceous, soft			15	85	

Installation: [illegible]
CTO:
BORING ID:

MW ID: TT06-MW02 / TT08-MW02

DATE: 11-1-07
LOGGED BY: R. Knapp

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
							1.5									
									11	CL	Clay, silty, olive (5Y 5/3) some orange mottling, very stiff plastic, very damp, sl micaceous					100
	✓								12							
		1035	18/18				9.7			SP	Sand, brown (10YR 4/3), med dense, wet				90	10
									13							
									14							
							9.8			SL	Clay, silty, light olive brown (2.5Y 5/4), stiff, plastic damp				5	95
									15							
										CL	Clay, olive gray (5Y 5/2), very stiff, plastic, damp					100
	✓	1639					9.1		16							
									17							
									18							
										CL	Clay, silty, sandy, light yellowish brown, stiff, damp				5	95
									19							
	✓										TD = 20'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTC-MW02
PROJECT: RI Addendum
SITE: 6
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.35

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-7-07 TIME: 1015
WELL INSTALLATION BEGAN:
DATE: 11-7-07 TIME: 1050
WELL INSTALLATION FINISHED:
DATE: 11-7-07 TIME: 1200
DRILLING CO.: Gregg Drilling
DRILLER: Jason
LICENSE:
DRILL RIG: Mark MST
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4¼" OD: 8"

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: PVC Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 20.35

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: PVC Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

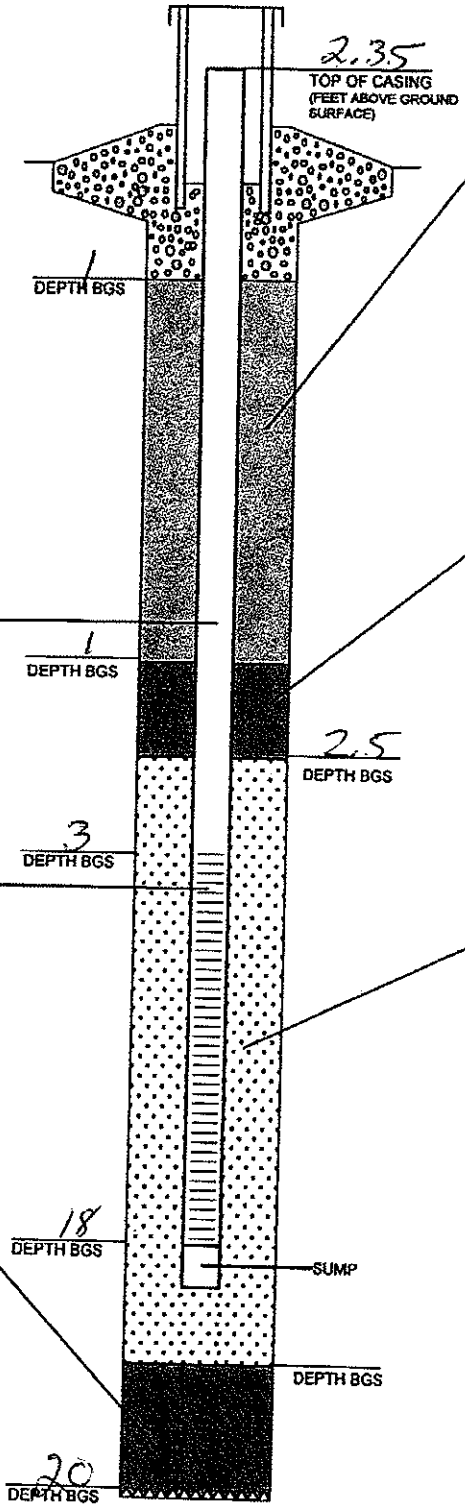
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [x] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [ ] PREPARED MIX
  - PRODUCT:
  - MFG. BY:

N/A

METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: medium
- [ ] OTHER:

PRODUCT: Bentonite Chips
MFG. BY: Pure Gold
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED:

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED:
- [x] SAND, SIZE: 2/16

PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL: 9.45
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

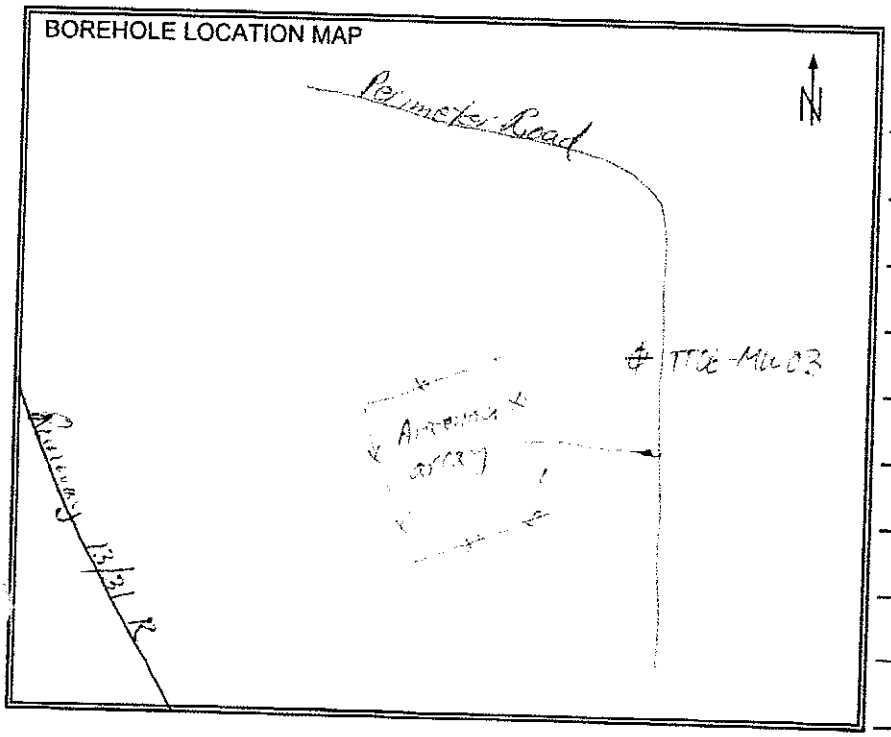
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TTC6 MW03	
Project Number: I4302300	Project Name: R.I. Addendum
Client: U.S Navy	
Site: 6	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Geoprobe Drilling	
Drill Rig Type/Method: Mark 45T All Terrain	
Sampler Type: Handauger to 5', acetate sleeves to TD	
Borehole Diameter (inches):	to: feet bgs
Overdrilled Diameter (inches):	to: feet bgs
Drill Start Date: 11-7-07	Drill Start Time: 1255
Drill Finish Date: 11-7-07	Drill Finish Time: 1318
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 7.5	Date: 11-7-07 Time: 1308
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-7-07	Well Completion Time: 1420
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-7-07
LOGGED BY: R. Knapp

MW ID: TTR6-MW03

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Surface loose soil					
Hand auger										ML	Silt, sandy, pale brown (10YR 6/3), very soft, dry				25	75
									1							
									2							
		1300							3	SP	Sand, brown (10YR 5/3), loose, dry			15	85	
									4							
		1308	18/36						5	ML	Silt, sandy olive brown (2.5Y 4/3) sl plastic, moist, micaceous				20	80
Acetate sleeves									6							
						5.3			7							
											As above but wet at 7.5					
		1310							8							
						3.5			9	SM	Silty sand, olive gray (5Y 4/4) dense, wet			70	30	

Installation: NAS Pensacola
CTO:
BORING ID:

DATE: 11-12-01
LOGGED BY: R. Knapp

MW ID: TT06-MW03

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
										CL	Clay, olive (5Y 5/3), very stiff, sl plastic, sl micaceous					100
									11	ML	Silt, clayey, olive grey (5Y 5/2) med stiff some orange mottling, damp, sl plastic, sl micaceous				2	98
		1313	24/18						12	CL	Clay, as logged above from 10-11					100
									13							
									14							
							6.2		15							
		1318	24/18						16	CL	Clay as above					100
									17							
							5.5		18	CL	Clay, silty, greyish brown (2.5Y 5/2), stiff, sl plastic				3	97
									19							
											TD = 20'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTG-MWC3
PROJECT: RI Addendum
SITE: 6
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.4

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-7-07 TIME: 1255
WELL INSTALLATION BEGAN:
DATE: 11-7-07 TIME: 1330
WELL INSTALLATION FINISHED:
DATE: 11-7-07 TIME: 1445
DRILLING CO.: Gregg
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4 1/4" OD: 8"

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT:
MFG. BY:
CASING DIAMETER:
ID: OD:
LENGTH OF CASING:

WELL SCREEN

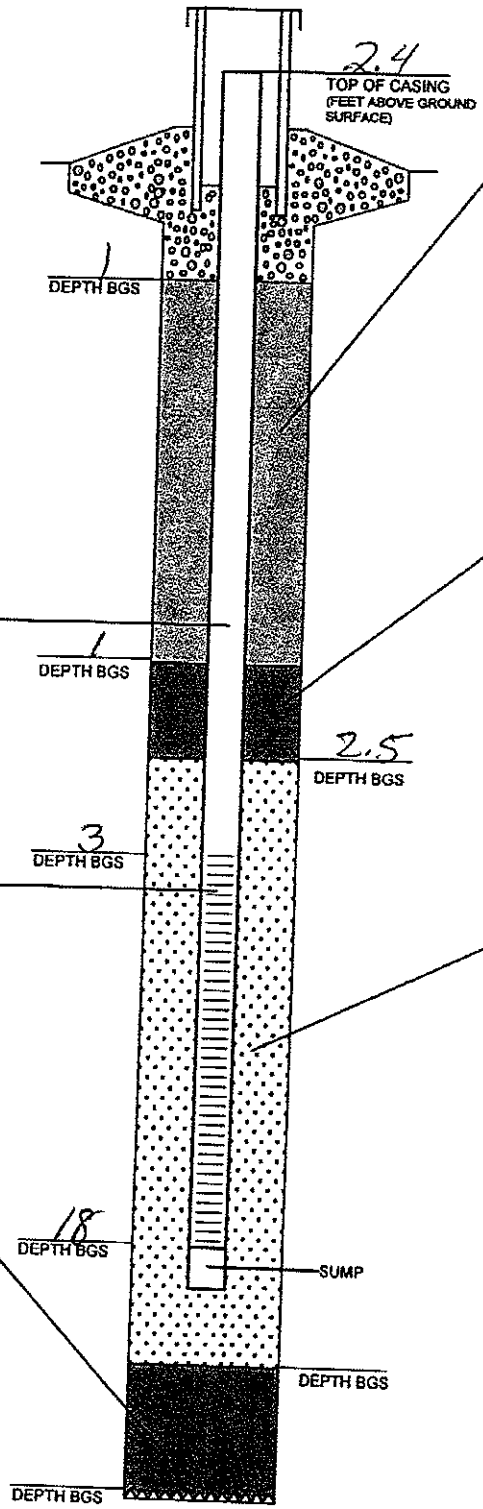
☐ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: OD:
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER: N/A
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: medium 3/8
☐ OTHER:
PRODUCT: Holeplug
MFG. BY: Baroid
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED:

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED:
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY:
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

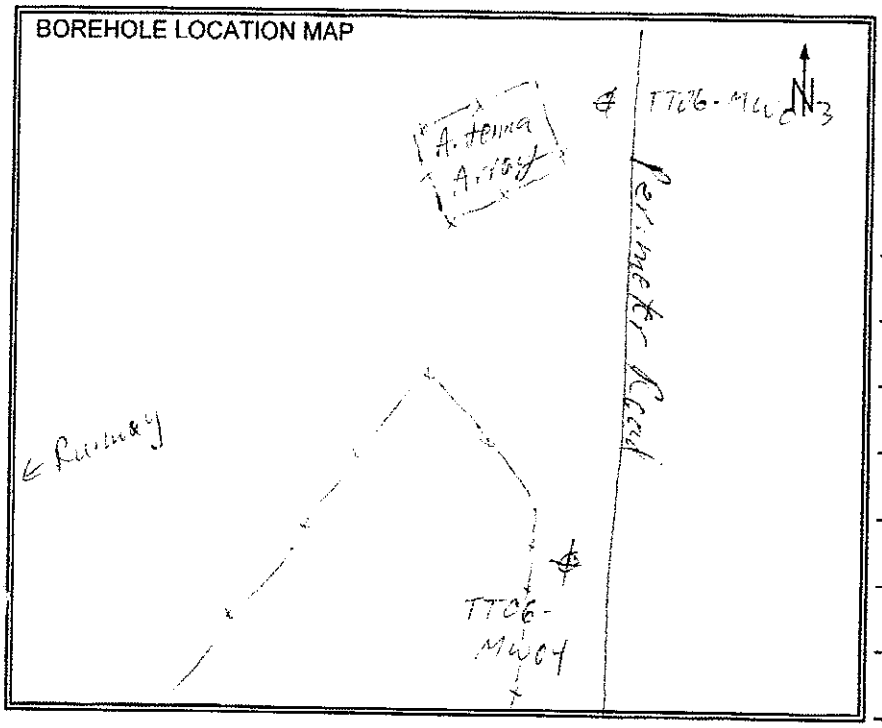
☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT06-MW04	
Project Number: I4302300	Project Name: RI Addendum
Client: US Navy	
Site: 6	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mari MST / Hollow Stem Auger	
Sampler Type: Hand auger to 5 feet, acetate sleeves to TD	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): N/A	to: feet bgs
Drill Start Date: 11-8-07	Drill Start Time: 1010
Drill Finish Date: 11-8-07	Drill Finish Time: 1030
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date: N/A	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6	Date: 11-8-07 / Time: 1016
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-8-07	Well Completion Time: 1130
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 5.5	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-8-01
LOGGED BY: K Knapp

MW ID: TT06-MW04

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Hand auger to 5'					
									1							
									2							
									3							
									4							
									5							
		1016					4.8			SP	Sand very dark grayish brown (10YR 3/2), loose, wet @ 6'			30	70	
									6							
									7							
		1023					5		8	SP	Sand as above, except sl coarser			50	50	
									9							

Installation: (NAS) Pensacola
CTO:
BORING ID:

DATE: 11-8-07
LOGGED BY: R. Knapp

MW ID: TTCE MW04

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
										CL	Clay, silty, olive (5Y 5/3) sl plastic, med stiff, moist					100
									11							
							6.2									
	✓	1026							12	SP	Sandy, greyish brown (2.5Y 5/2) loose, wet			70	30	
									13							
							7.4									
									14							
									15	CL	Clay, silty, olive (5Y 5/3) sl plastic, moist, stiff					100
	✓	1030							16	CL	Clay as above					100
									17							
							6.6		18							
									19							
	✓										TD = 20'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTCE-MW04
PROJECT: CI Addendum
SITE: 6
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-8-07 TIME: 1010
WELL INSTALLATION BEGAN:
DATE: 11-8-07 TIME:
WELL INSTALLATION FINISHED:
DATE: 11-8-07 TIME: 1130
DRILLING CO.: Gregg
DRILLER: Jason Neff
LICENSE:
DRILL RIG: Mark MST
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: OD:

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT:
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: OD:
LENGTH OF CASING:

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT:
MFG. BY:
CASING DIAMETER:
ID: OD:
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

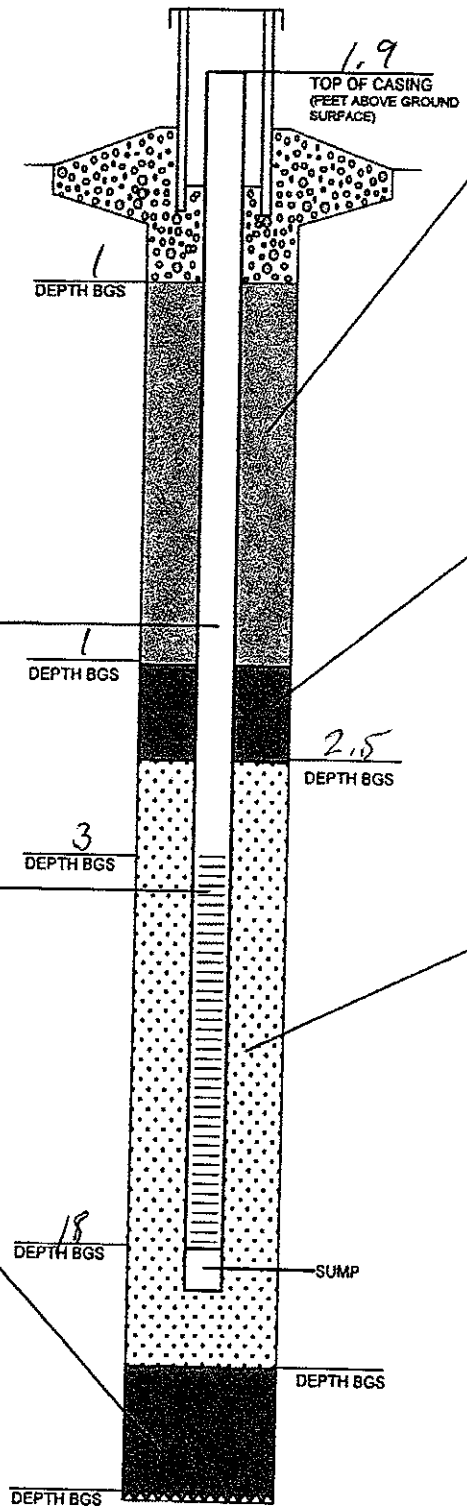
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [ ] PREPARED MIX
  - PRODUCT:
  - MFG. BY:

METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] PELLETS, SIZE:
- [ ] CHIPS, SIZE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED:

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED:
- [x] SAND, SIZE: 2/16

PRODUCT: Lapis Lustre
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

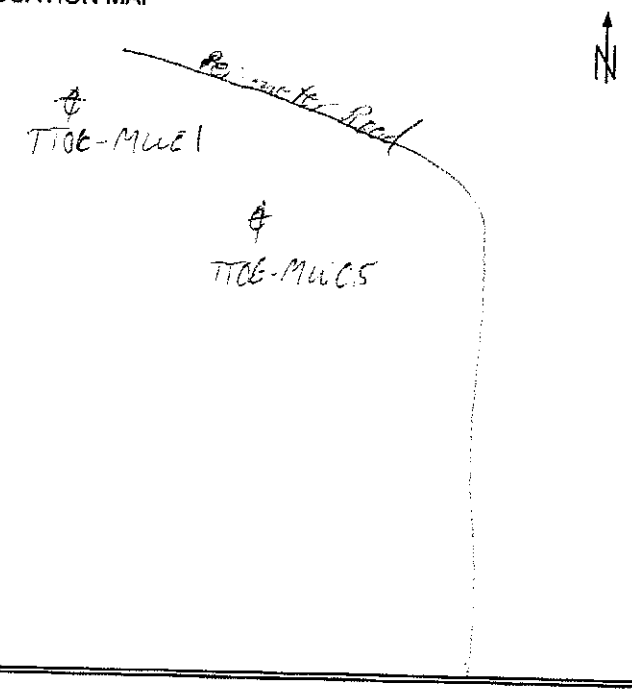
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT06-MW05	
Project Number: I4302300	Project Name: RI Addendum
Client: US Navy	
Site: 6	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mark MST All Terrain	
Sampler Type: Hand auger to 5 feet, acetate sleeves 5 feet to TD	
Borehole Diameter (inches): 8	to: 20 feet bgs
Overdrilled Diameter (inches): N/A	to: feet bgs
Drill Start Date: 11-8-07	Drill Start Time: 0810
Drill Finish Date: 11-8-07	Drill Finish Time: 0825
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date: N/A	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6	Date: 11-8-07 Time: 0813
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-8-07	Well Completion Time: 0920
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 7.3	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: TYNDALL AFB
CTO:
BORING ID:

DATE: 11-8-01
LOGGED BY: R Knapp

MW ID: TT06-MW05

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Hand auger to 5' "Hard pan" surface crust					
Hand auger									1	SP	Sand dark yellowish brown (10YR 4/4), loose, dry, sl micaceous			15	80	5
									2							
									3							
									4							
									5							
Acetate sleeves		0813	24/26													
									6	ML	Silt, sandy, med stiff, wet, sl odor			40	60	
						16			7							
		0816	45/48			242			8	ML	Silt, clayey, stiff, sl plastic damp, odor			2	98	
									9							

Installation: TVTS Pavilion
CTO:
BORING ID:

DATE: 11-8-01
LOGGED BY: R Knapp

MW ID: TTCC-MW05

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
							80			ML	Silt, sandy, olive gray (5Y 4/3), soft, wet, moist, some orange mottling, odor				35	65
									11							
										ML	As above but med stiff, less sand, sl odor				10	90
		0821	48/48				11		12							
									13							
									14							
							5			ML	Silt, clayey, olive (5Y 5/4), very stiff, damp, sl plastic					100
									15							
							2									
		0825	0/18						16		No recovery. Driller says formation fairly soft (?) ~~clay~~					
									17							
									18							
									19							
											TD = 20'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTC6-MW05
PROJECT: RI Addendum
SITE: 6
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 19.9

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-8-07 TIME: 0810
WELL INSTALLATION BEGAN:
DATE: 11-8-07 TIME: 0830
WELL INSTALLATION FINISHED:
DATE: 11-8-07 TIME: 0920
DRILLING CO.: Gregg
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4 1/4 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor Pipe
MFG. BY: Beart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 4.9

WELL SCREEN

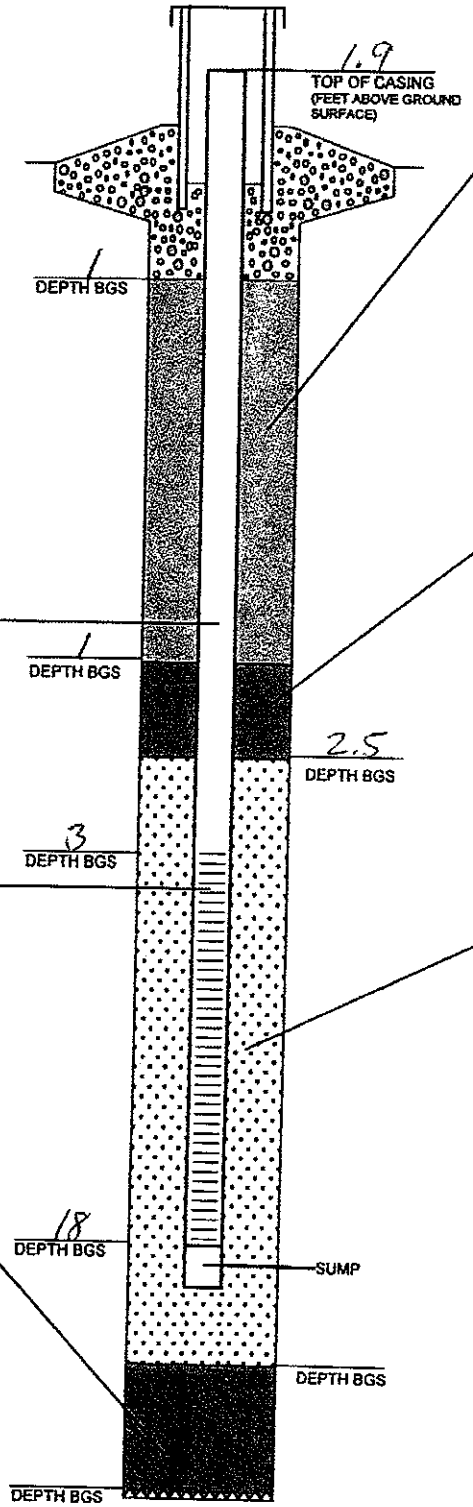
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor Screen
MFG. BY: Beart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND ~~WITH BUMPER POST~~
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Holeplug
MFG. BY: Baroid
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED:
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL: 9.2
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Site 14

Lithologic logs were not available for the following monitoring wells located at Site 14 during report development:

Well ID	Installation Date
BAT-14-F	9/23/1997
MW-27	3/9/1991
P3-MW-01	5/16/2002
P3-MW-02	5/17/2002
P3-MW-03	5/17/2002
P3-MW-04	5/16/2002
P3-MW-05	5/17/2002
P3-MW-06	5/16/2002
P3-MW-07	5/16/2002
P3-MW-08	5/16/2002
P3-MW-09	5/17/2002
P3-MW-10	5/17/2002
P3-MW-11	6/6/2002
P3-MW-12	6/6/2002
P3-MW-13	6/6/2002
P3-MW-14	6/6/2002
P4-BS-01	11/2002
P4-BS-02	11/2002
P4-BS-03	11/2002
P4-BS-04	11/2002
P4-BS-05	11/2002

P4-BS-06	11/2002
P4-BS-07	11/2002
P4-BS-08	11/2002
P4-BS-09	11/2002
P4-BS-10	11/2002
P4-MW-01	6/5/2002
P4-MW-02	5/20/2002
P4-MW-03	5/21/2002
P4-MW-04	6/4/2002
P4-MW-05	5/21/2002
P4-MW-06	5/20/2002
P4-MW-07	5/21/2002
P4-MW-08	5/21/2002
P4-MW-09	5/21/2002

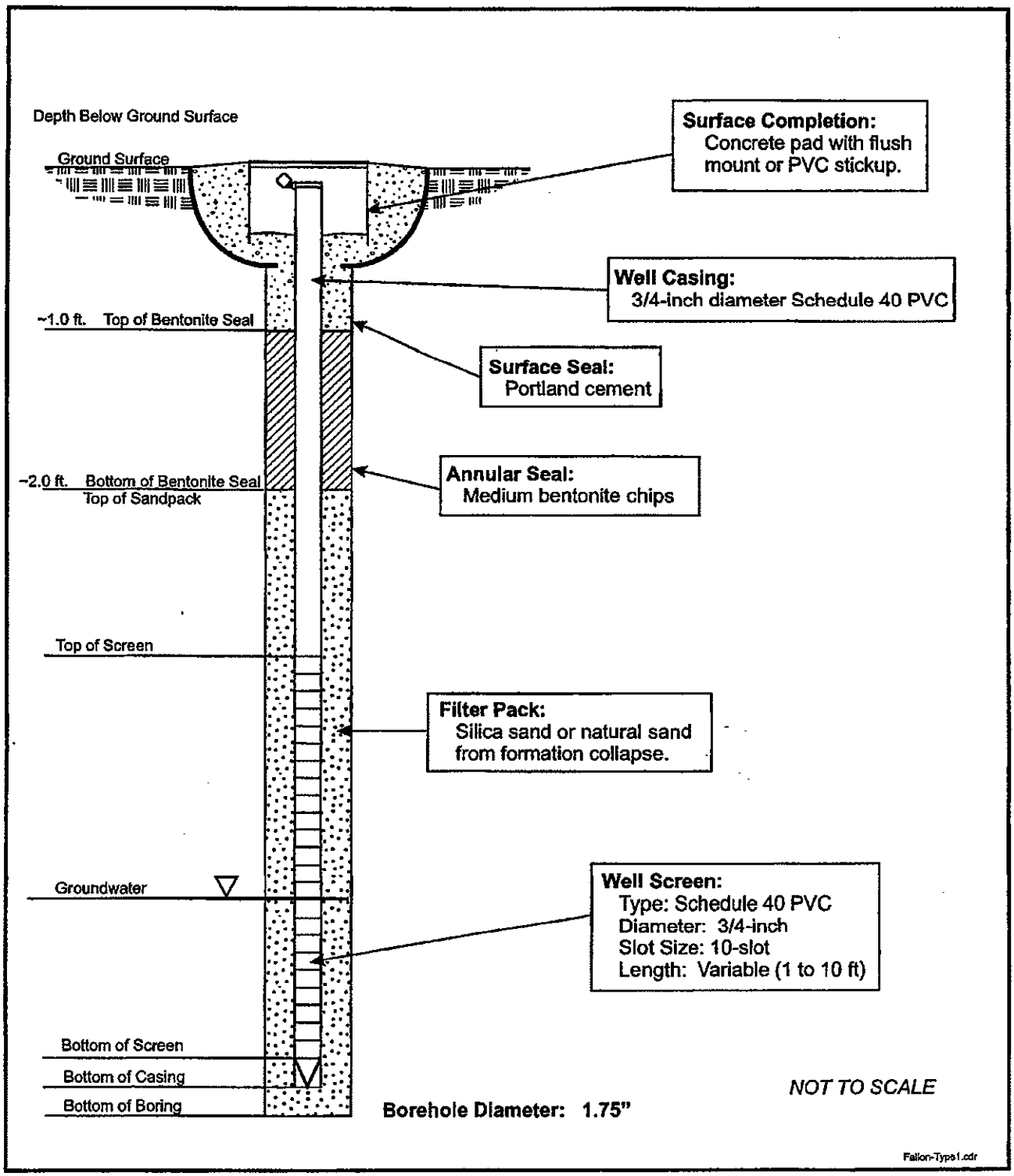
Notes & Comments:

Well BAT-14-F is of the construction shown on either of the next two pages, Figure G-1 or G-2. Specific well details are listed in the table (G.1-1) that immediately follows the above figures.

Battelle
. . . Putting Technology To Work

Figure G-1

WELL COMPLETION DIAGRAM SILICA/NATURAL SAND PACK[a]

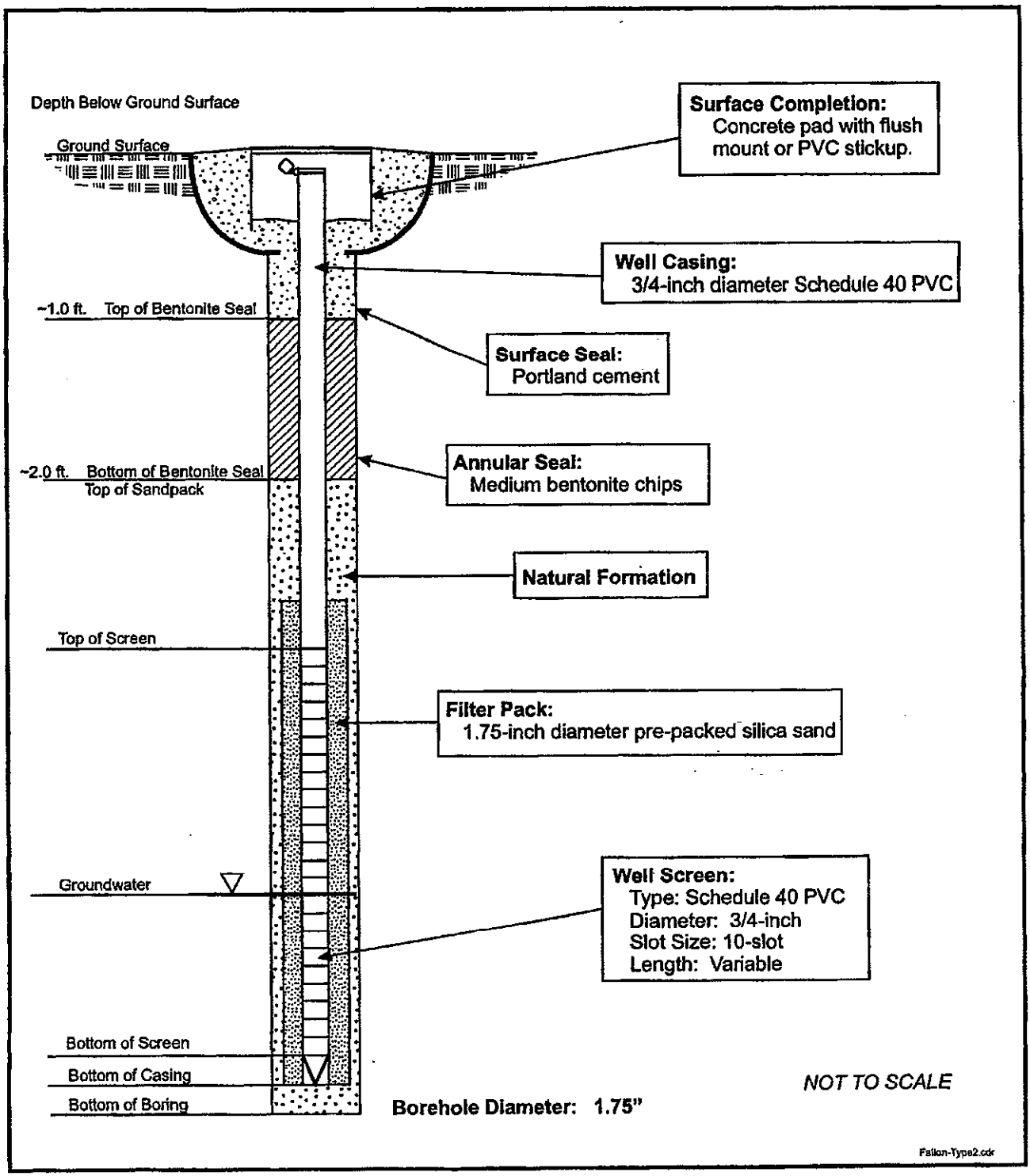


a) Note: all wells installed in September 1997 were constructed in this manner.

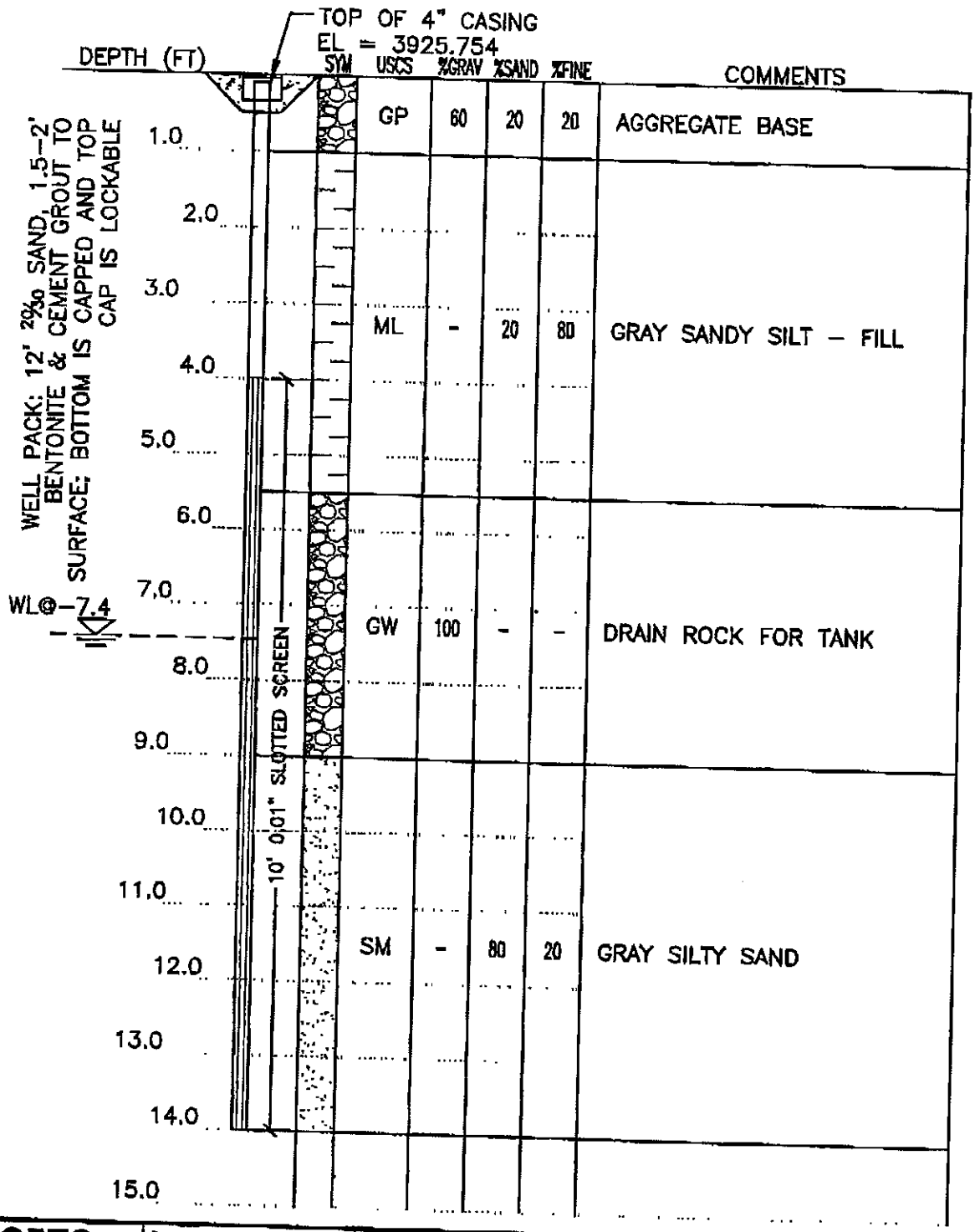
Battelle
. . . Putting Technology To Work

Figure G-2

WELL COMPLETION DIAGRAM PRE-PACKED SCREEN[a]



a) Note: all wells installed after September 1997 were constructed in this manner.



SATO ENVIRONMENTAL

DRAWN: NER/RENG

DATE: 02/07/2005

PREPARED FOR:
FALLON NAVAL AIR STATION
Contract # N44255-03-C-0657

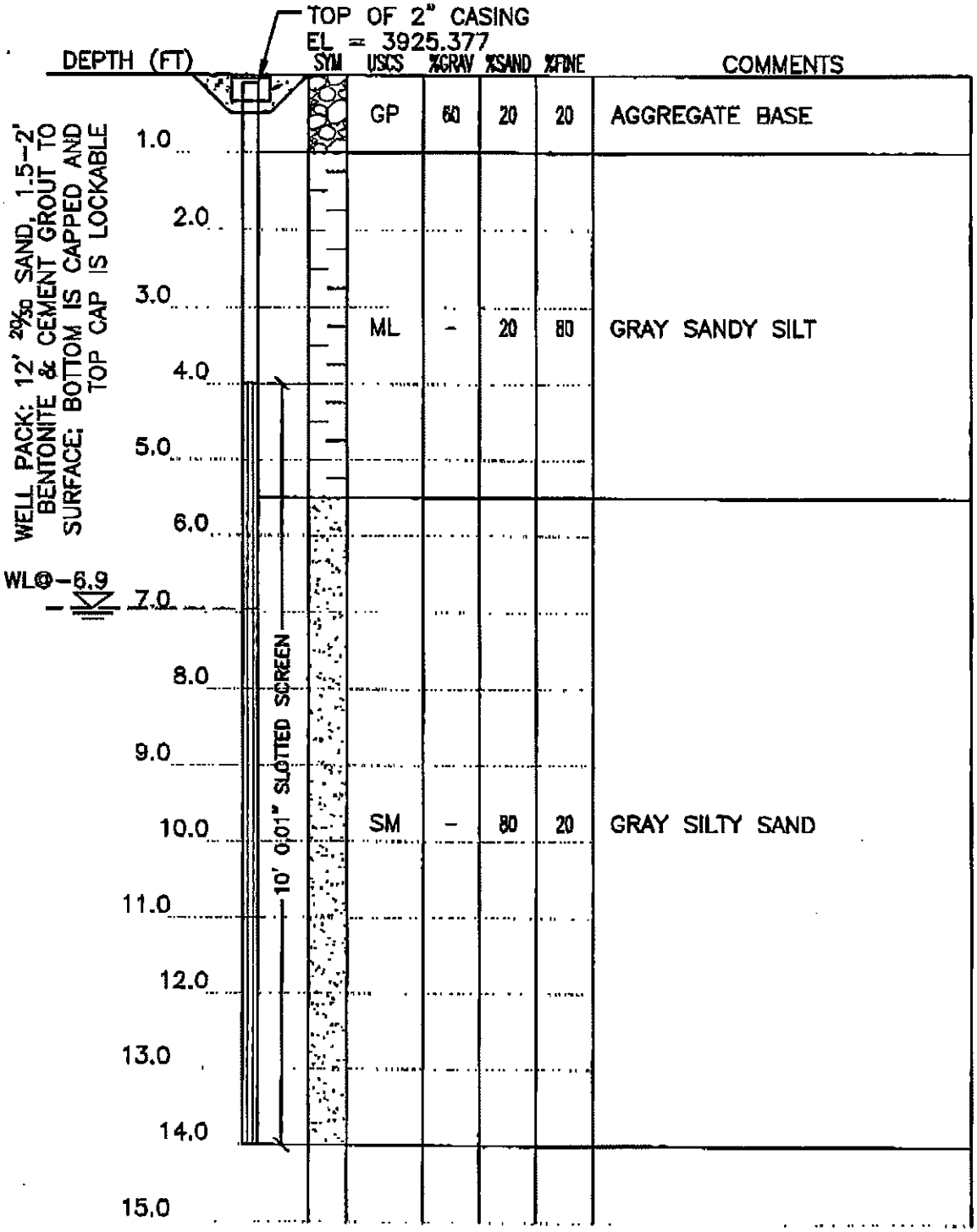
NOTE: WATER LEVEL (WL) MEASURED 10–21–04

0 1 2
SCALE IN: FEET

REFERENCE: ROBISON ENG. FIELD LOG 10–18–04

4TH & C Street Work Site
Soil & Groundwater Sampling

DRAFT SUMMARY REPORT
FIGURE 6-1
WELL CW-14-1 LOG



SATO ENVIRONMENTAL

DRAWN: NER/RENG

DATE: 02/07/2005

PREPARED FOR:
FALLON NAVAL AIR STATION
Contract # N44255-03-C-0657

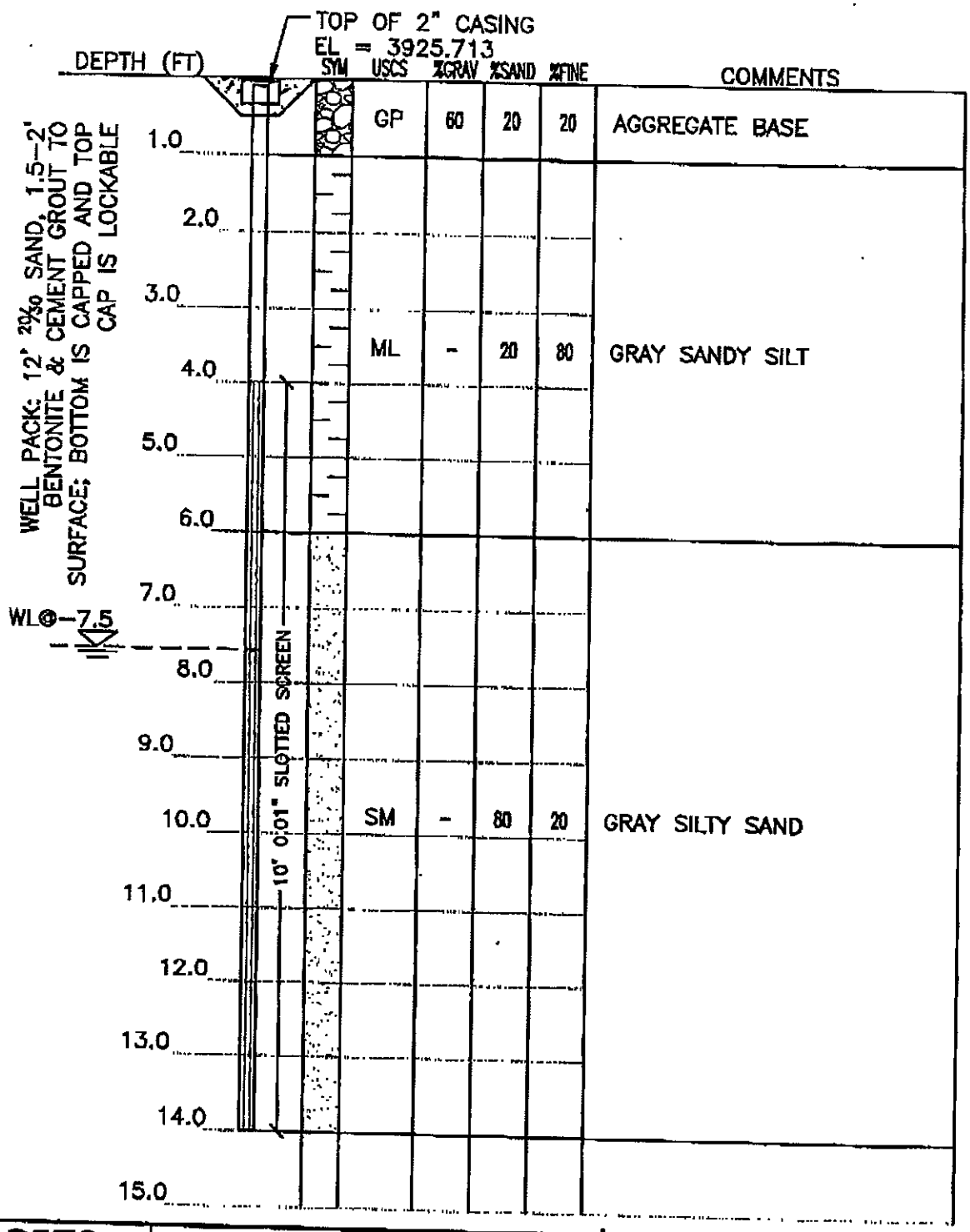
NOTE: WATER LEVEL (WL) MEASURED 10-21-04

0 1 2
SCALE IN: FEET

REFERENCE: ROBISON ENG. FIELD LOG 10-19-04

4TH & C Street Work Site
Soil & Groundwater Sampling

DRAFT SUMMARY REPORT
FIGURE 6-2
WELL CW-14-2 LOG



SATO ENVIRONMENTAL

DRAWN: NER/RENG

DATE: 02/07/2005

PREPARED FOR:
FALLON NAVAL AIR STATION
Contract # N44255-03-C-0657

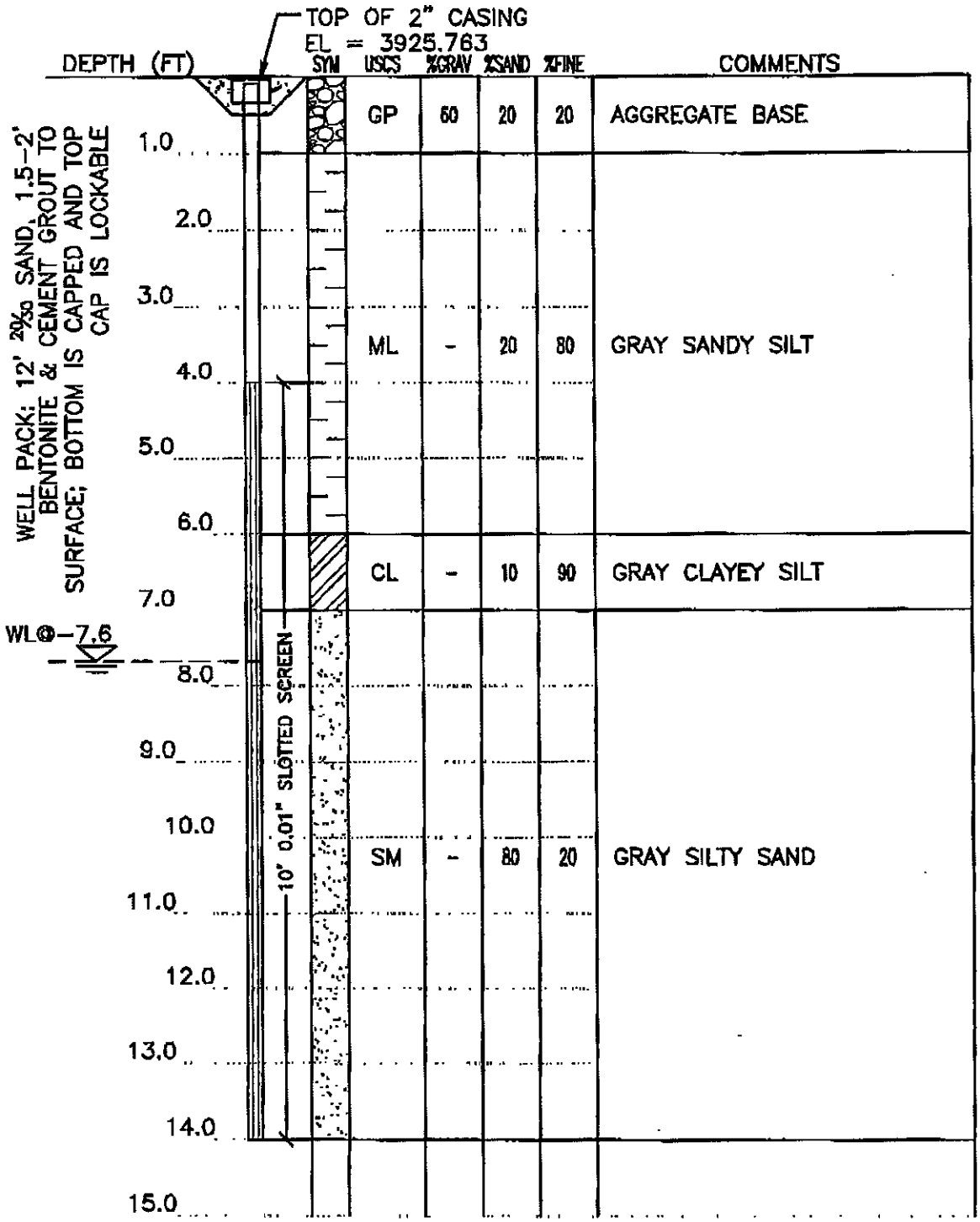
NOTE: WATER LEVEL (WL) MEASURED 10–21–04

0 1 2
SCALE IN: FEET

REFERENCE: ROBISON ENG. FIELD LOG 10–20–04

4TH & C Street Work Site
Soil & Groundwater Sampling

DRAFT SUMMARY REPORT
FIGURE 6-3
WELL CW-14-3 LOG



SATO ENVIRONMENTAL

DRAWN: NER/RENG

DATE: 02/07/2005

PREPARED FOR:
FALLON NAVAL AIR STATION
Contract # N44255-03-C-0657

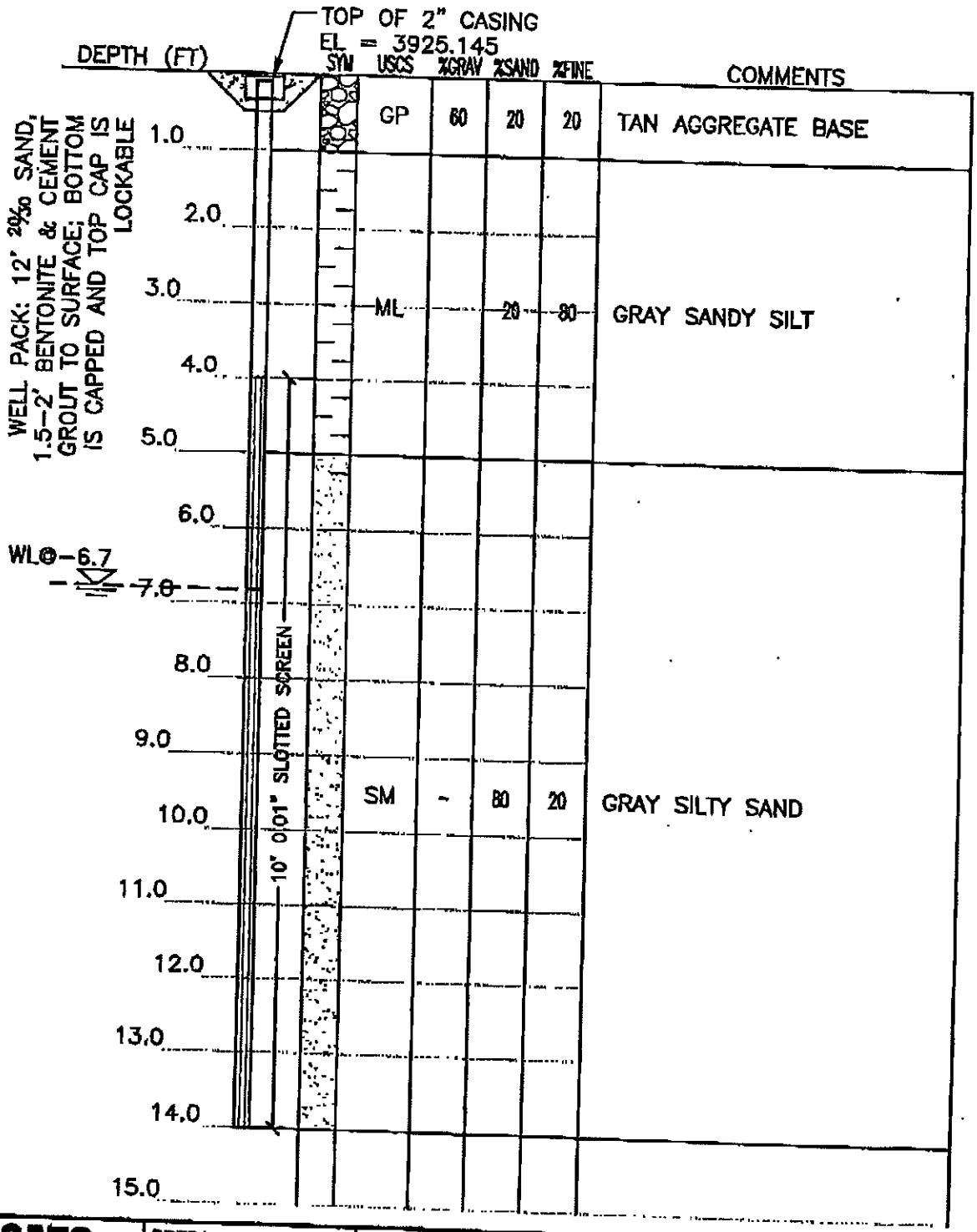
NOTE: WATER LEVEL (WL) MEASURED 10-21-04

0 1 2
SCALE IN: FEET

REFERENCE: ROBISON ENG. FIELD LOG 10-20-04

4TH & C Street Work Site
Soil & Groundwater Sampling

DRAFT SUMMARY REPORT
FIGURE 6-4
WELL CW-14-4 LOG



SATO ENVIRONMENTAL

DRAWN: NER/RENG

DATE: 02/07/2005

PREPARED FOR:
FALLON NAVAL AIR STATION
Contract # N44255-03-C-0657

NOTE: WATER LEVEL (WL) MEASURED 10-21-04

0 1 2
SCALE IN: FEET

REFERENCE: ROBISON ENG. FIELD LOG 10-20-04

4TH & C Street Work Site
Soil & Groundwater Sampling

DRAFT SUMMARY REPORT
FIGURE 6-5
WELL CW-14-5 LOG

Drilling Log

GROUNDWATER TECHNOLOGY

Extract. / Inject. Well **GTI 14-2**

Project NAS Fallon Owner US Navy
Location Fallon, NV Proj. No. 830011068
Surface Elev. -- ft. Total Hole Depth 16 ft. Diameter 10 in.
Top of Casing -- ft. Water Level Initial 6.5 ft. Static 6.51 ft.
Screen: Dia 4 in. Length 10 ft. Type/Size .010 in.
Casing: Dia 4 in. Length 5 ft. Type SCH 40 PVC
Fill Material #1C sand Rig/Core CME 75/split spoon
Drill Co. West Hazmat Method HSA
Driller Mike Barr Log By Bob Davis Date 5/31/95 Permit # N/A
Checked By License No.

See Site Map For Boring Location

COMMENTS:

FREE PRODUCT RECOVERY WELL. Free product at 6.3 ft. First 11 ft. of GTI14-2 drilled as screening well on 5/22/95. 01385

Depth (ft.)	Well Completion	PID (ppm)	Sample ID	Blow Count/ % Recovery	Graphic Log	USCS Class.	Description (Color, Texture, Structure) Trace < 10%, Little 10% to 20%, Some 20% to 35%, And 35% to 50%
-2							All percentages are approximate.
0							
2						SM	
4							
6		9	14-2-5	1 2 2			SILTY SAND (SM): 80% fine, subrounded to subangular sand; 20% silt; poorly graded; very loose; dark yellowish brown (10YR 4/2); moist; strong hydrocarbon odor.
8		45		1 2 2		CL	LEAN CLAY (CL): 70% slightly plastic clay; 20% silt; 10% fine sand; soft; dark yellowish brown; moist; strong hydrocarbon odor.
10		45	14-2-10	4 7 9		SM	SILTY SAND (SM): 85% fine, subrounded to subangular sand; 15% silt; poorly graded; medium dense; pale yellowish brown (10YR 6/2); saturated; strong hydrocarbon odor.
12							
14						SP	POORLY GRADED SAND (SP): 80% fine, subrounded to subangular sand; 20% medium sand; poorly graded; medium dense; saturated; strong hydrocarbon odor.
16		132	14-2-15	5 8 9			

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

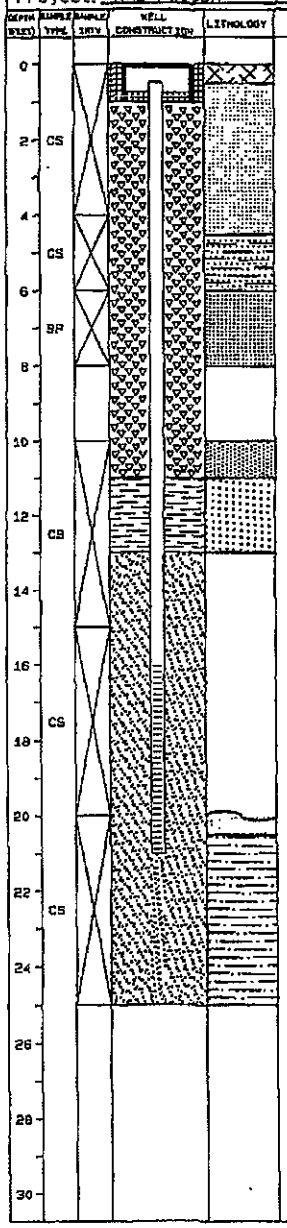
Prepared By: Bob Schlosser Date: 3/7/91 Page: 1 OF 1

Hole No.: MW18L Casing Elevation: 3926.29' Ground Elevation: 3926.37'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 4

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5'x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smyth Date: 3/10/91



DESCRIPTION

FILL: Gravel and sand

SP SAND: light gray (10YR6/2), subangular, arkosic, micaceous, some dark accessory minerals HNU=20-40 ppm

HNU=60 ppm

CL SILTY CLAY: dark grayish brown (10YR4/2), some root hairs and Fe staining. HNU=68 ppm @ 6.0'

SP SAND: color as above mU, subangular, saturated at 7.5', HNU=150 ppm

AUGER FROM 8'-10'

SP SAND: as above

SW SAND: dark grayish brown (10YR4/2), well graded, some vF dark accessory minerals, arkosic in part micaceous

NO SAMPLE 13.5'-20', hole surged with sand to 11' probably SW SAND or SP SAND

SP SAND: as above

CL CLAYEY SILT: olive, very silty in part, strong Fe stained vF sand at 21.5' CARSON RIVER-LAKE LAHONTON CONTACT

CONCRETE 0'-1'
NEAT CEMENT 1'-11'
BENTONITE PELLETS (3/8") 11'-13'
FRAC SAND, (8/20) 13'-25'
SLOTTED 2" PVC SCREEN (.020") 16'-21'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

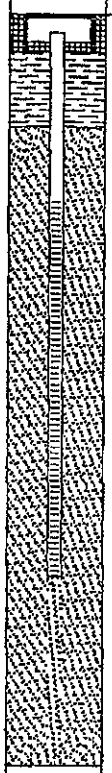
Prepared By: Bob Schlosser Date: 3/7/91 Page: 1 OF 1

Hole No.: MW18U Casing Elevation: 3926.23' Ground Elevation: 3926.29'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 4

Auger Size: 6" O.D. Sample Type: NONE

Project: NAS Fallon Data Verified By: Bob Schlosser Date: 3/10/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					NO SAMPLES TAKEN. SEE MW18L FOR LITHOLOGY
4					AUGER TO 20'
6					
8					
10					CONCRETE 0'-1.0' SLOTTED 2" PVC SCREEN (0.010") 5'-15' BENTONITE PELLETS (3/8") 1.0'-3.0' FRAC SAND (8/20) 3'-20'
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

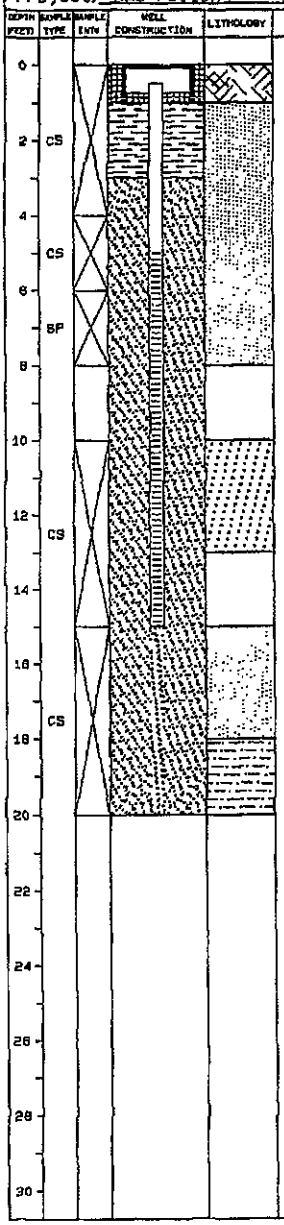
Prepared By: W.H.Burke Date: 3/7/91 Page: 1 OF 1

Hole No.: MW19 Casing Elevation: 3925.94' Ground Elevation: 3926.96'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 4

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91



DESCRIPTION

FILL: gravel and sand

SP SAND: light yellowish brown (10YR6/4), fU, sub-angular to subround, dark accessory minerals

SP SAND: grayish brown (10YR4/3), vfU

SP SAND: yellowish brown (10YR4/6), vfL, subround, some dark accessory minerals, HNU=0.1ppm

AUGER 8'-10'

SP SAND: brown (10YR5/3), cU, subrounded

SP SAND: light yellowish brown (10YR6/4), mL, sub-angular to subround

LOST 13'-15'

SP SAND: as above

SM SILTY SAND: olive (5YR5/4), micaceous, some shell fragments

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20), 3'-20'
SLOTTED 2" PVC SCREEN (0.10") 5'-15'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

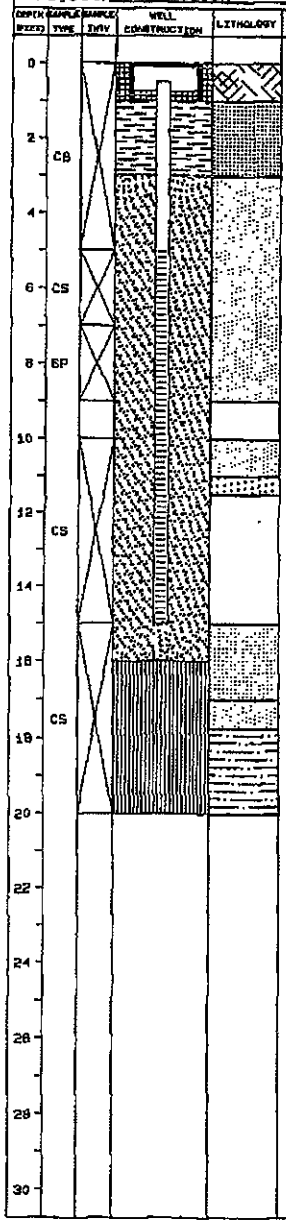
Prepared By: Bob Schlosser Date: 3/8/91 Page: 1 OF 1

Hole No.: NW22 Casing Elevation: 3925.10' Ground Elevation: 3925.67'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 12.13

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91



DESCRIPTION

FILL: gravel and old asphalt

SP SAND: dark yellowish brown, (10YR4/4), fL-mL, micaceous, abundant dark accessory minerals

SP SAND: color as above, vfL-fL, scattered cL, subangular to subrounded

SP SAND: as above, becoming silty, abundant oxidized zones

SP SAND: as above, HNU=0.8 ppm, smell of pesticides

AUGER 9'-10'

SP SAND: as above, strong pesticide/herbicide odor

SW SAND: dark yellowish brown (10YR4/4), cL-vcU, loosly consolidated, very micaceous

LOST 11.5'-15.0'

SP SAND: color as above, scattered dark organics

SP SAND: as above, becoming olive at 16.9'

CL CLAY: olive, silty and sandy, vfL Fe stained sand at 19.5', CARSON RIVER-LAKE LAHONTON CONTACT

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20) 3'-16'
SLOTTED 2" PVC SCREEN (0.020") 5'-15'
NATIVE FILL 16'-20'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

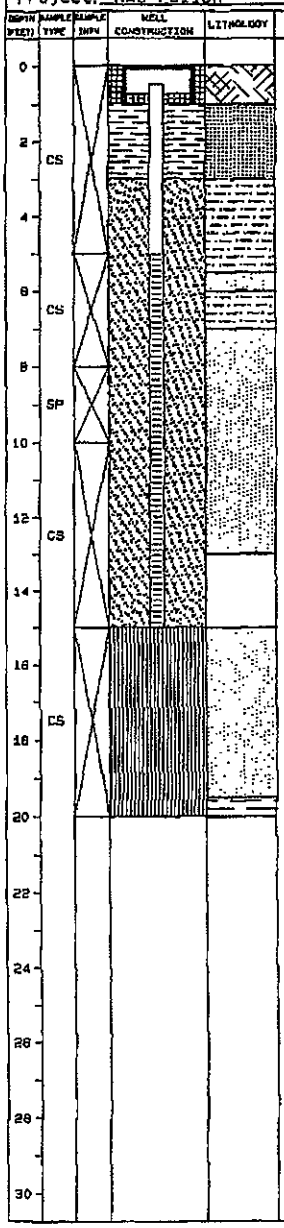
Prepared By: Bob Schlosser Date: 3/8/91 Page: 1 OF 1

Hole No.: MW23 Casing Elevation: 3926.24' Ground Elevation: 3926.30'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 13

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91



DESCRIPTION

FILL: very fine grained sand and gravel

SP SAND: yellowish brown, (10YR5/4), mL, calcareous

SM SANDY SILT: dark grayish brown (10YR3/2)

SP SAND: as above, fU, loosely consolidated

SM SANDY SILT: as above

SP SAND: yellowish brown (10YR5/4), fL- mL, round to subangular, saturated, non-calcareous

SP SAND: as above, arkosic

SP SAND: yellowish brown (10YR5/6), vfL-fL, becoming finer with depth

LOST 13'-15'

SP SAND: yellowish brown (10YR5/6), fL, abundant dark accessory minerals, calcareous locally, micaceous

CL CLAY: olive, very silty and sandy

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20) 3'-15'
SLOTTED 2" PVC SCREEN (0.20") 5'-15'
NATIVE FILL 8'-14'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: Bob Schlosser Date: 3/8/91 Page: 1 OF 1

Hole No.: MW24 Casing Elevation: 3924.47' Ground Elevation: 3925.14'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 13

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					FILL: very fine grained sand and gravel
2	CS				SAMPLER PLUGGED, NO SAMPLE 1'-4'
4					
6	CS				SM SANDY SILT: brown (10YR5/3), micaceous, abundant oxidized zones
8	SP				SP SAND: light yellowish brown (10YR5/3), fU-mL, non calcareous, arkosic, occasionally micaceous
					AUGER FROM 9'-10'
10					SP SAND: brown (10YR5/3), fL- mU, predominantly clear and translucent quartz
12	CS				
14					LOST SAMPLE 12.5'-15.0'
16					SP SAND: as above
18	CS				
20					CL CLAY: olive, very silty and sandy
22					CONCRETE 0'-1' BENTONITE PELLETS (3/8") 1'-3' FRAC SAND (8/20) 3'-18' SLOTTED 2" PVC SCREEN (0.20") 5'-15' NATIVE FILL 18'-20'
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

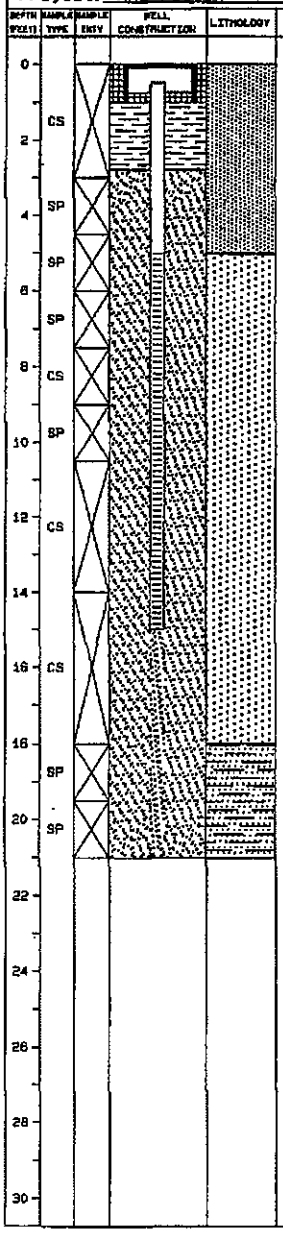
Prepared By: S.R. Sturm Date: 11/20/91 Page: 1 OF 1

Hole No.: MW53 Casing Elevation: 3925.70' Ground Elevation: 3925.99'

Total Depth: 21' No. of Compl.: 1 Rig Type: CME-75 Location: Site 14

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION
SP SAND: yellowish brown (10YR5/4), fL-cU, subangular to subrounded, dark accessory minerals.
SW SAND: yellowish brown (10YR5/4), mL-vcU, subangular to subrounded, pebbles, prdominantly quartz, some flecks of mica, 5% dark minerals.
SW SAND: as above, becoming coarser, abundant clear quartz with some amber and milky, 5% dark minerals, some 3-5 mm pebbles.
SW SAND: as above occasional biotite flecks.
SW : as above.
CS SILTY CLAY: olive (5Y5/4), mottled grayish green (5G5/2), vertical desiccation cracks with SP sand infill, HNU 15 ppm at contact. Fe oxide marker bed at 21.0'.
CONCRETE 0-1' BENTONITE PELLETS (3/8") 1.0'-2.8' FRAC SAND (#2), 2.8'-21' SLOTTED 2" PVC SCREEN (0.010") 5'-15'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

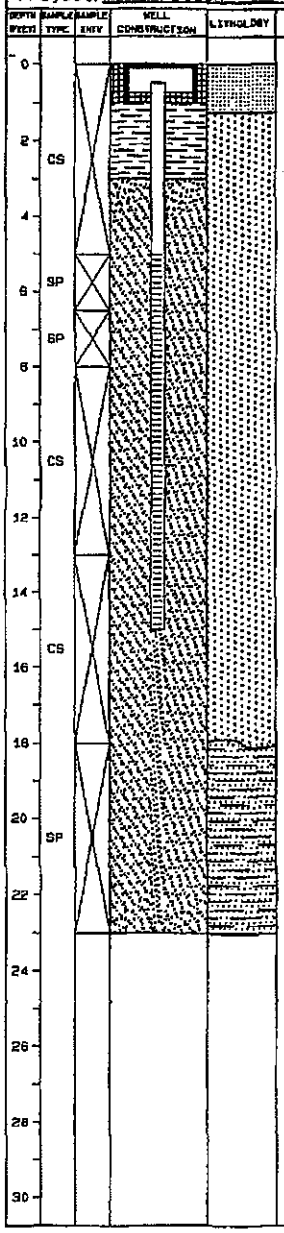
Prepared By: S.A. Sturm Date: 11/21/91 Page: 1 OF 1

Hole No.: MW54 Casing Elevation: 3924.26' Ground Elevation: 3924.53'

Total Depth: 23' No. of Compl.: 1 Rig Type: CME-75 Location: Site 14

Auger Size: 10" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

SP SAND: yellowish brown (10YR5/4), some silt, fL-fU, subangular.

SW SAND: yellowish brown (10YR5/4), fU-vcU, subangular to subrounded, pebbles 2-10mm, predominantly clear quartz, 5% mafics.

SW SAND: as above.

SW SAND: as above, some milky quartz, common mica.

SW SAND: as above, increasing % 2-10mm pebbles.

SW SAND: as above, less pebbles.

SC SILTY CLAY: olive (5Y5/4), mottled grayish green (5G5/2), verticle desiccation cracks up to 5mm wide with SP SAND infill.

CONCRETE 0-1'
BENTONITE PELLETS (3/8") 1.0'-3.0'
FRAC SAND (#2), 3.0'-23'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

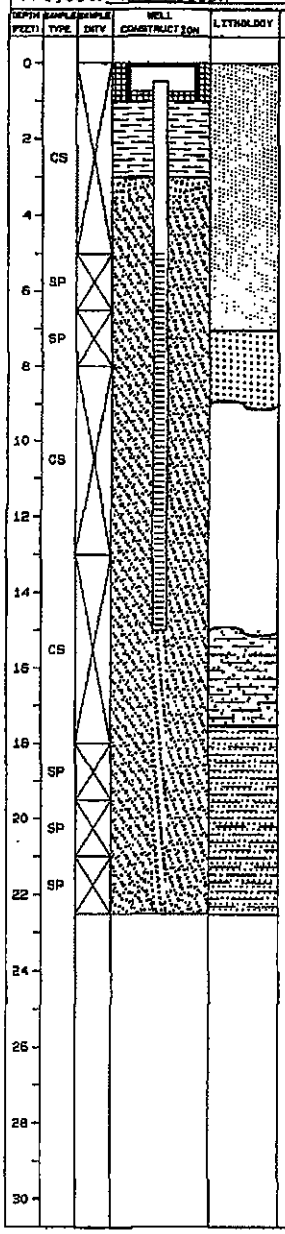
Prepared By: S.R. Sturm Date: 11/21/91 Page: 1 OF 1

Hole No.: MW55 Casing Elevation: 3928.34' Ground Elevation: 3926.62'

Total Depth: 22.5' No. of Compl.: 1 Rig Type: CME-75 Location: Site 14

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

SP SAND: brown (10YR4/3), silty, common pebbles.

SP SILTY SAND: (10YR4/3), common pebbles, roots, damp, firm.

SW SAND: yellowish brown (10YR5/4), mL-vcU, subangular to subrounded, common mica, predominantly clear quartz, 5% mafics, wet, loose, saturated.

LOST 9'-15'

GC PEBBLY CLAY: brown (10YR4/3), soft, gradual change from SW to GC, 2-8mm pebbles imbedded in clay.

CS SILTY CLAY: olive (5Y5/4), with some sand, desiccation cracks with SP SAND infill, CLAY is fat very homogenous.

CS SILTY CLAY: as above.

CONCRETE 0-1'
BENTONITE PELLETS (3/8") 1.0'-3.0'
FRAC SAND (#2), 3.0'-23'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'

Driller: Gordon A. Jensen

Total Depth: 22' Ground Surface El:

Date Began: 3/19/96 Top of Casing El: 3924.62

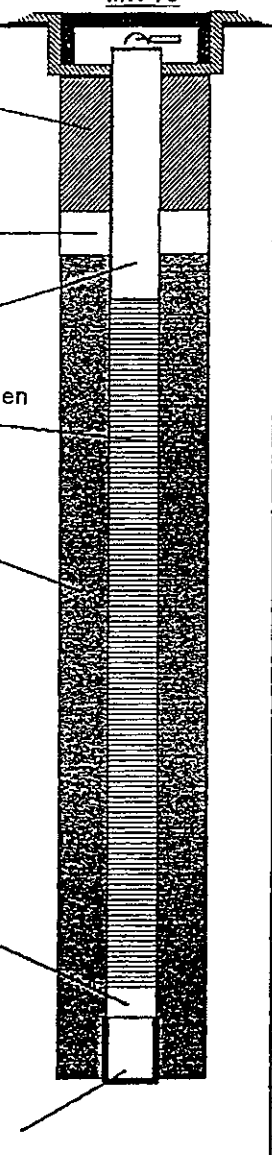
Date Finished: 3/19/96

Depth Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	
0						Base section on native ground 3"
1	SP/01	18/18	15 33	SM		Dark brown silty sand, grey fine sands to silt
2						
3						
4						
5	SP/02	18/18	5 26	CL		Clayey silt, brown in color Very finesand mottled with organics and iron Moist Water at 6.4' bs
10	SP/03	18/18	6 33	SP		Clean sand, granitic in nature, vey poorly graded Saturated
	SP/04	18/18	5 30	GP		Very coarse sand at 15' bs then into yellow-grey clayed silt
20	SP/05	18/18	9 32	ML		Clayey silt interbeded with sandy, silty clay
25						

All samples are grabs

WELL SUMMARY

MW-73



Bottom of hole at 22' bs
Well set at 22' bs

Readings taken after Well Devolpement

pH: 6.53

Temperature: 64.7

Conductivity: Conductivity is higher than range on meter

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.
Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457
Engineering Field Activity, West
Naval Air Station Fallon, Nevada

bs - Below Grade Surface

Denotes Water Table

WELL SUMMARY

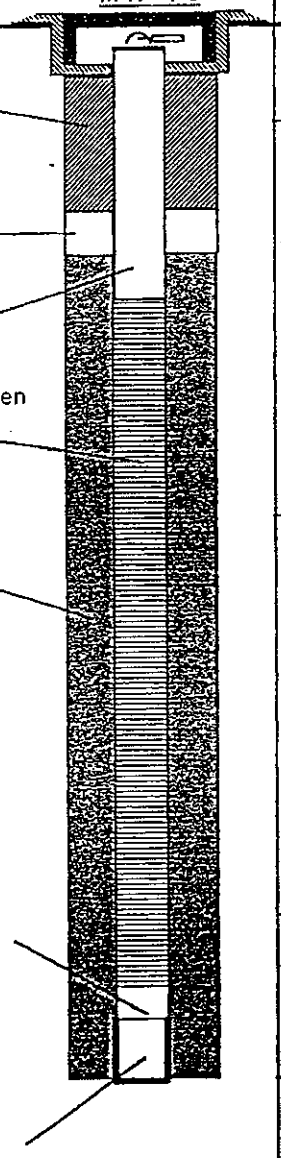
Driller: Gordon A. Jensen

Total Depth: 22' Ground Surface El:

Date Began: 3/13/96 Top of Casing El: 3925.26

Date Finished: 3/13/96

Depth in Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	
						Red organic rock on surface, mixed with compact native material
1	SP/01	18/18	7 18			
2				SM		Silty coarse to medium grain sand brown in color Dry
3						
4						Natural increase in moisture to saturated
5	SP/02	18/18	7 20			
6						Water at 7.0' bs - Clean
10	SP/03	18/18	9 32	SP		Coarse to fine sand interbeded from coarse to fine Saturated
	SP/04	18/18	35 50			Light brown to tan sand, coarse to medium to fine with trace of silt Spoon contained clayey silt at 16.7' bs
20	SP/05	18/18	35 42	SM		Interbeded silts and sands, grey to brown Silt, mottled in color
25						



Bottom of hole at 22' bs

Well set at 22' bs

All samples are grabs

Readings taken after Well Devolpement

pH: 6.59

Temperature: 66.5

Conductivity: Conductivity is higher than range on meter

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

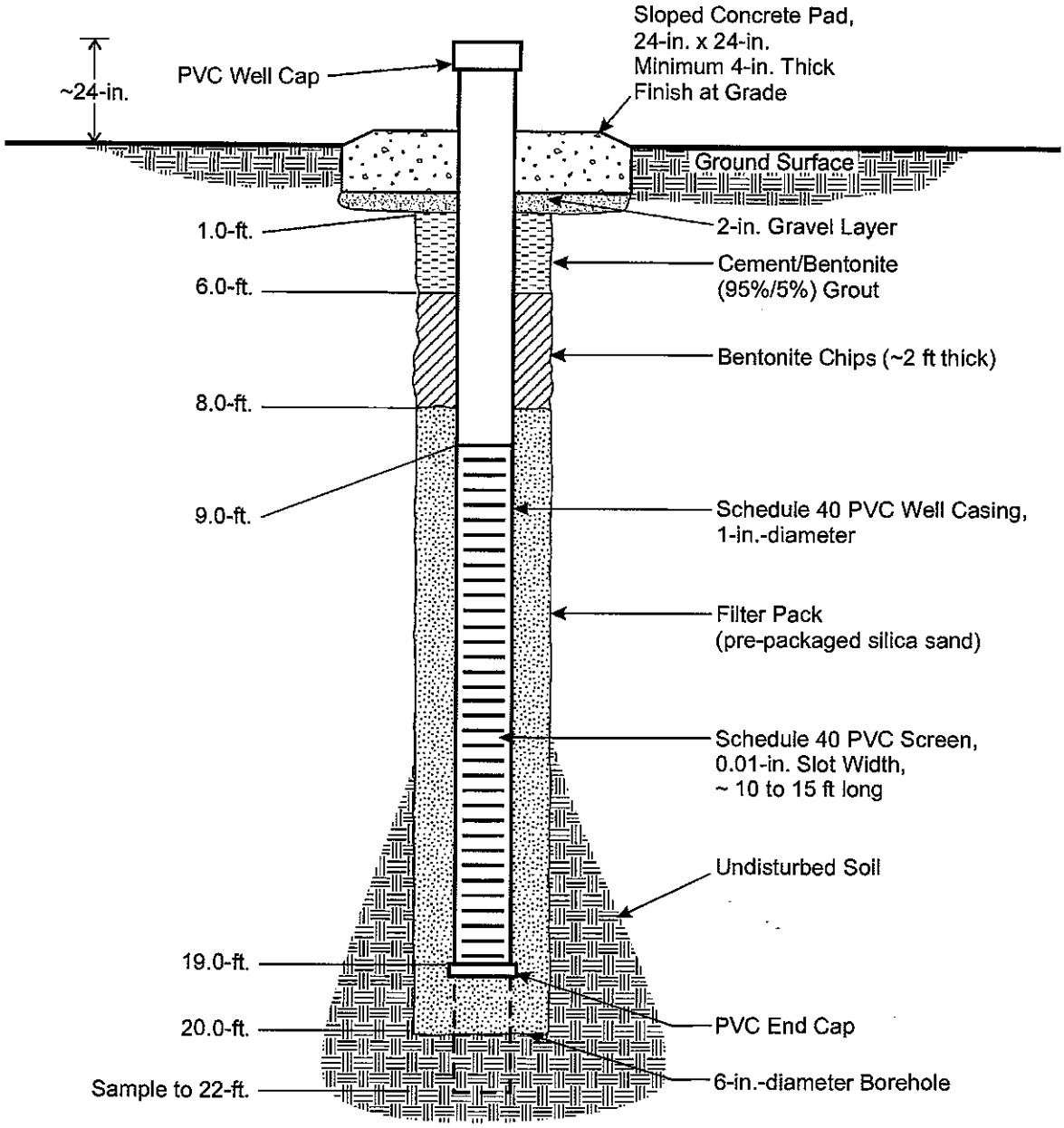
Client: Engineering Field Activity, West

Location: Naval Air Station Fallon, Nevada

bs - Below Grade Surface

▼ Denotes Water Table

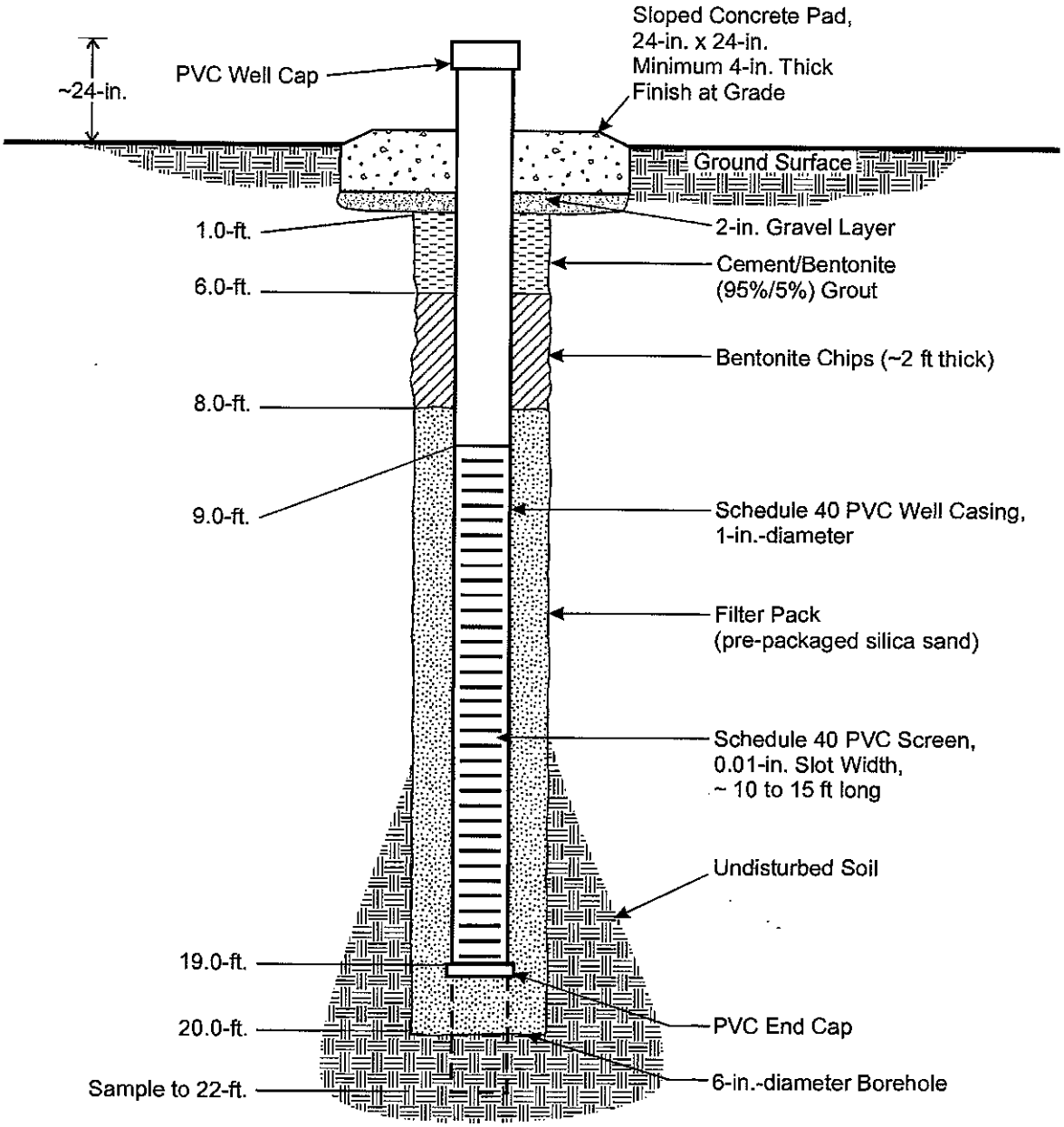
P3-MW-01
(5-16-02)



NOT TO SCALE

DESIGNED BY CP	Battelle ... Putting Technology To Work
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P3MWS.CDR · DATE 07/02

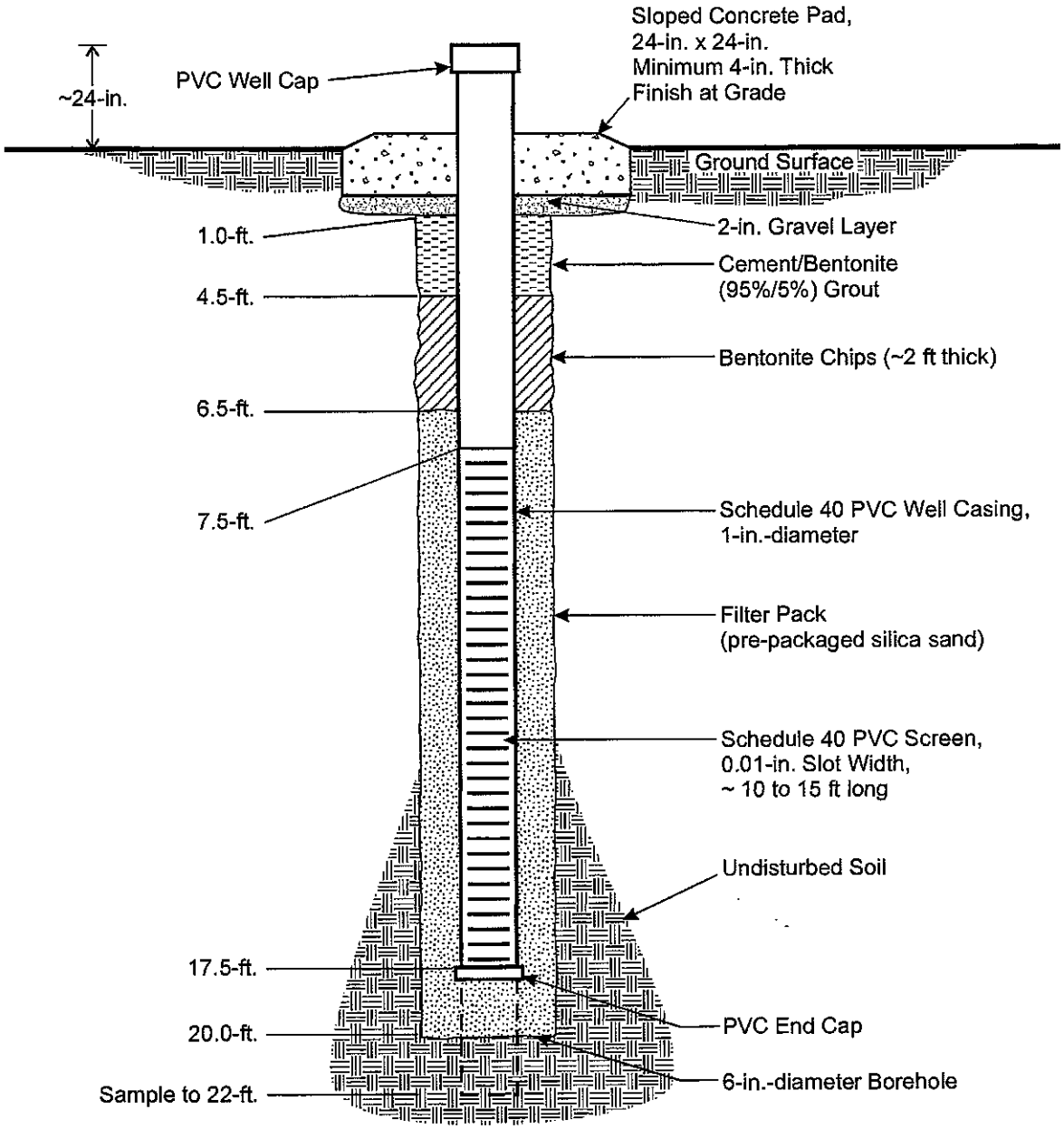
P3-MW-02
(5-17-02)



NOT TO SCALE

DESIGNED BY CP	Battelle ... Putting Technology To Work
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 | P3MWS.CDR | DATE 07/02

P3-MW-03
(5-17-02)



NOT TO SCALE

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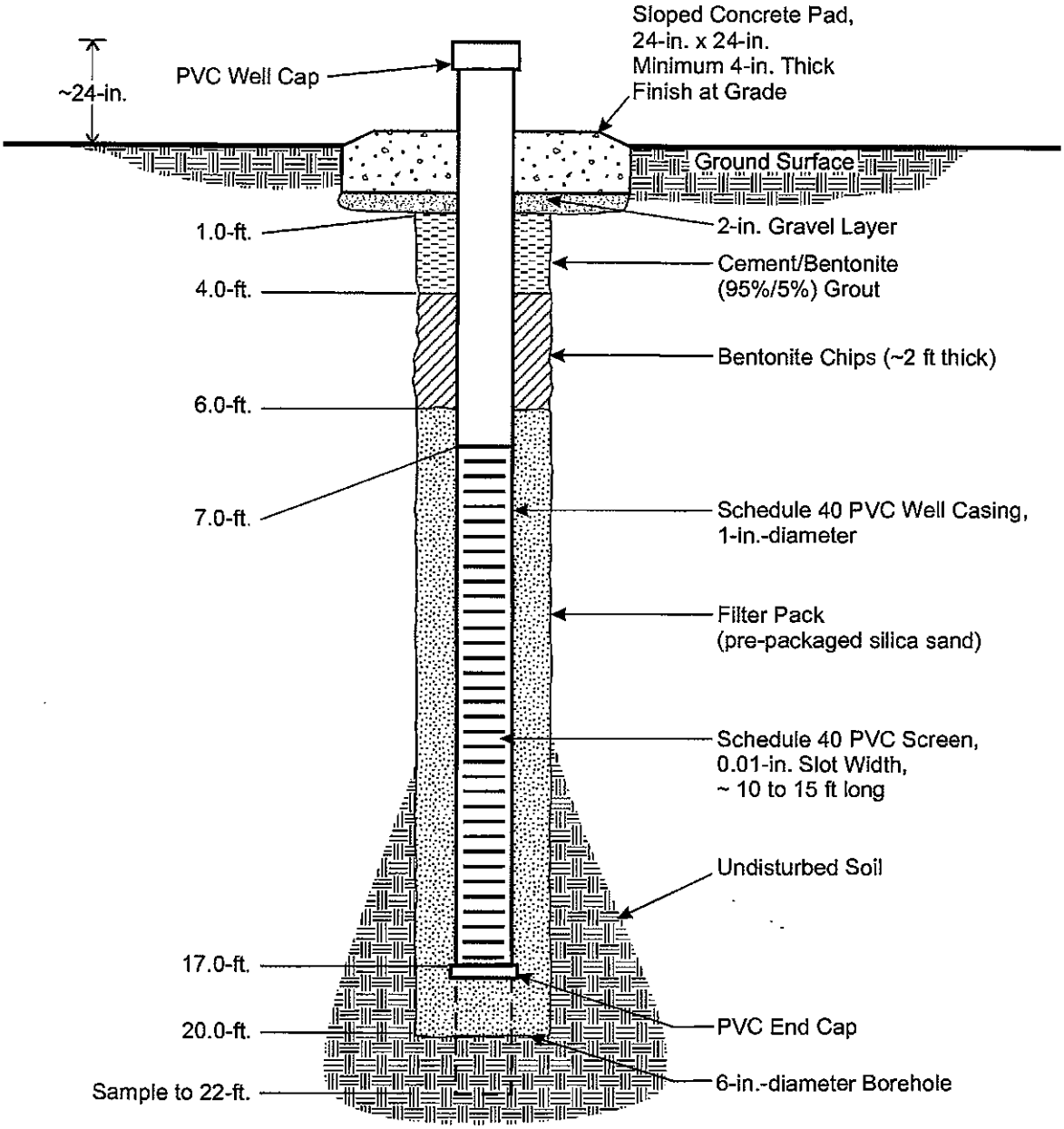
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**		
CHECKED BY MK	NAS FALLON - FALLON, NEVADA		
	PROJECT G469137-30	P3MWS.CDR	DATE 07/02

P3-MW-04
(5-16-02)



NOT TO SCALE

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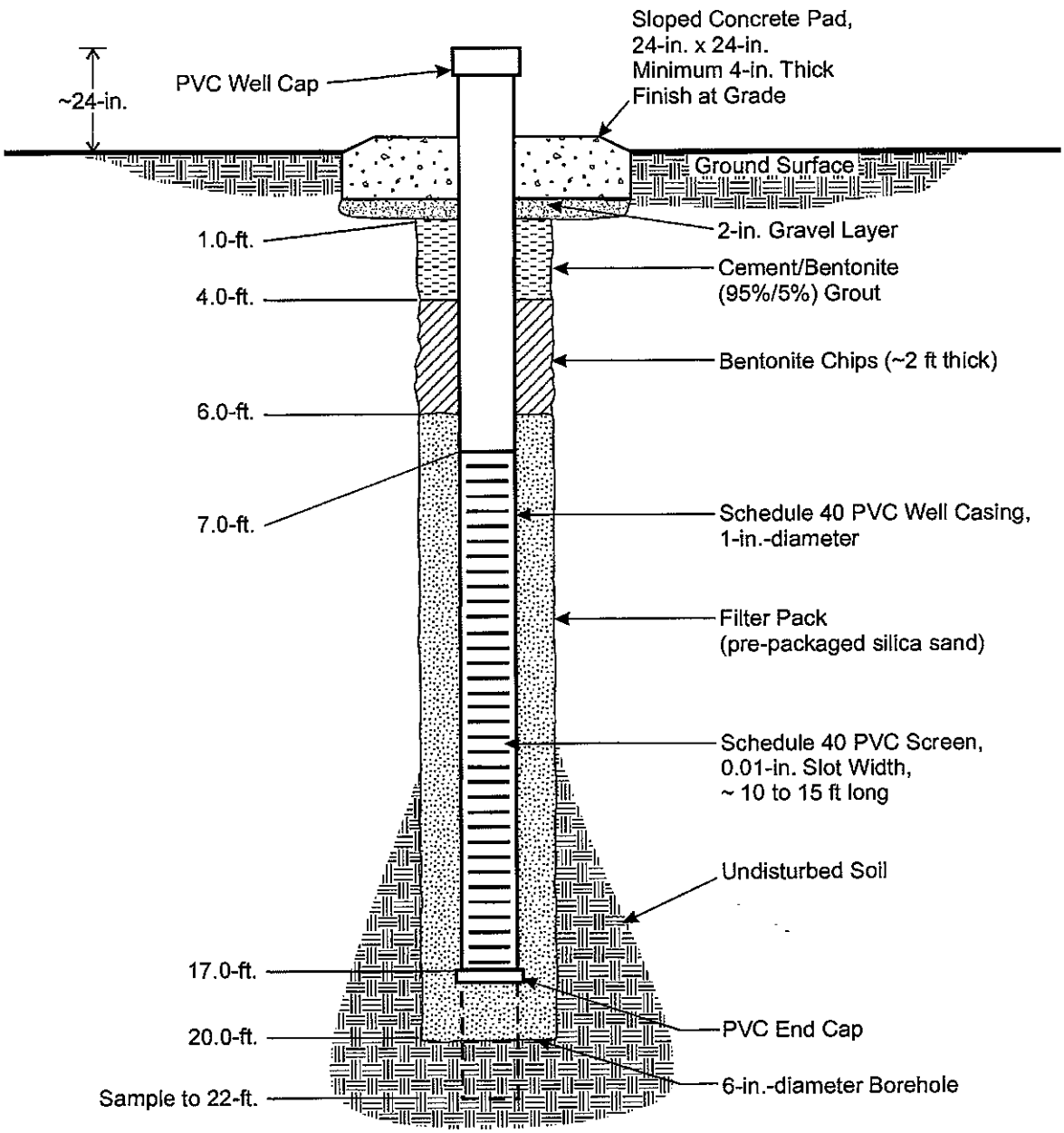
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 | P3MWS.CDR | DATE 07/02

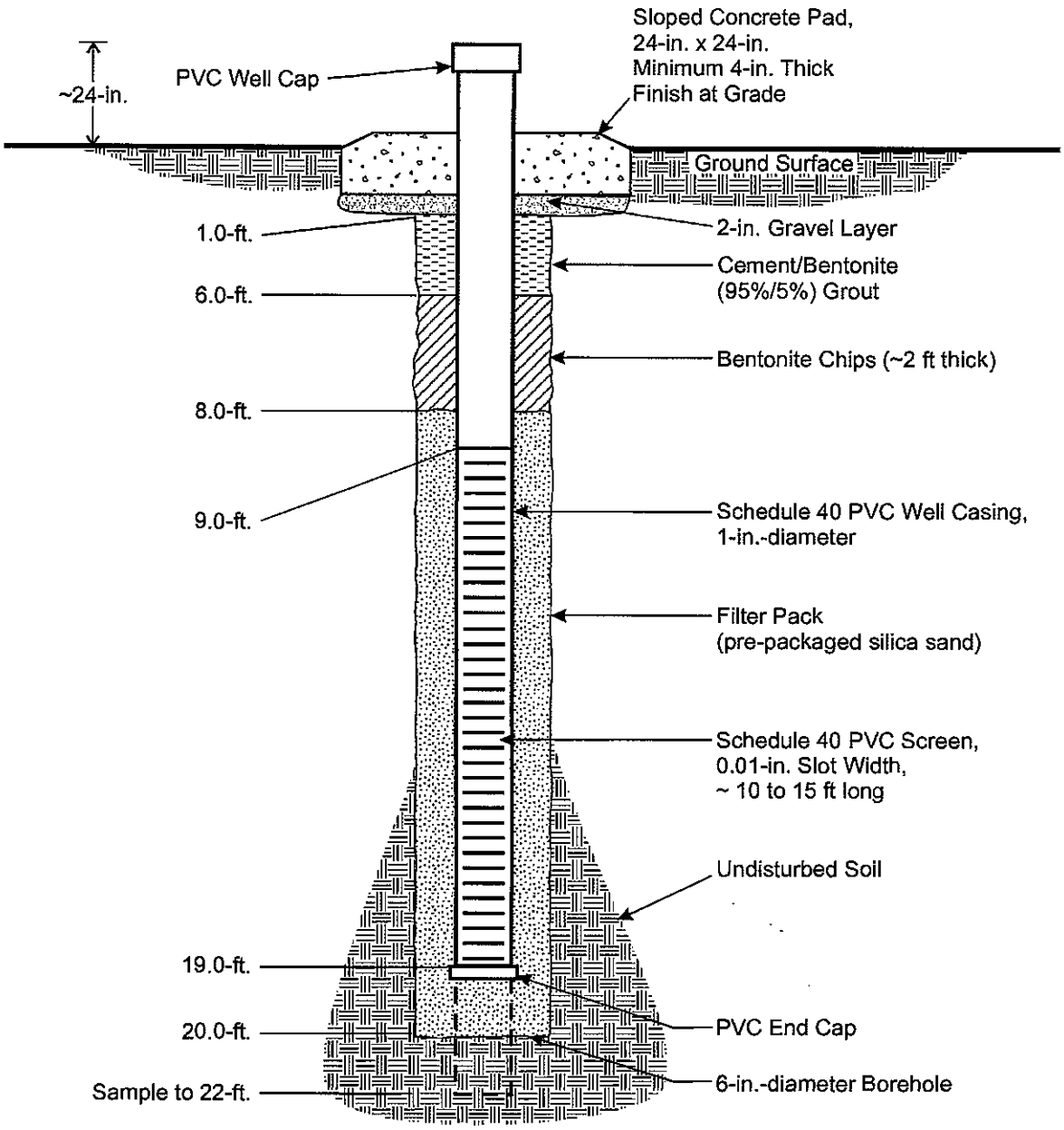
P3-MW-05
(5-17-02)



NOT TO SCALE

DESIGNED BY CP	Battelle ... Putting Technology To Work
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P3MWS.CDR · DATE 07/02

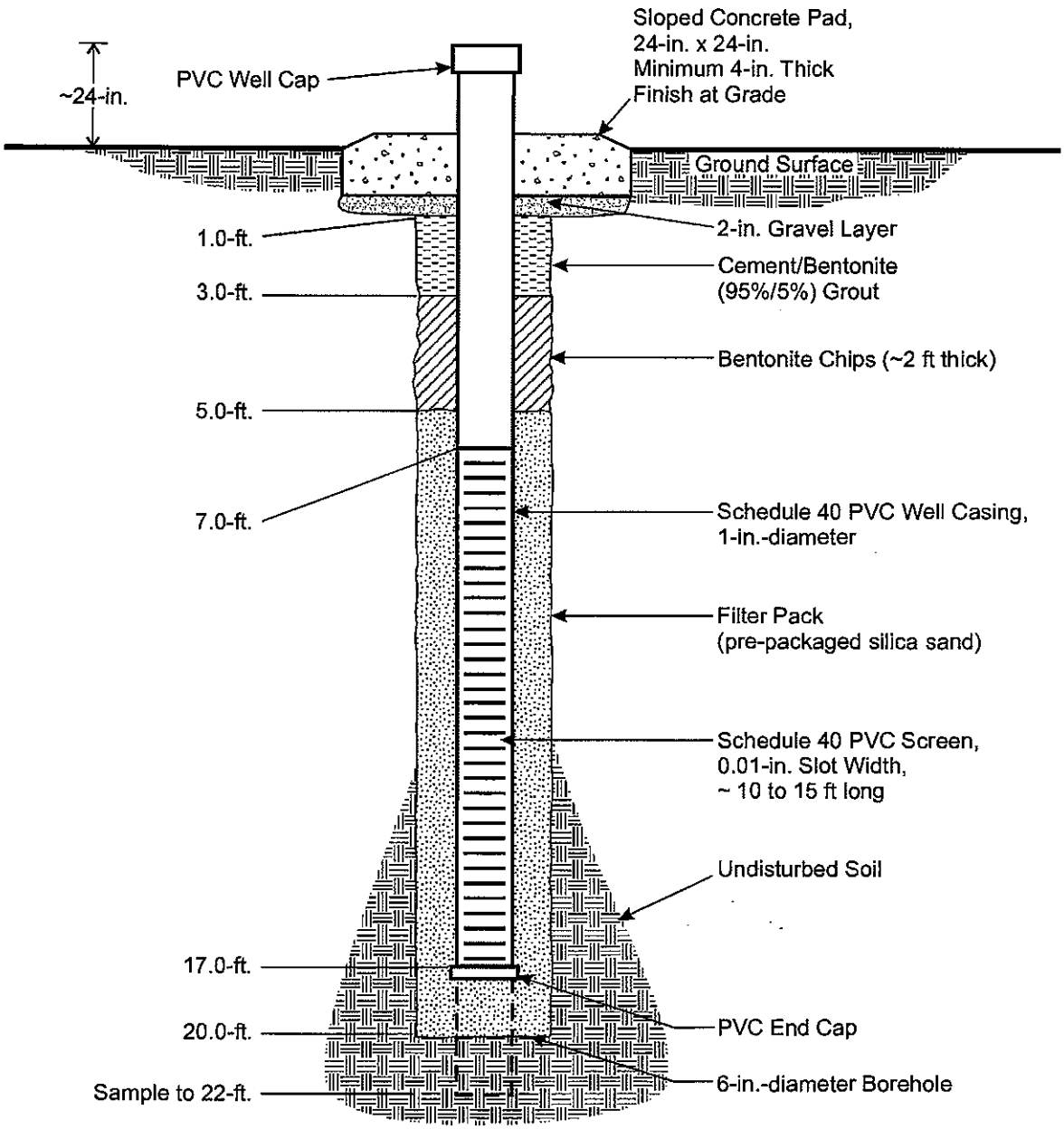
P3-MW-06
(5-16-02)



NOT TO SCALE

DESIGNED BY CP	Battelle ... Putting Technology To Work
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P3MWS.CDR · DATE 07/02

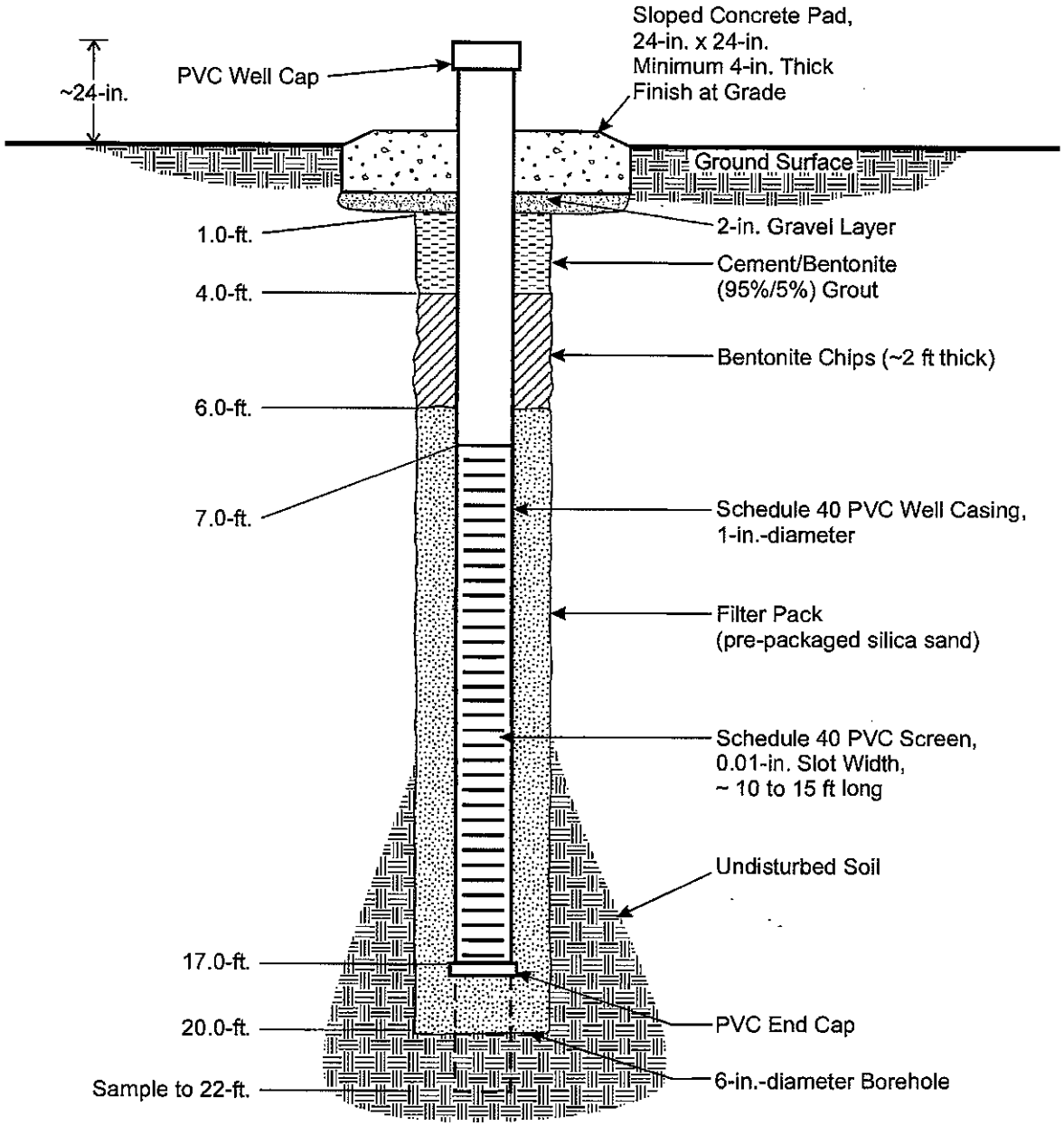
P3-MW-07
(5-16-02)



NOT TO SCALE

DESIGNED BY CP	Battelle ... Putting Technology To Work		
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**		
CHECKED BY MK	NAS FALLON - FALLON, NEVADA		
	PROJECT G469137-30	P3MWS.CDR	DATE 07/02

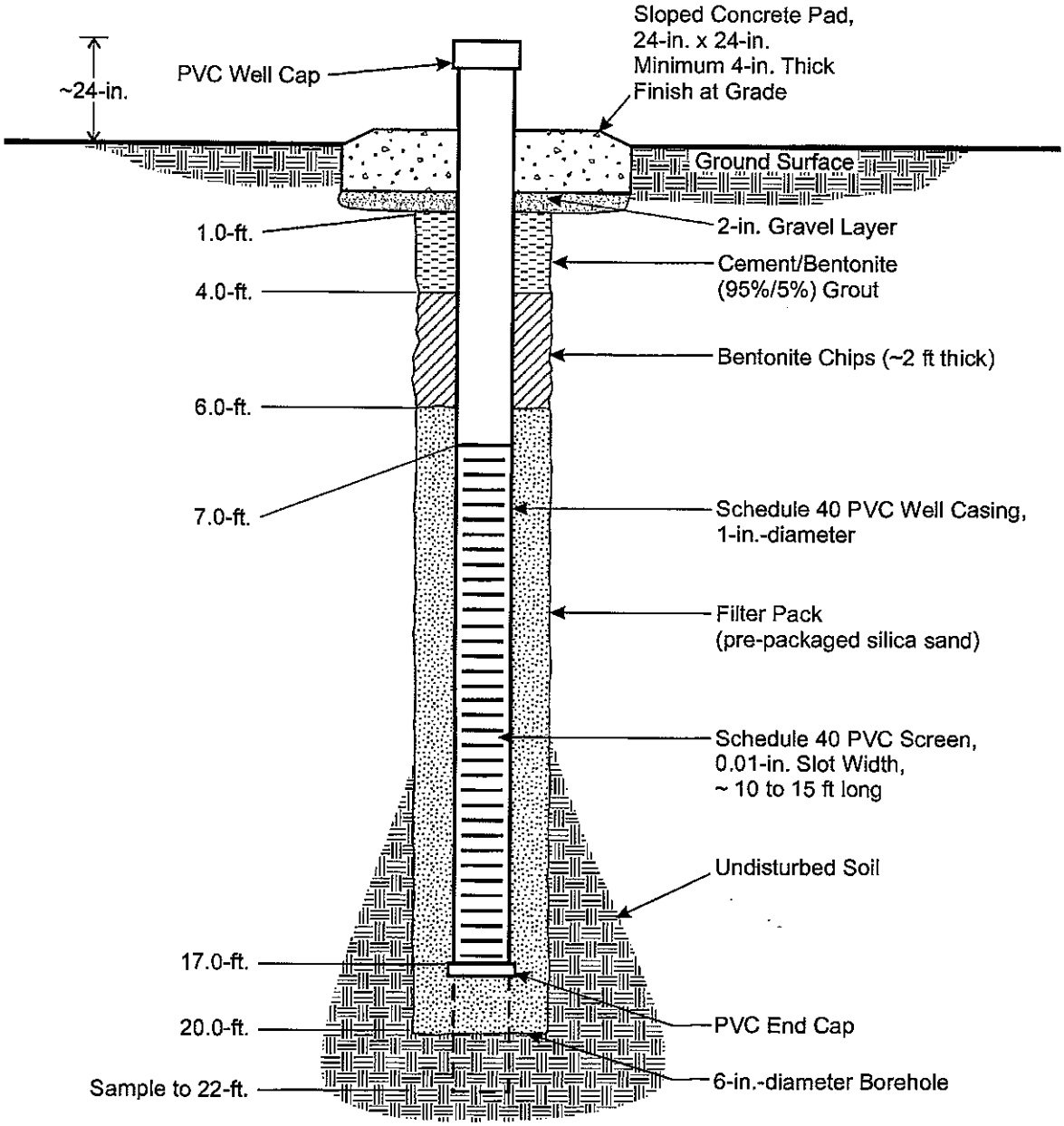
P3-MW-08
(5-16-02)



NOT TO SCALE

DESIGNED BY CP	Battelle ... Putting Technology To Work
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P3MWS.CDR · DATE 07/02

P3-MW-09
(5-17-02)



NOT TO SCALE

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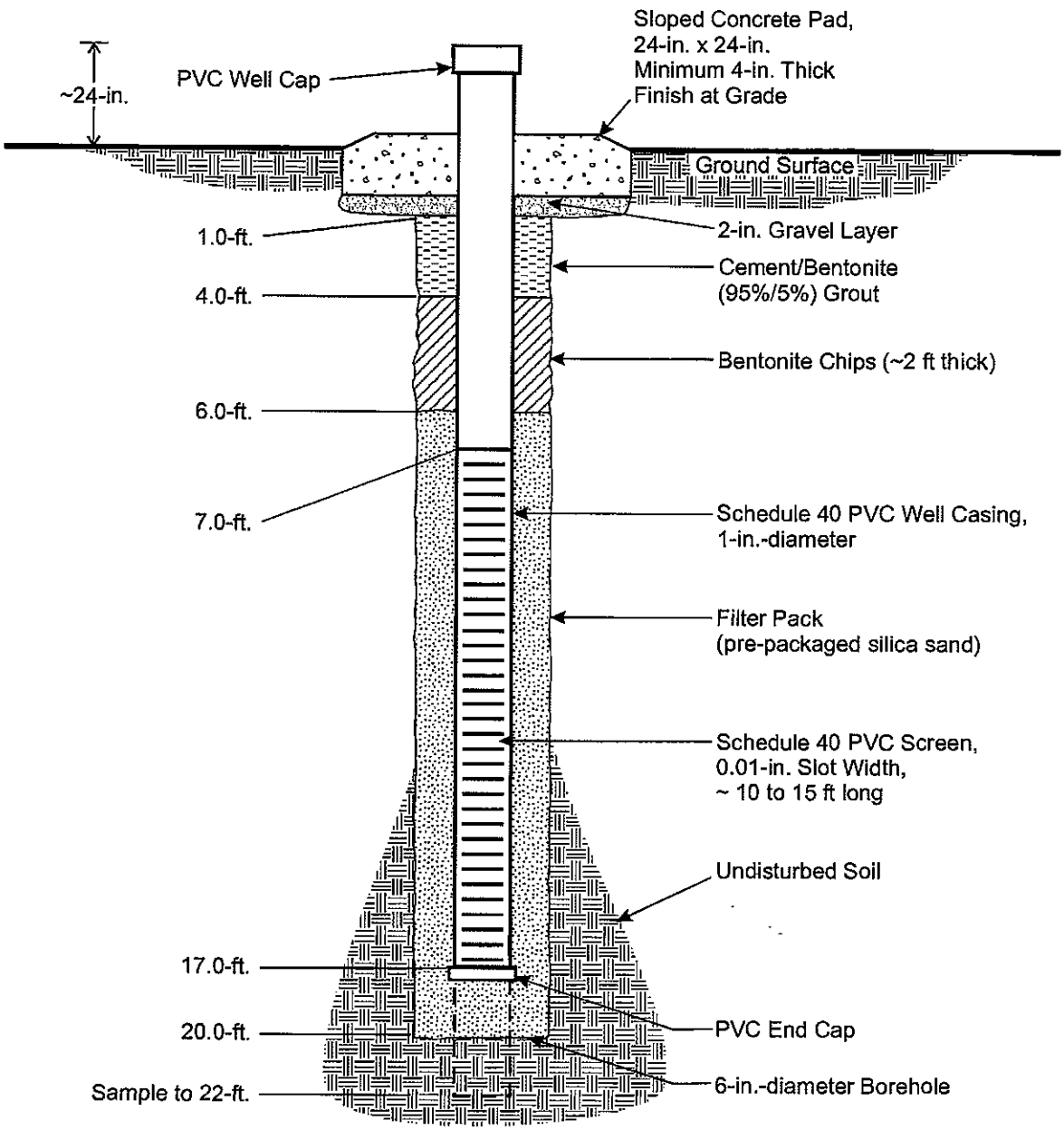
	PROJECT G469137-30 · P3MWS.CDR · DATE 07/02

P3-MW-10
(5-17-02)



NOT TO SCALE

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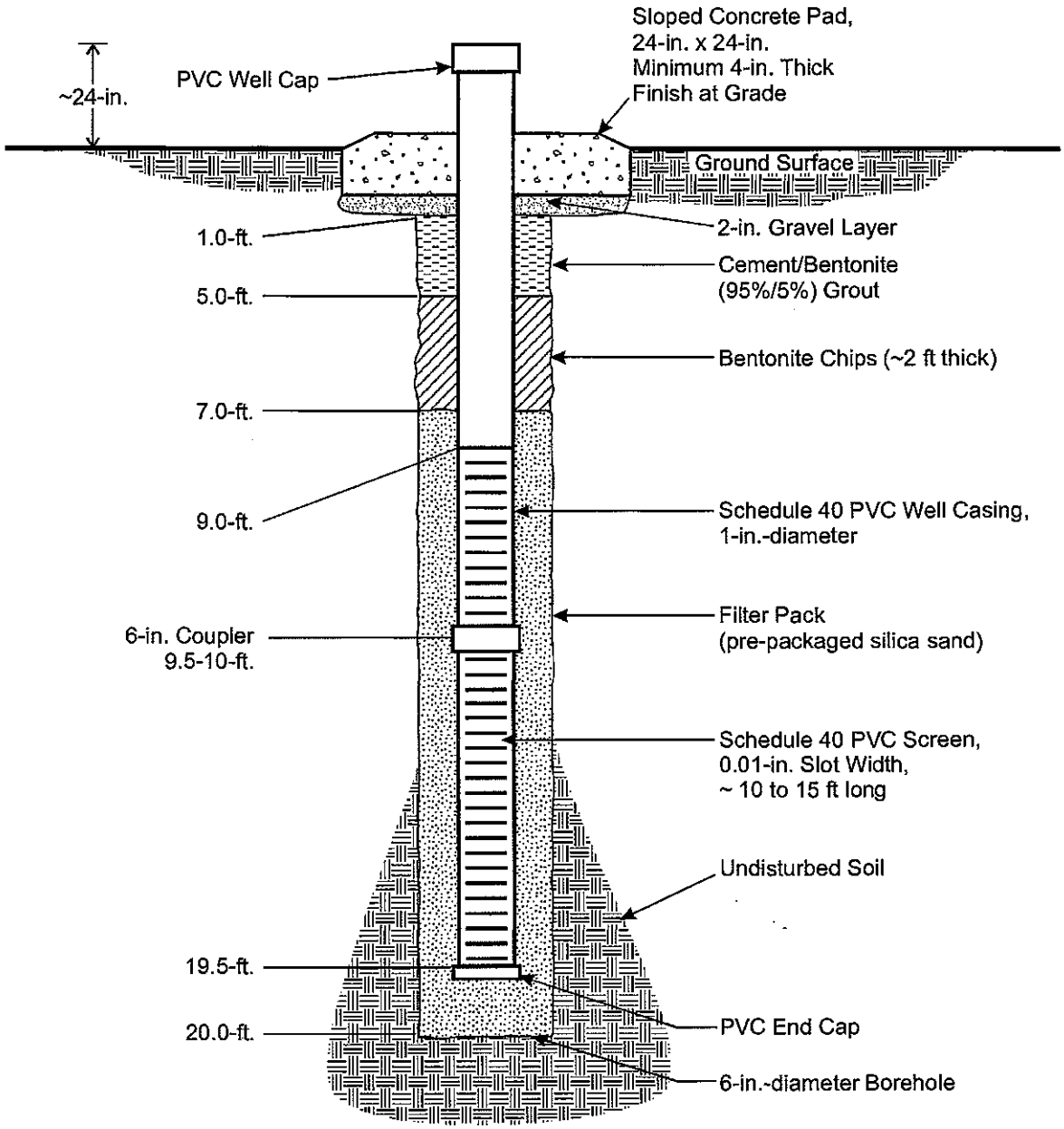
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P3MWS.CDR · DATE 07/02

P3-MW-11
(6-6-02)



NOT TO SCALE

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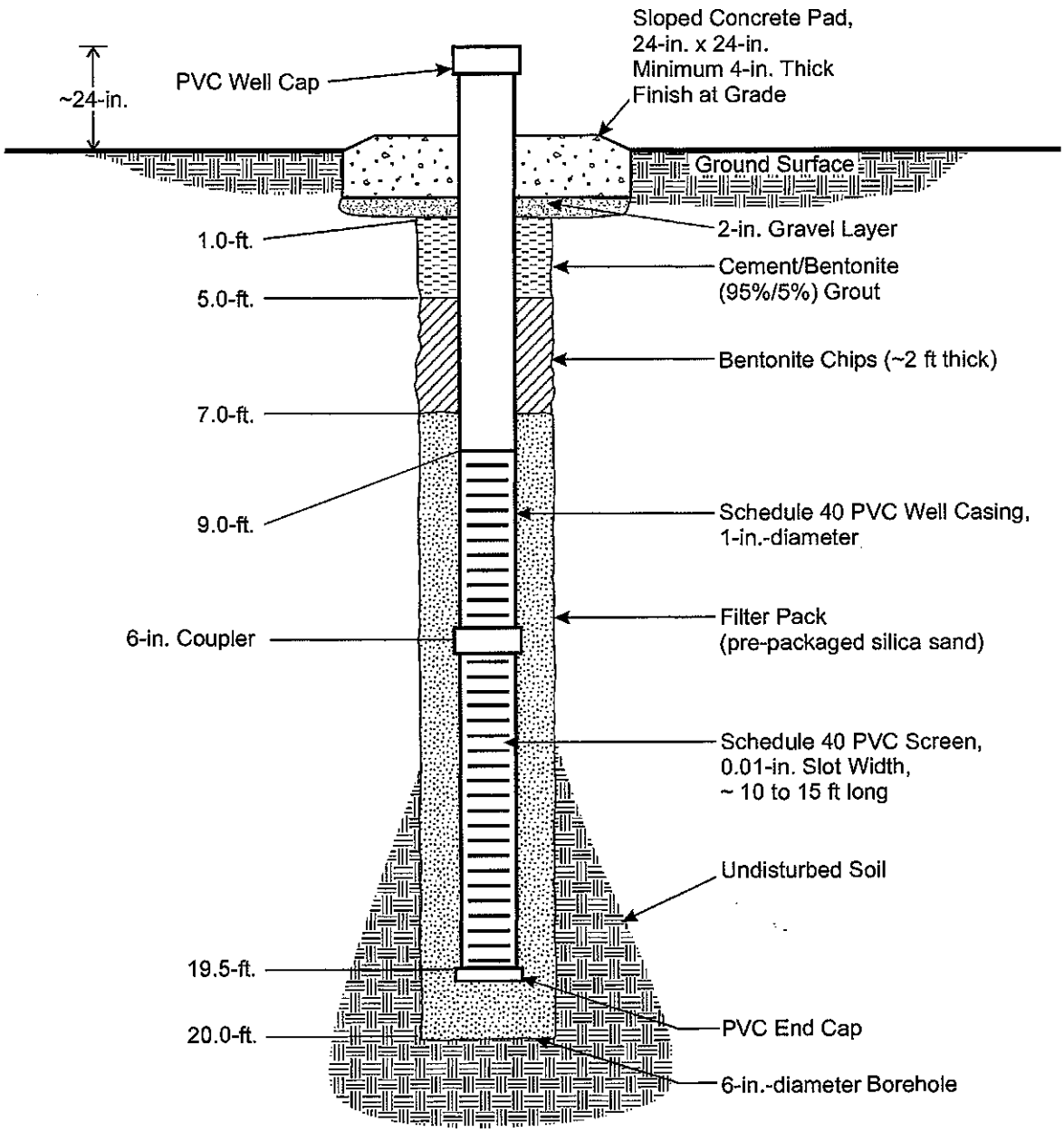
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P3MWS.CDR · DATE 07/02

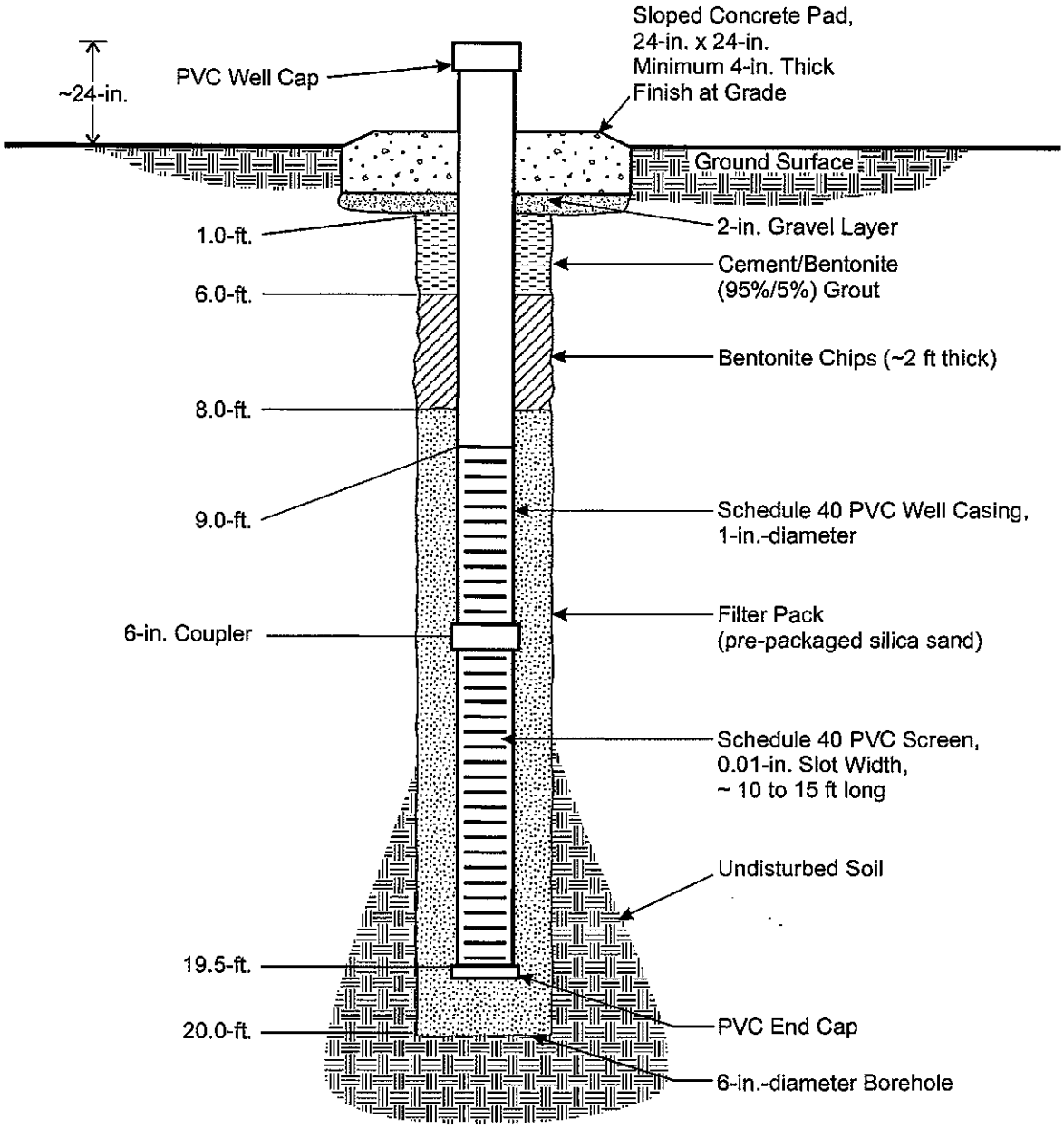
P3-MW-12
(6-6-02)



NOT TO SCALE

DESIGNED BY CP	Battelle ... Putting Technology To Work
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P3MWS.CDR · DATE 07/02

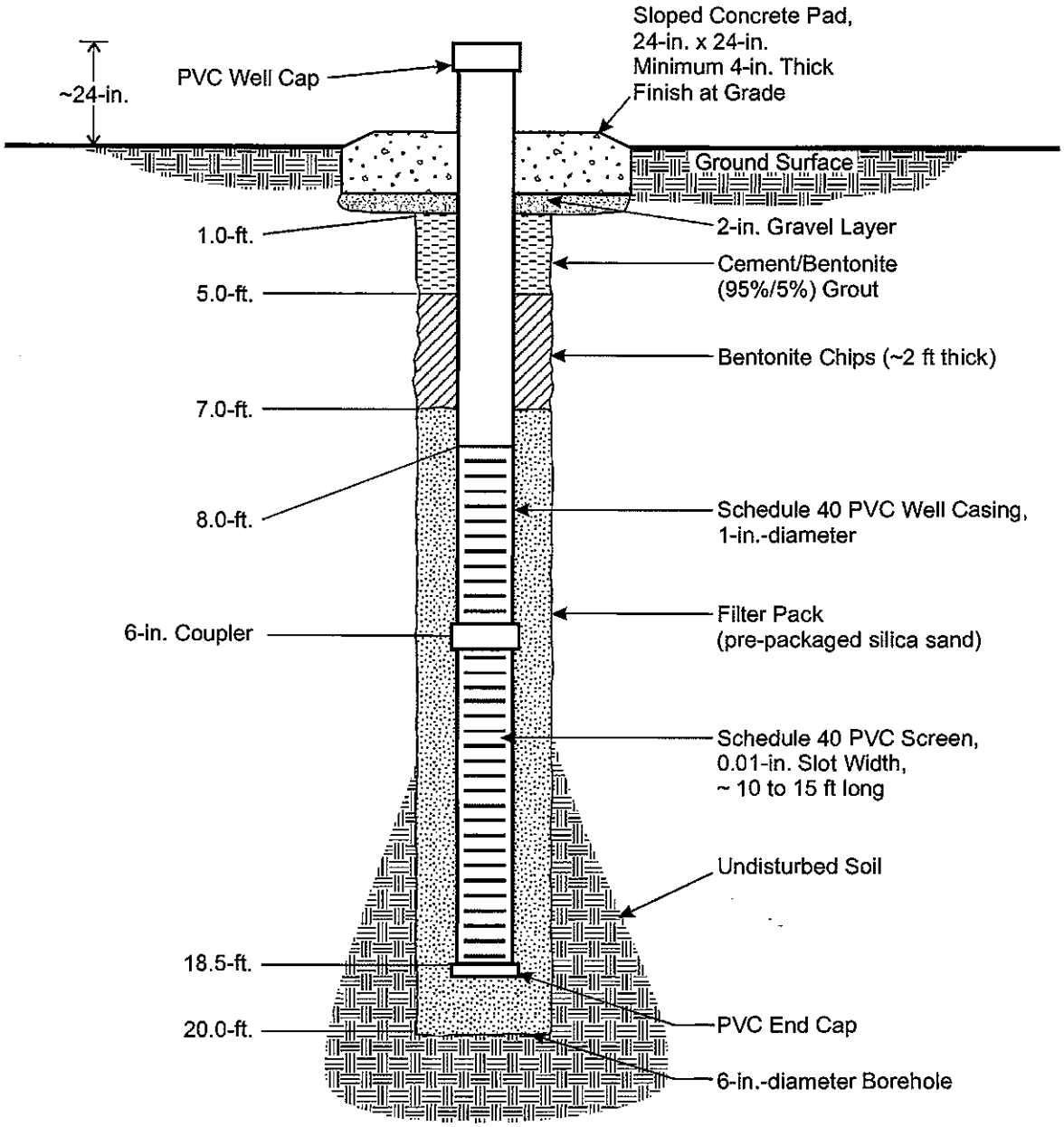
P3-MW-13
(6-6-02)



NOT TO SCALE

DESIGNED BY CP	Battelle ... Putting Technology To Work		
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**		
CHECKED BY MK	NAS FALLON - FALLON, NEVADA		
	PROJECT G469137-30	P3MWS.CDR	DATE 07/02

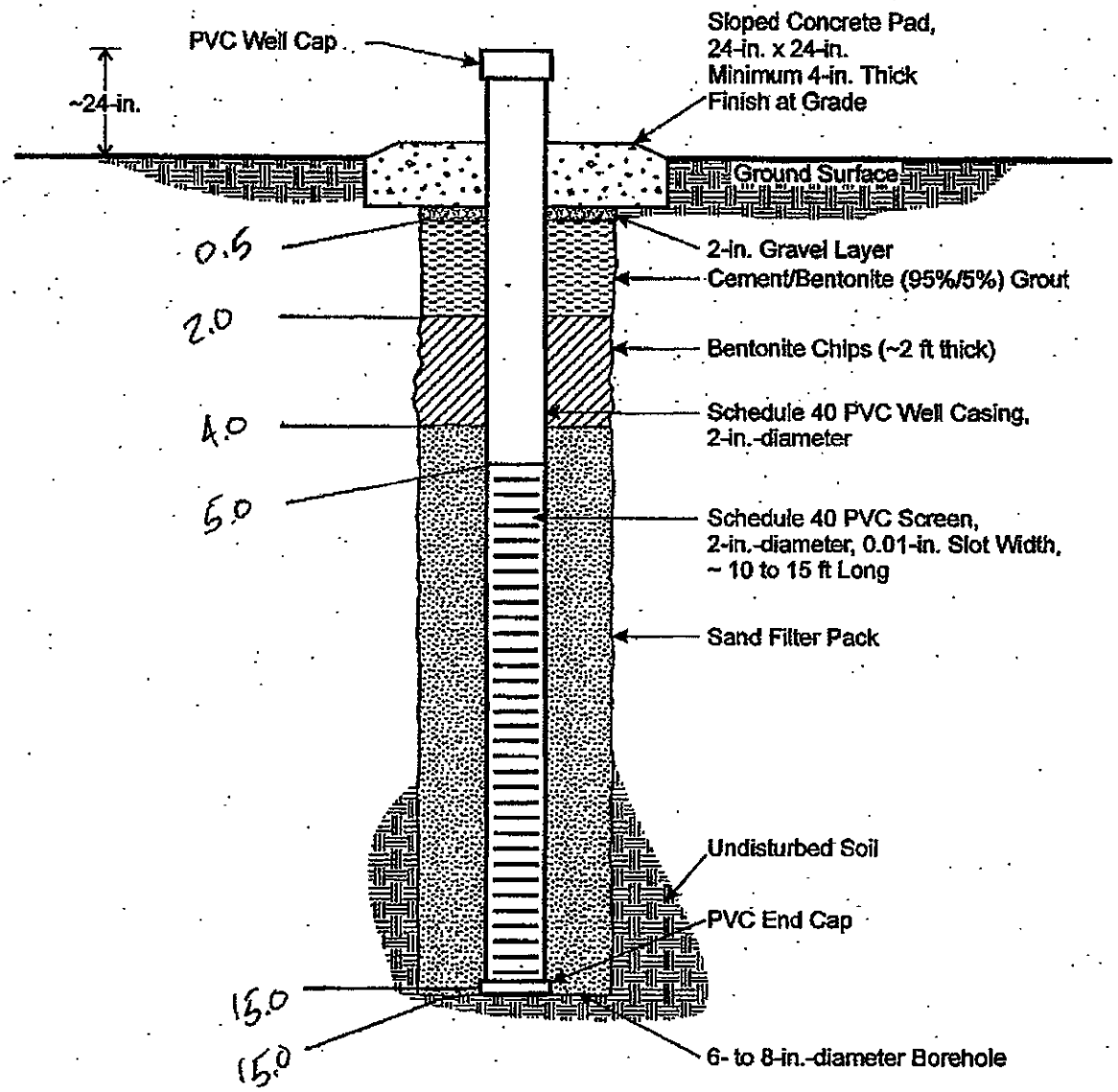
P3-MW-14
(6-6-02)



NOT TO SCALE

DESIGNED BY CP	Battelle ... Putting Technology To Work		
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**		
CHECKED BY MK	NAS FALLON - FALLON, NEVADA		
	PROJECT G469137-30	P3MWS.CDR	DATE 07/02

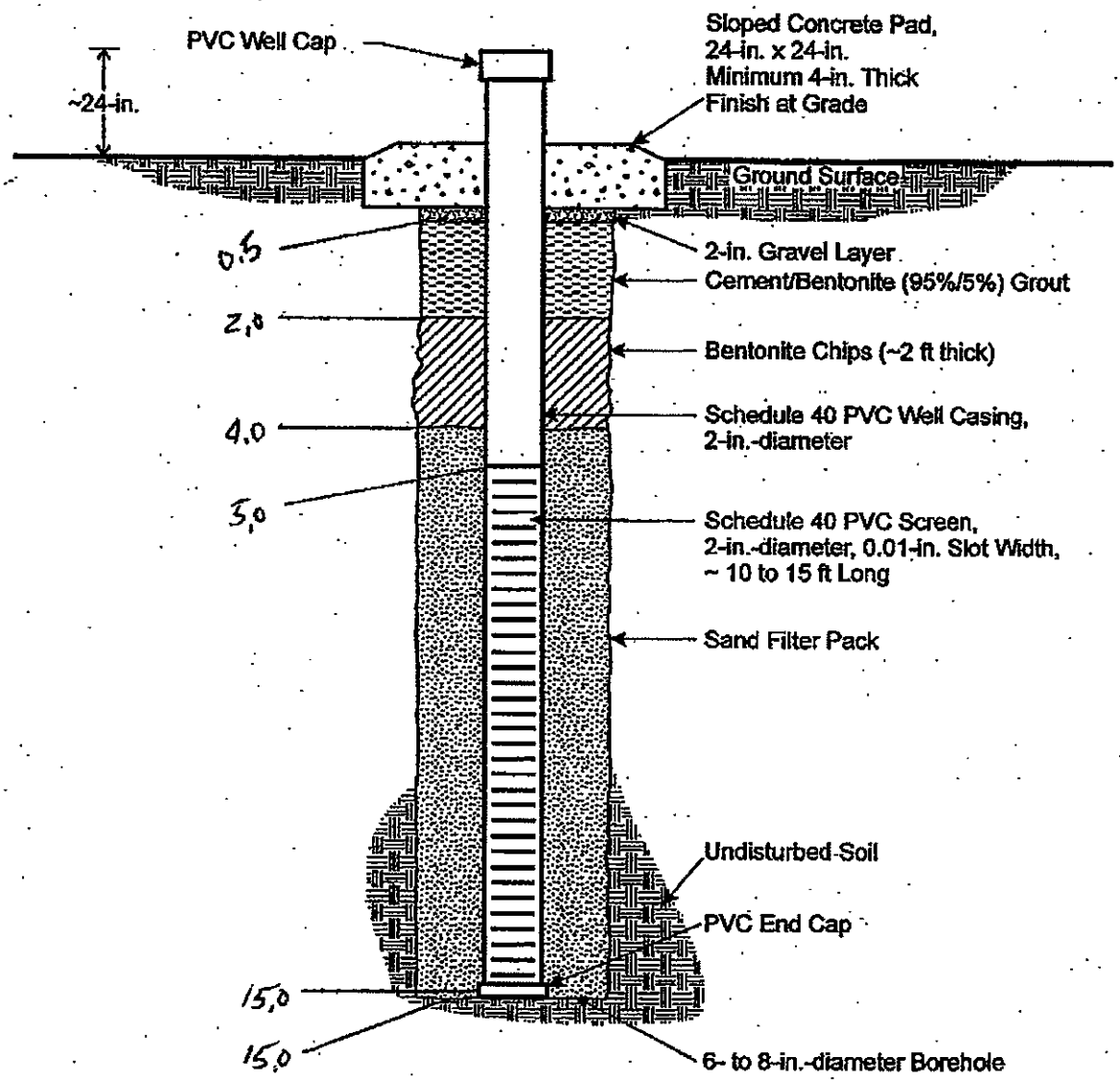
PA-BS-01
11-06-02



NOT TO SCALE

DESIGNED BY SM	Battelle ... Putting Technology To Work
DRAWN BY LC	**Typical 2-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY TWW	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-11 · 2INMW2.CDR · DATE 05/02

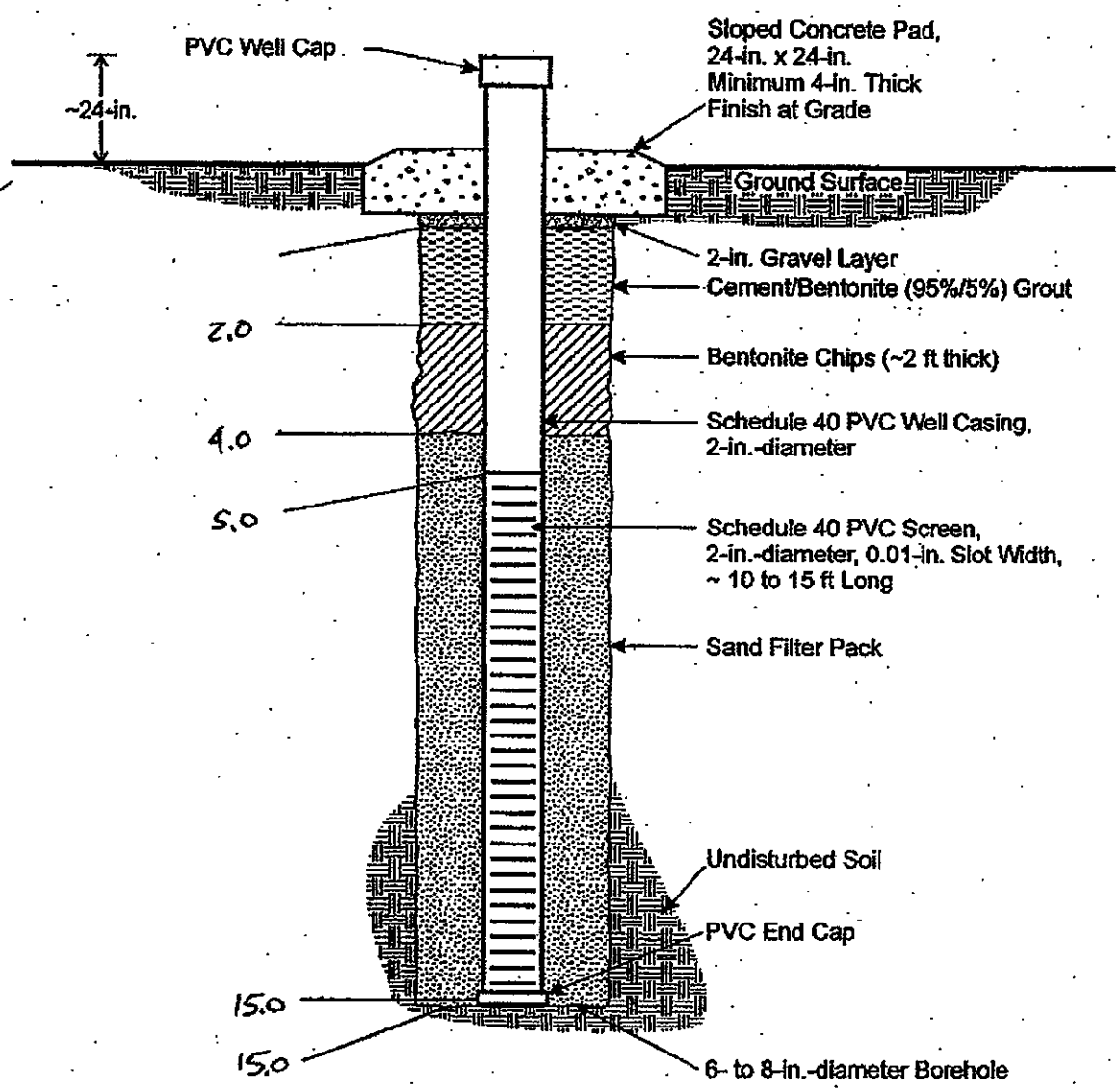
PA-BS-02
11-5-02



NOT TO SCALE

DESIGNED BY SM	Battelle ... Putting Technology To Work
DRAWN BY LC	Typical 2-inch diameter Groundwater Monitoring Well Construction
CHECKED BY TWW	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-11 · 2INMW2.CDR · DATE 05/02

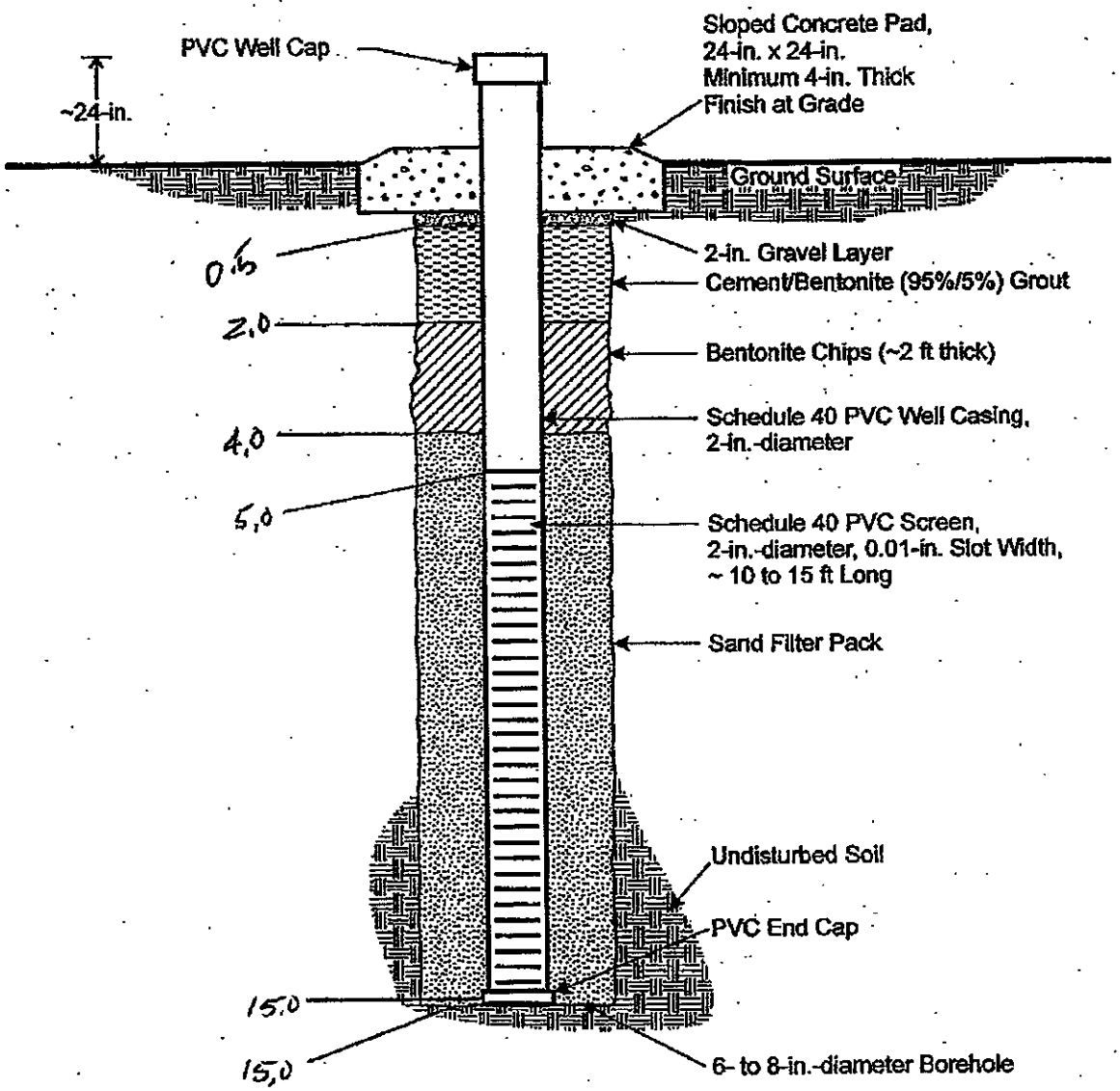
P4-BS-03
11-05-02



NOT TO SCALE

DESIGNED BY SM	Battelle ... Putting Technology To Work
DRAWN BY LC	**Typical 2-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY TWW	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-11 | 2INMW2.CDR | DATE 05/02

PA-BS-04
11-06-02



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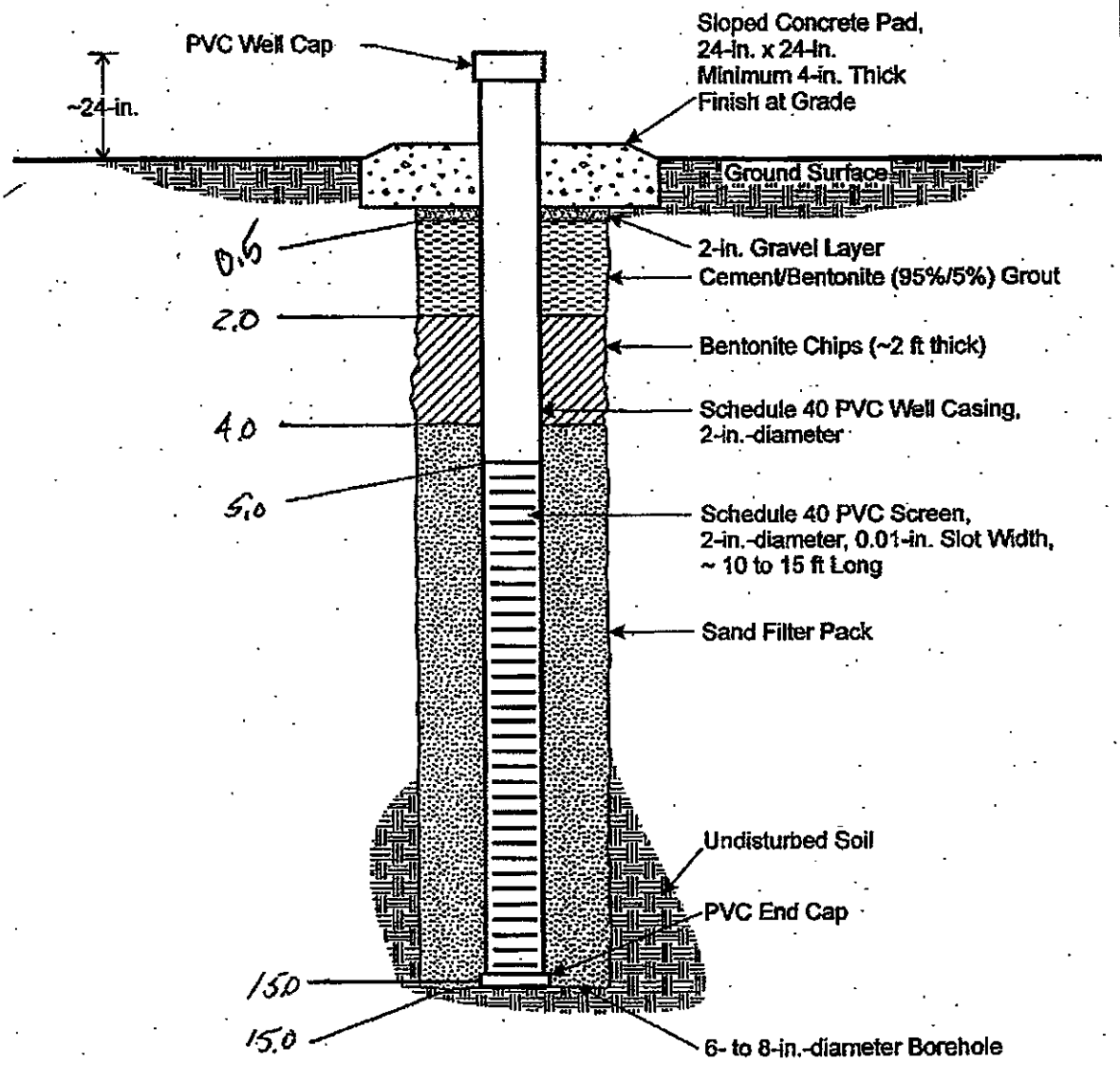
DRAWN BY LC	**Typical 2-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY TWW	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-11 · 2INMW2.CDR · DATE 05/02

P4-BS-05
11-6-02



NOT TO SCALE

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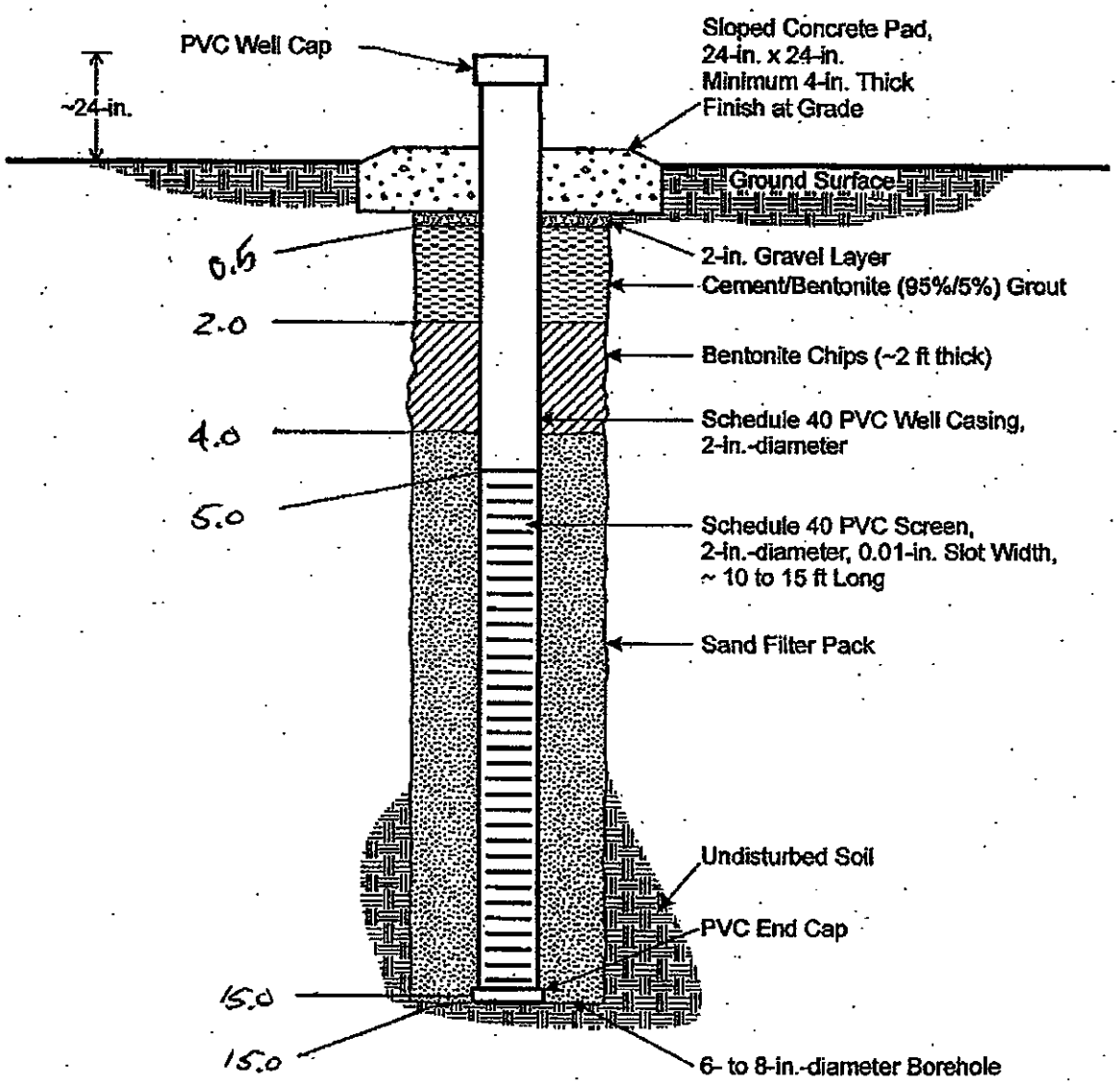
	PROJECT G469137-11 | 2INMW2.CDR | DATE 05/02

P4-BS-06
11-6-02



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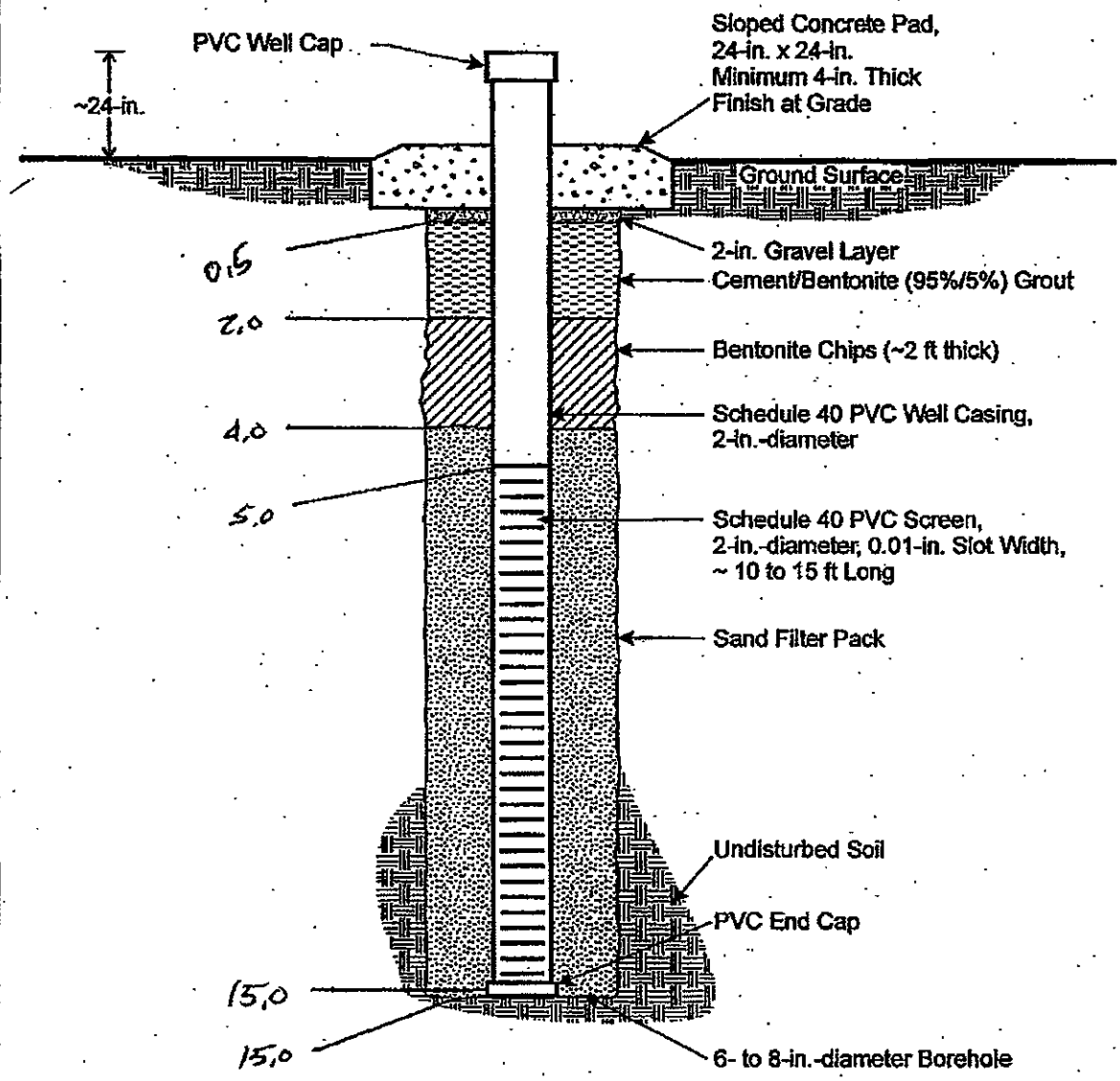
CHECKED BY TWW	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-11 · 2INMW2.CDR · DATE 05/02

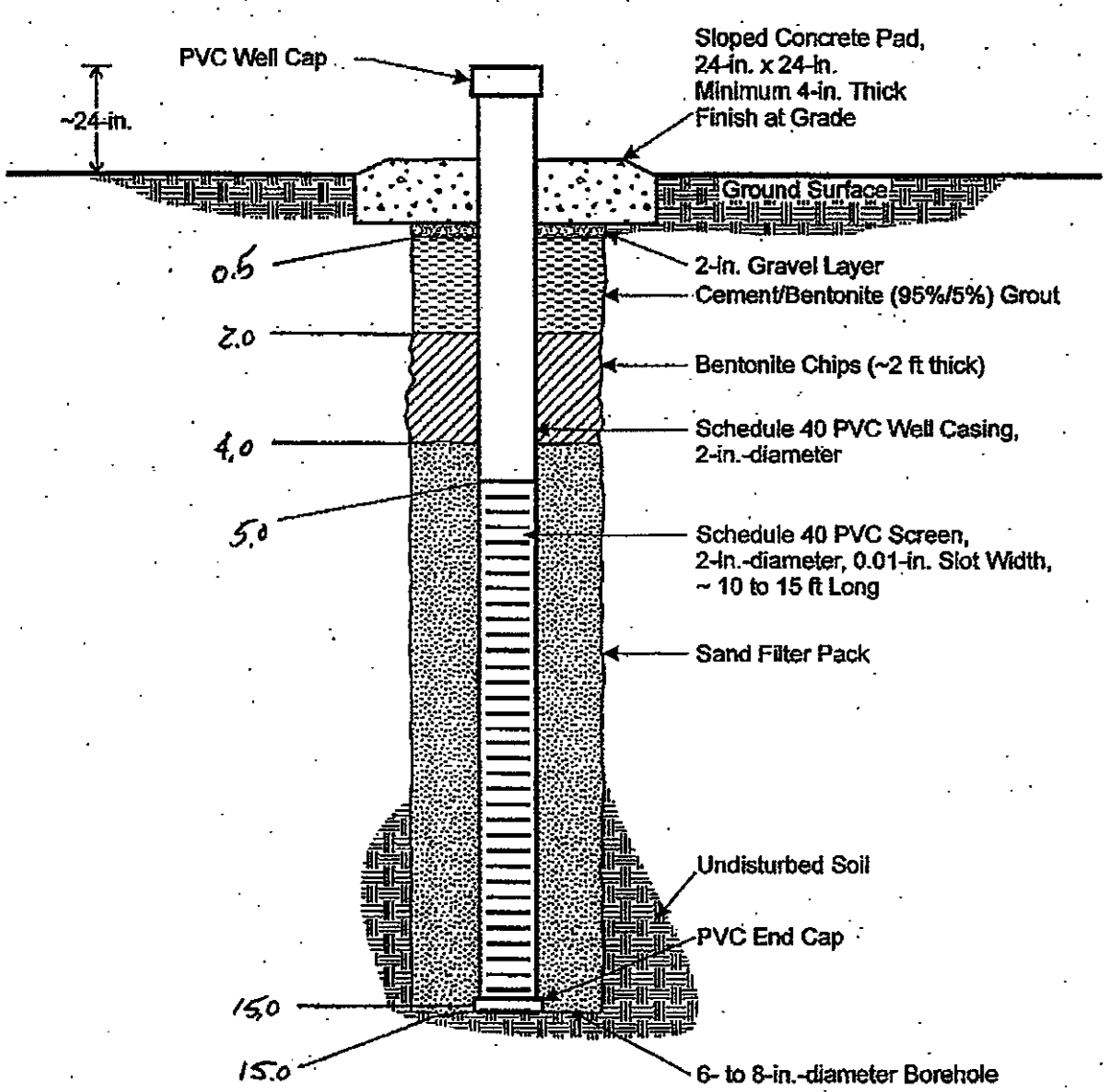
PA-BS-07
11-6-02



NOT TO SCALE

DESIGNED BY SM	Battelle ... Putting Technology To Work
DRAWN BY LC	**Typical 2-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY TWW	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-11 | 2INMW2.CDR | DATE 05/02

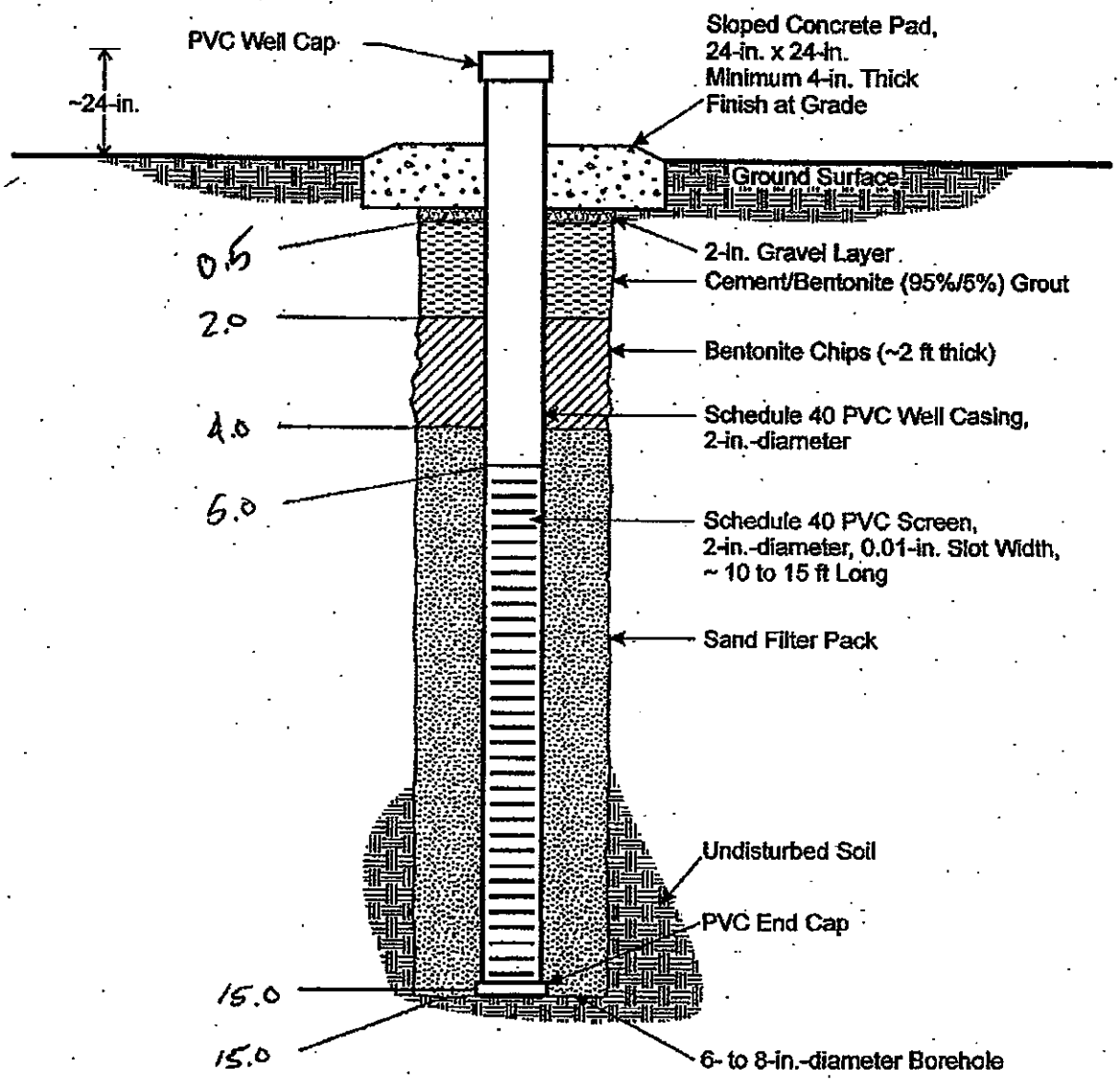
P4-BS-08
11-6-02



NOT TO SCALE

DESIGNED BY SM	Battelle ...Putting Technology To Work
DRAWN BY LC	**Typical 2-inch diameter Groundwater Monitoring Well Construction**
CHECKED BY TWW	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-11 | 2INMW2.CDR | DATE 05/02

P4-BS-09
11-6-02



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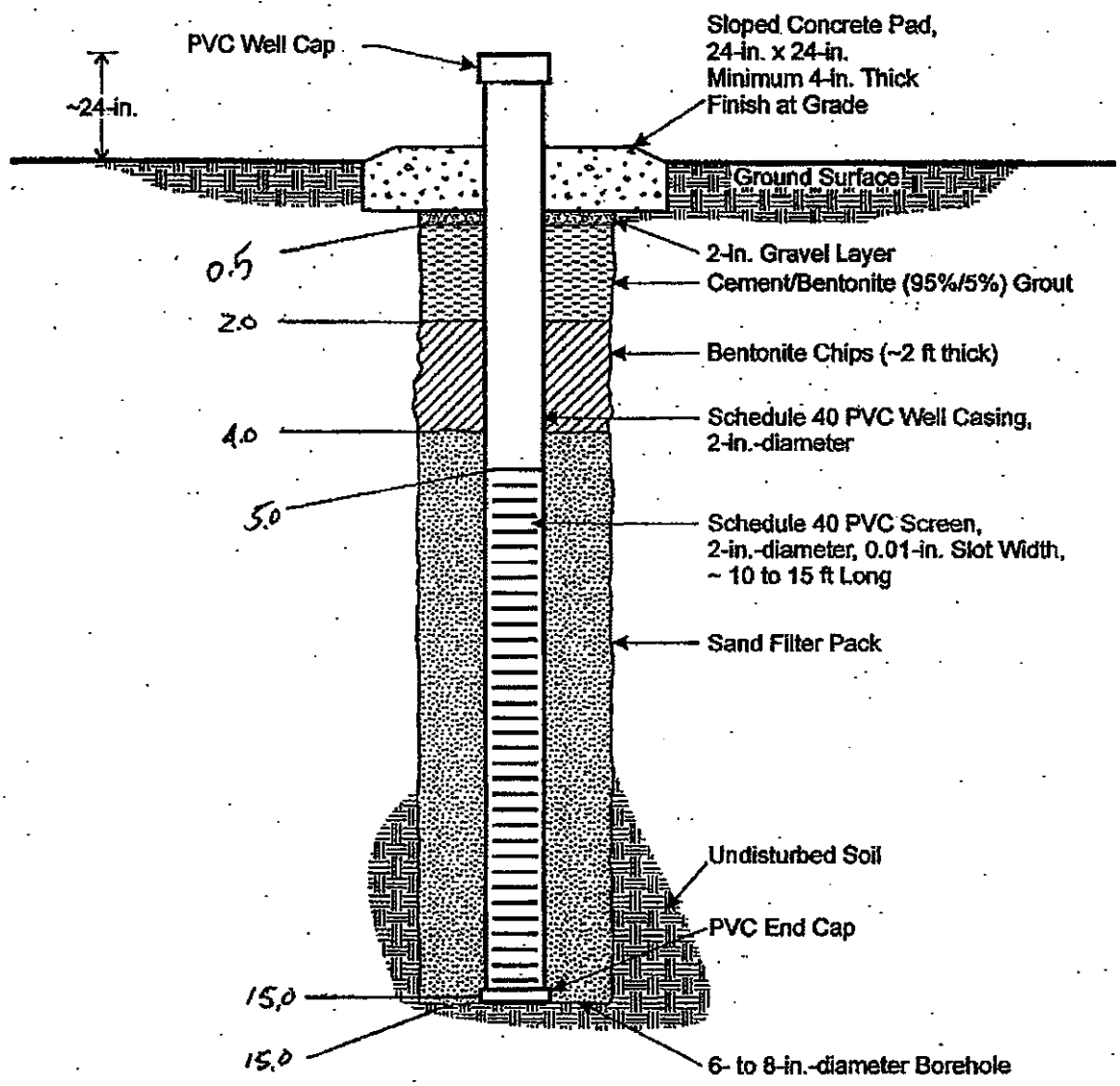
	PROJECT G468137-11 | 2INMW2.CDR | DATE 05/02

P4-BS-10
11-6-02



NOT TO SCALE

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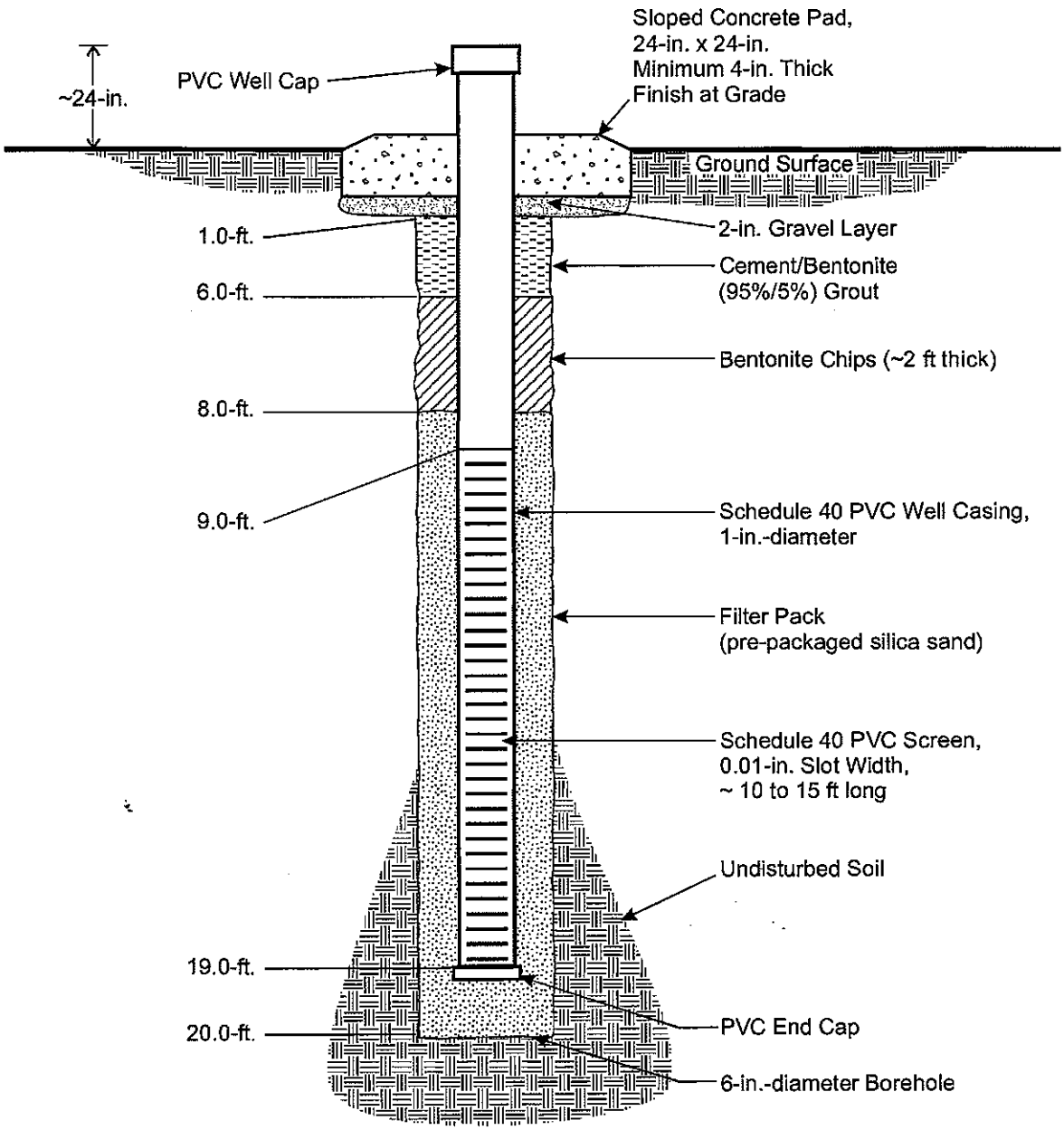
CHECKED BY TWW	NAS FALLON - FALLON, NEVADA
	PROJECT G468137-11 · 2INMW2.CDR · DATE 05/02

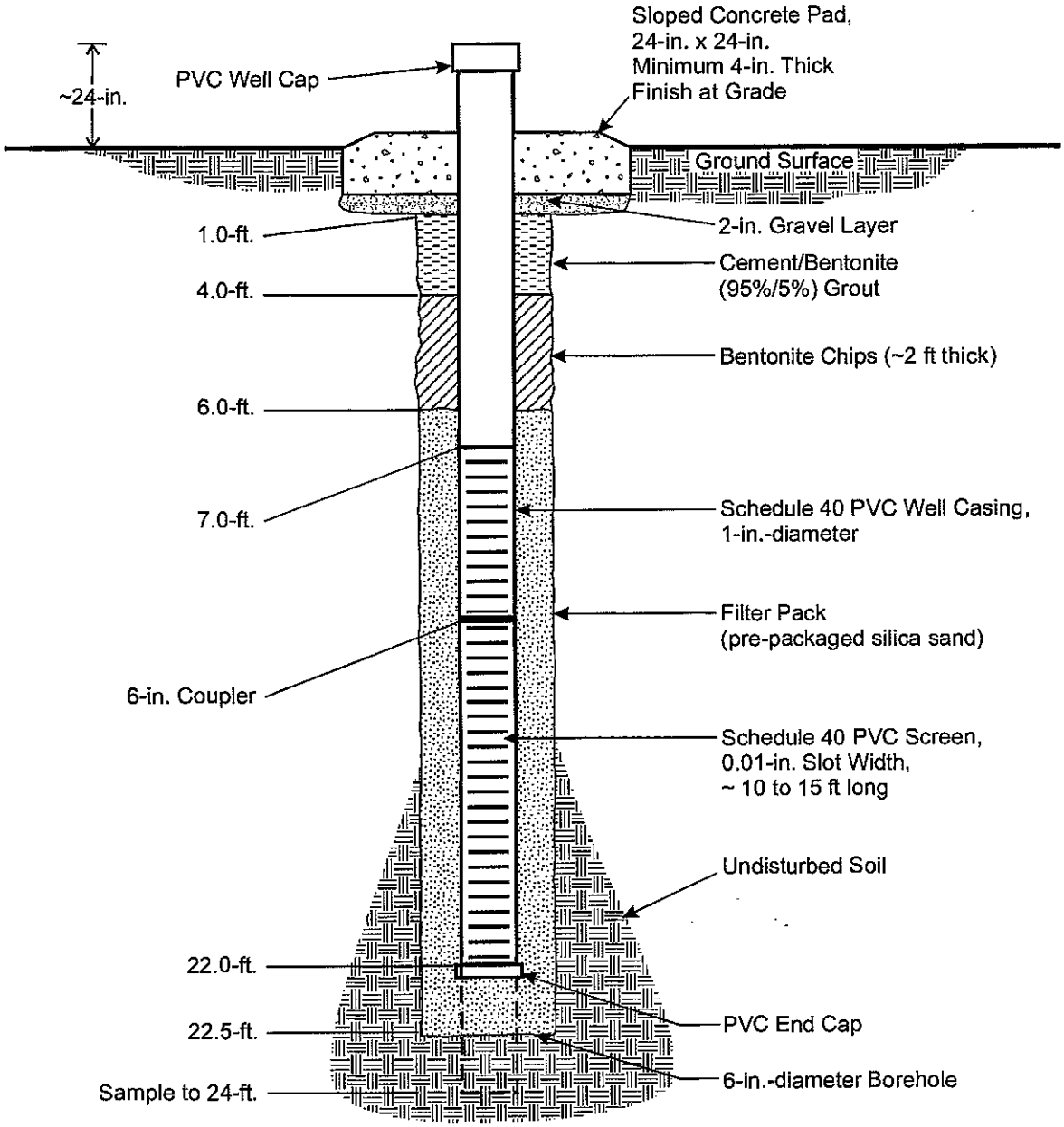
P4-MW-01
(6-5-02)



NOT TO SCALE

DESIGNED BY CP	Battelle ... Putting Technology To Work		
DRAWN BY DS	**Typical 1-inch diameter Groundwater Monitoring Well Construction**		
CHECKED BY MK	NAS FALLON - FALLON, NEVADA		
	PROJECT G469137-30	P4MWS.CDR	DATE 08/02

P4-MW-02
(5-20-02)



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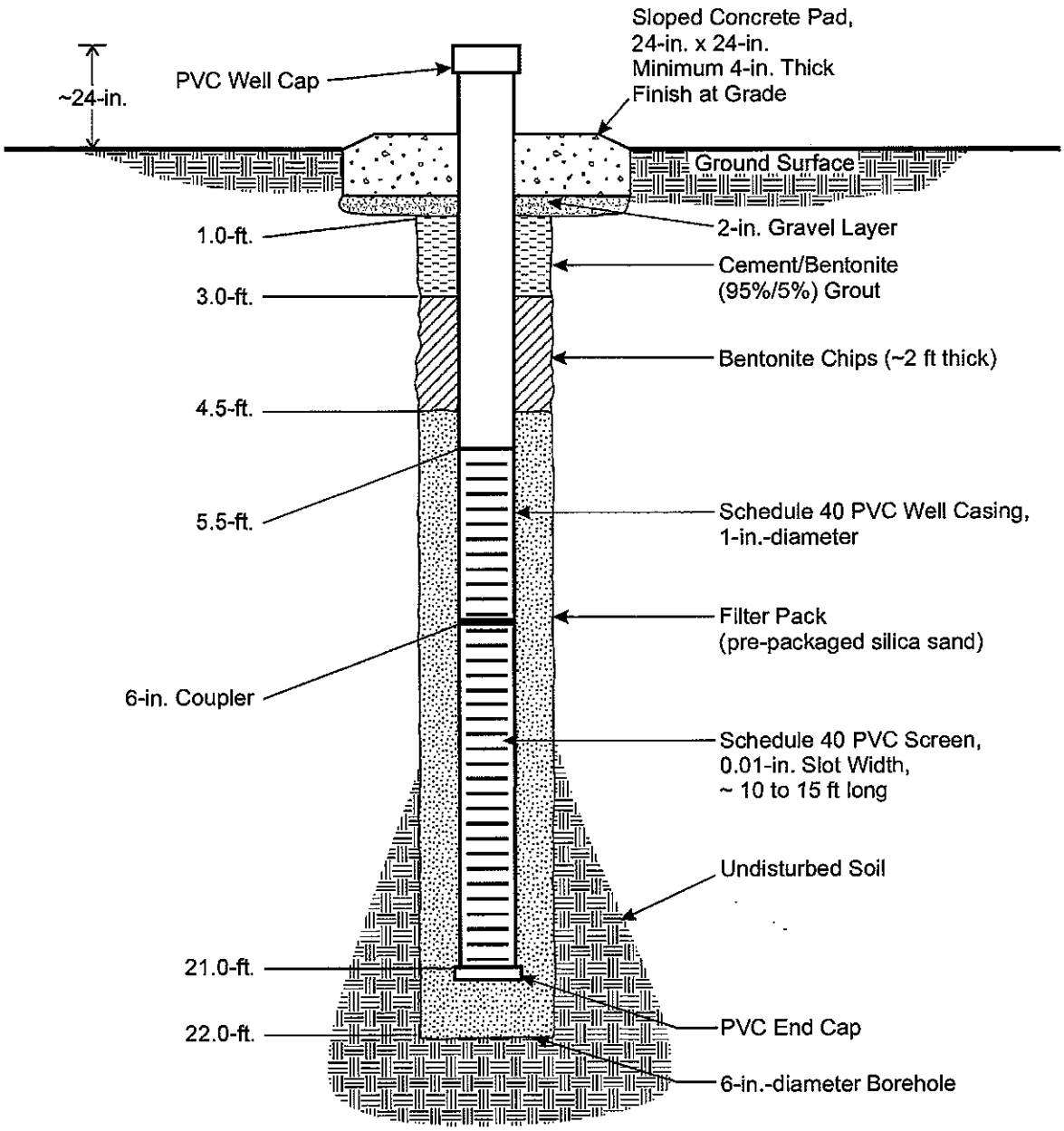
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P4MWS.CDR · DATE 08/02

P4-MW-03
(5-21-02)



NOT TO SCALE

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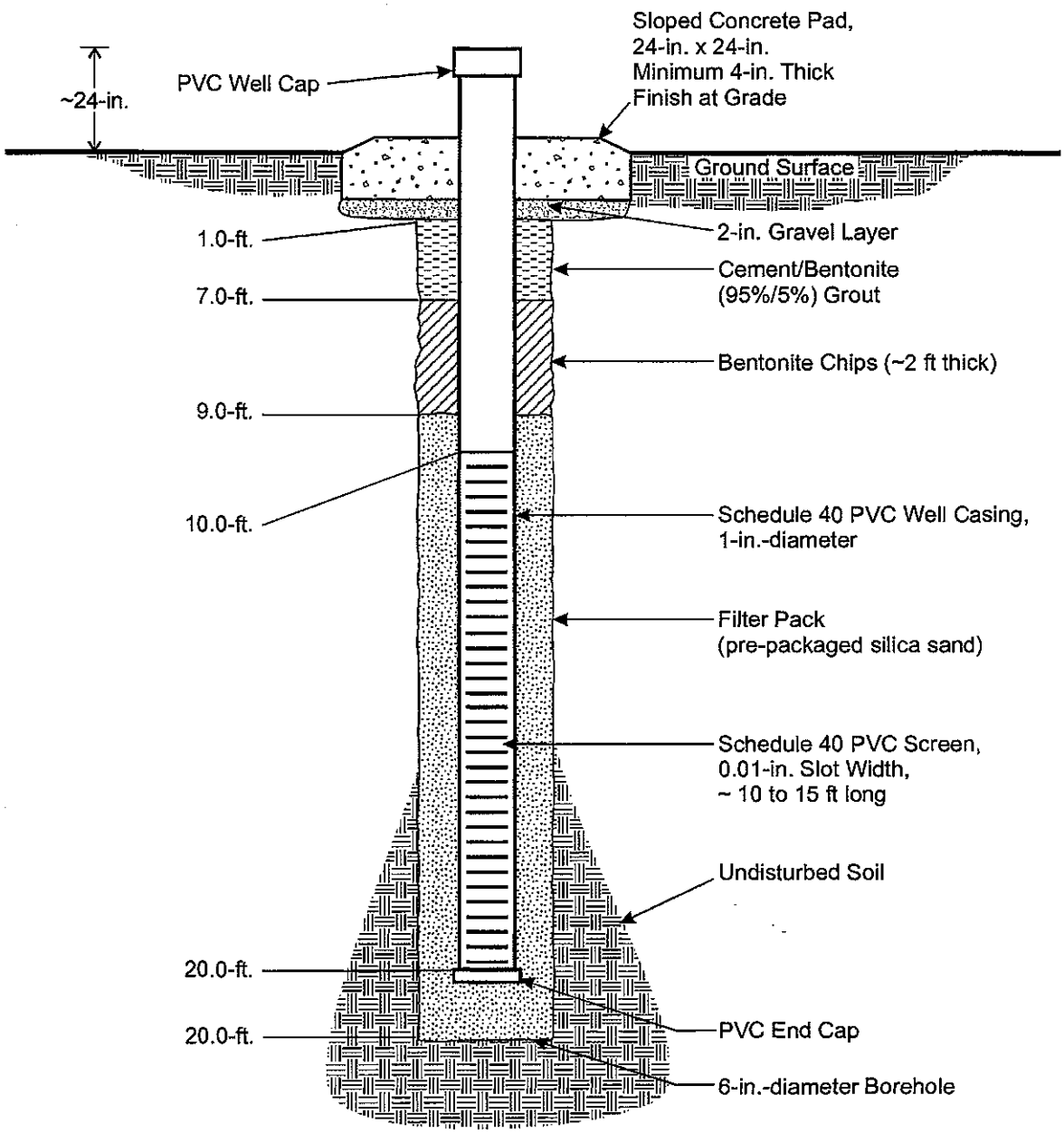
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P4MWS.CDR · DATE 08/02

P4-MW-04
(6-4-02)



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CHECKED BY MK	NAS FALLON - FALLON, NEVADA
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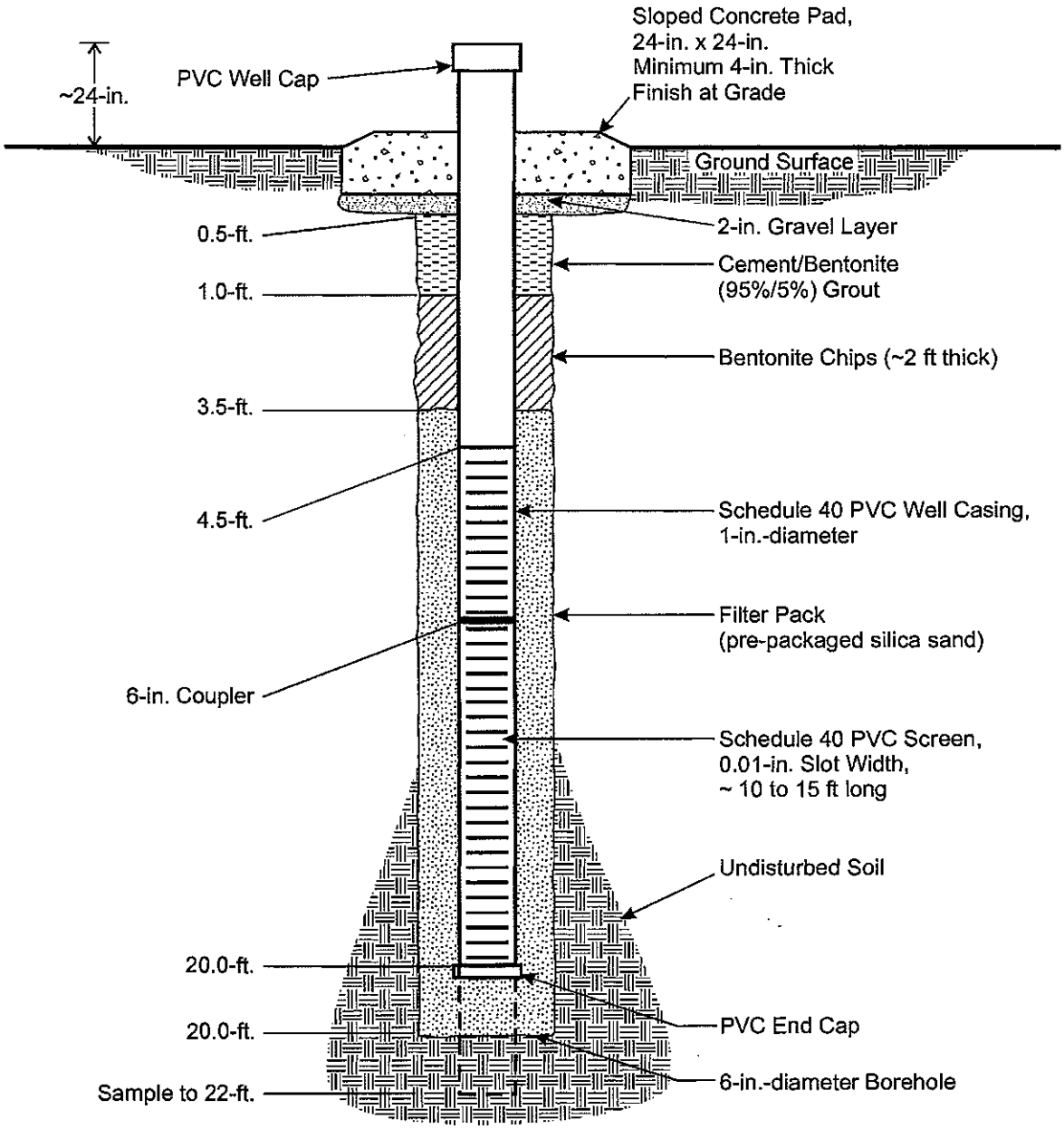
P4-MW-05
(5-21-02)



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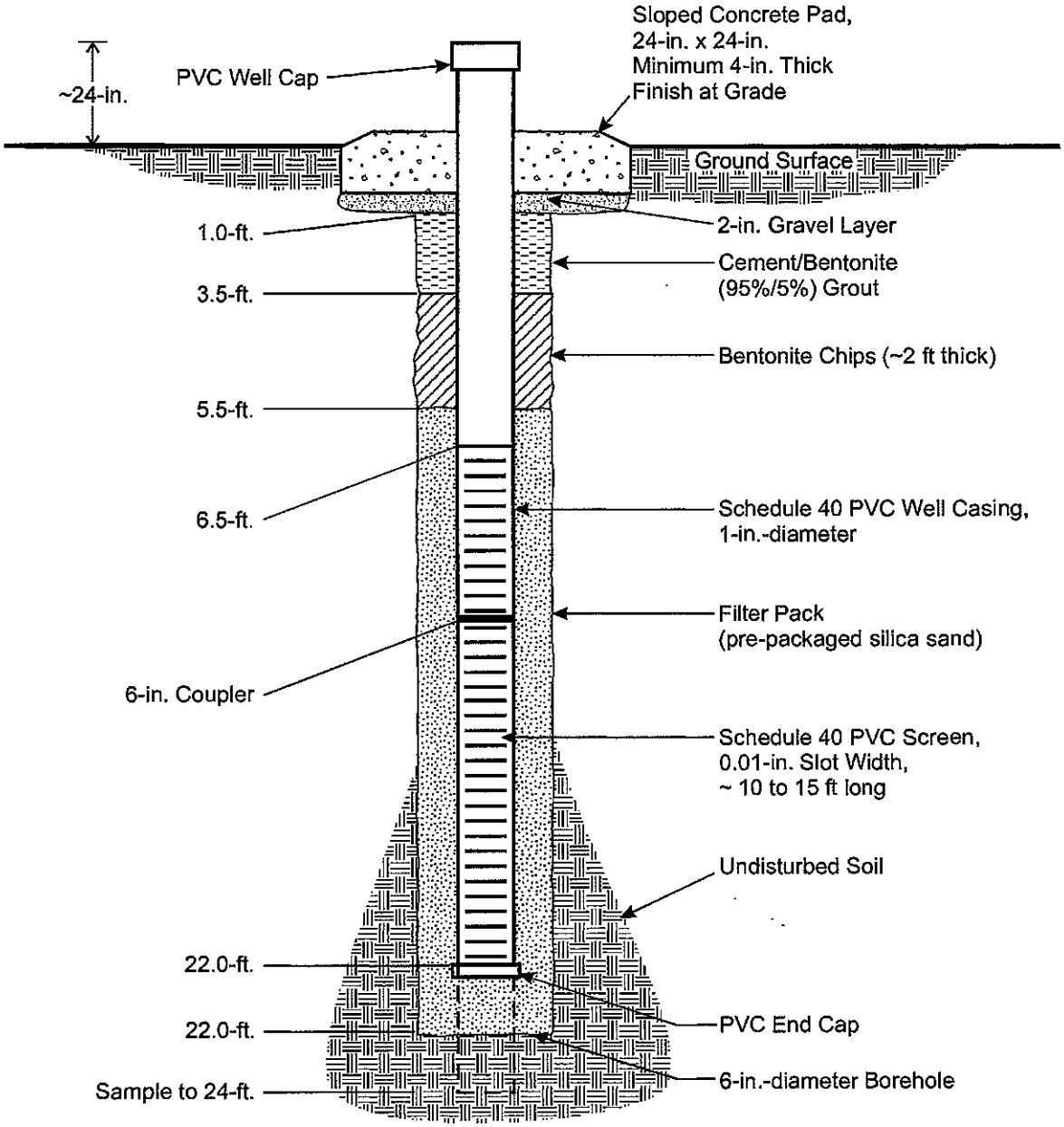
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P4MWS.CDR · DATE 08/02

P4-MW-06
(5-20-02)



NOT TO SCALE

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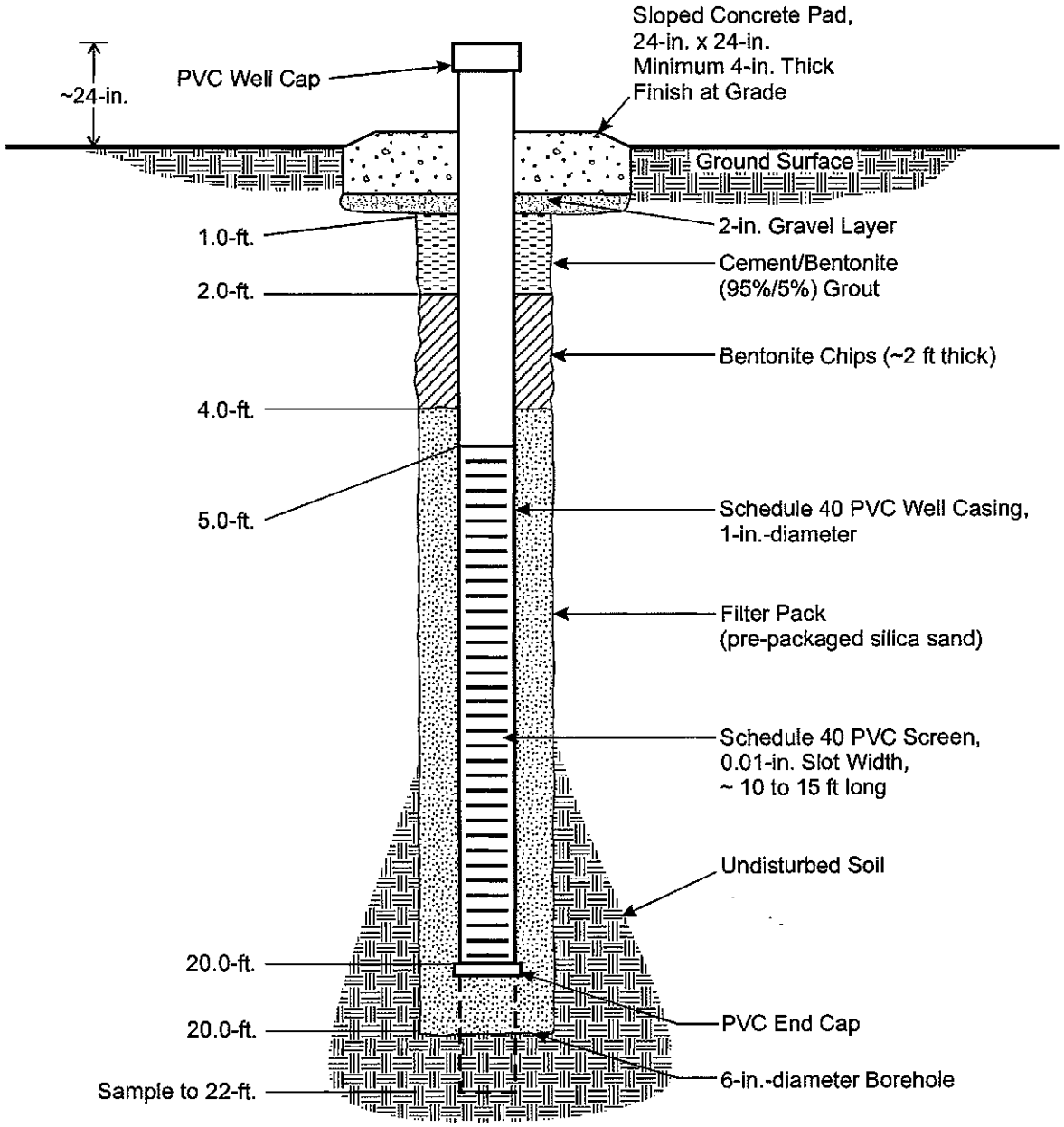
CHECKED BY MK	NAS FALLON - FALLON, NEVADA
	PROJECT G469137-30 · P4MWS.CDR · DATE 08/02

P4-MW-07
(5-21-02)



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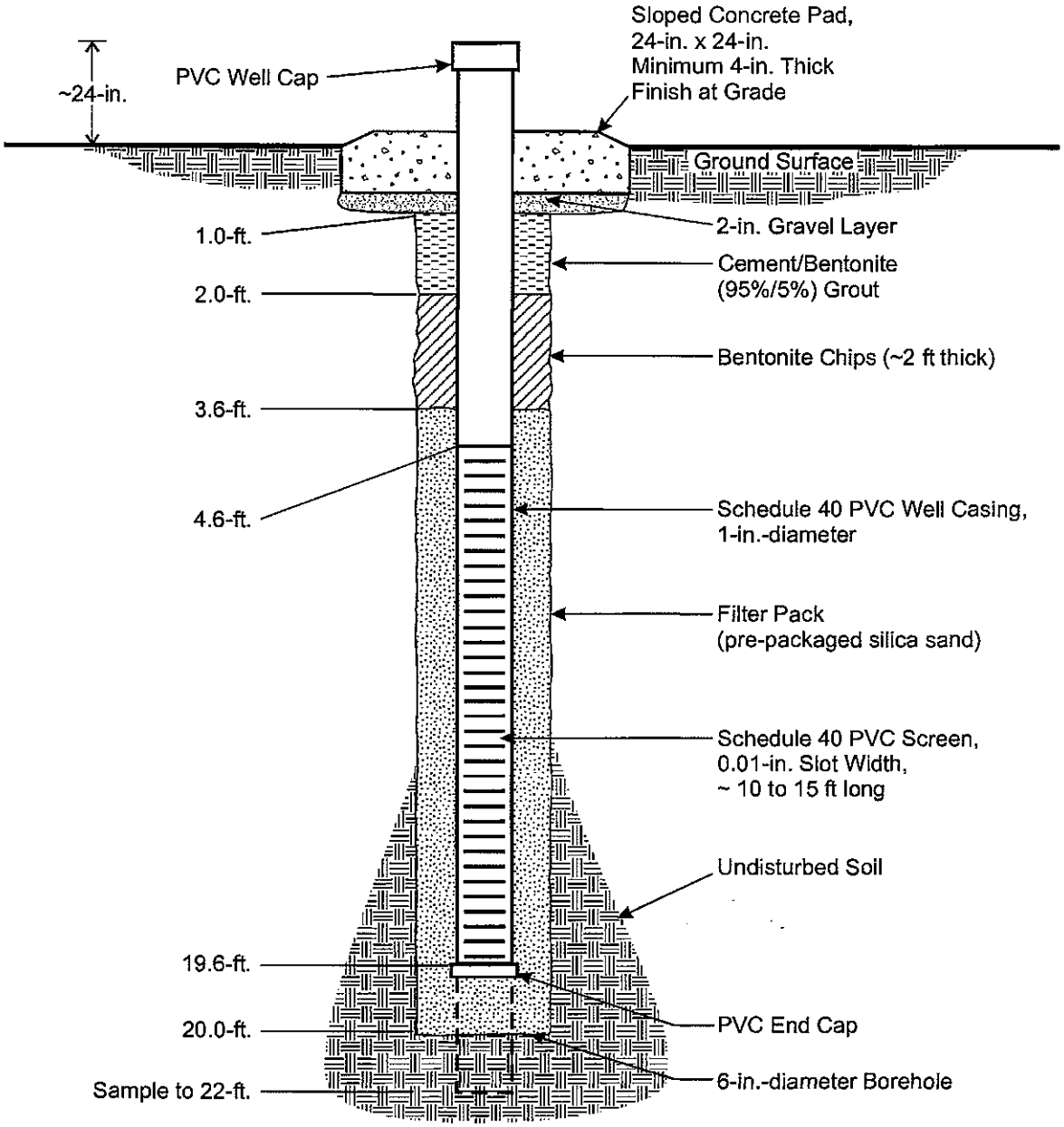
	PROJECT G469137-30	P4MWS.CDR	DATE 08/02

P4-MW-08
(5-21-02)



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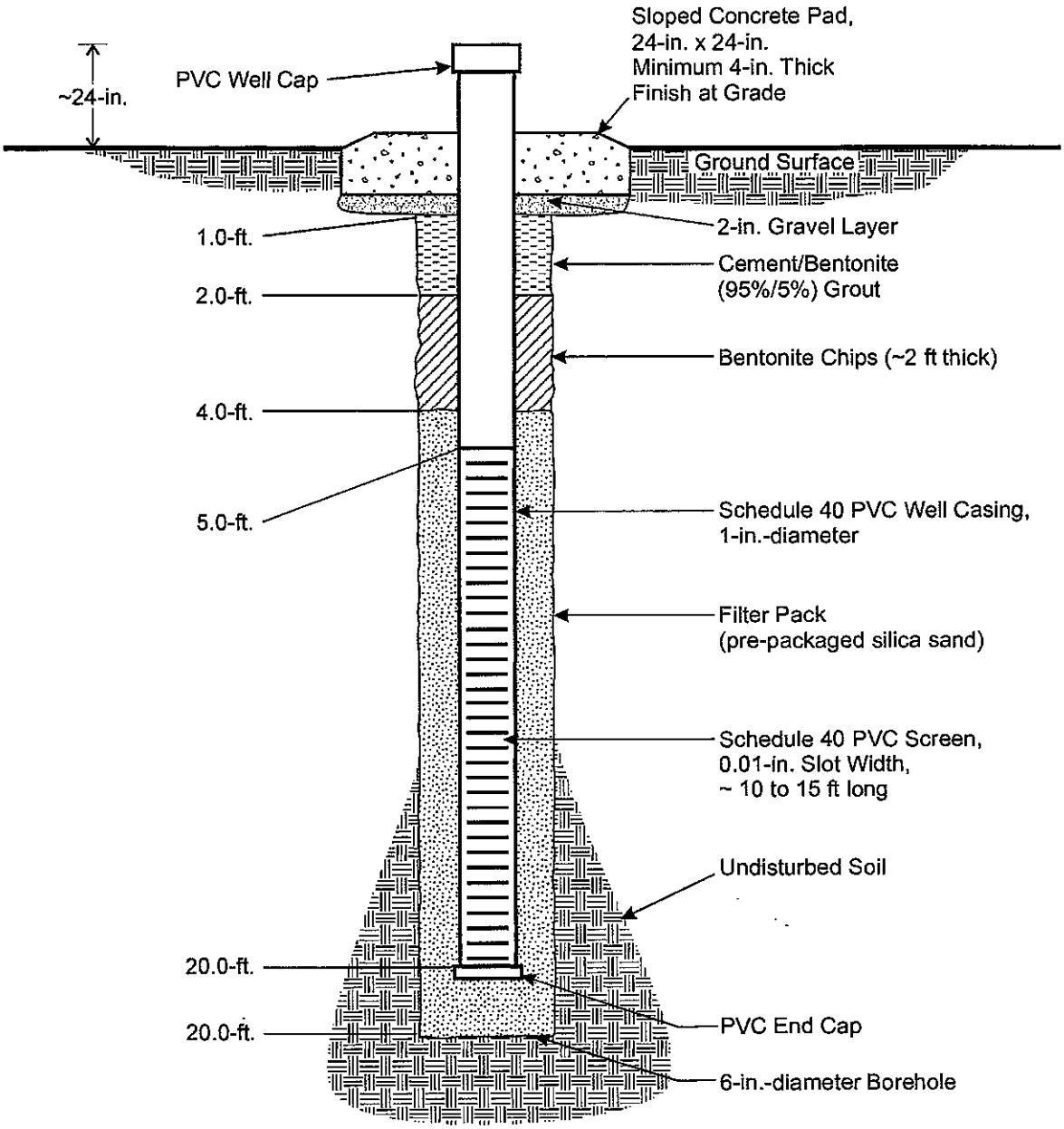
	PROJECT G469137-30	P4MWS.CDR	DATE 08/02

P4-MW-09
(5-21-02)



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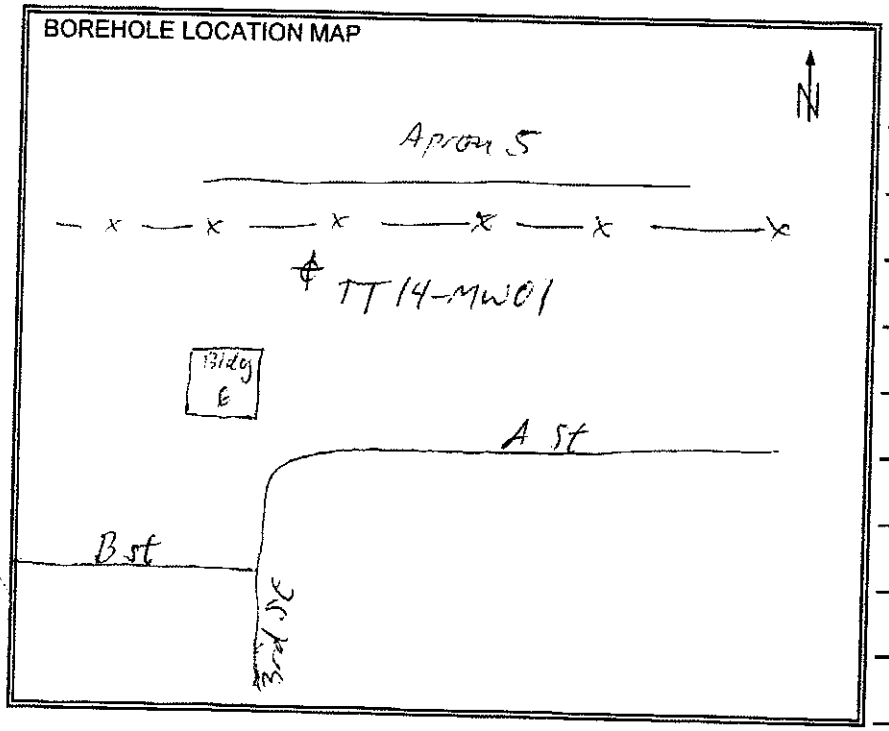
CHECKED BY MK	NAS FALLON - FALLON, NEVADA		
	PROJECT G469137-30	P4MWS.CDR	DATE 08/02

Boring ID:	
Monitoring Well ID: TT14-MW01	
Project Number: I4302300	Project Name: RI Addendum
Client: US Navy	
Site: 14	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg	
Drill Rig Type/Method: Mobil MST / Hollow stem auger	
Sampler Type: Hand auger to 5', acetate sleeves to TD	
Borehole Diameter (inches): 8	to: 18 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 11-10-07	Drill Start Time: 0730
Drill Finish Date: 11-10-07	Drill Finish Time: 0745
Total Borehole Depth (feet bgs): 18	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 8	Date: 11-10-07 Time: 0740
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-10-07	Well Completion Time: 0850
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 9.1	

BOREHOLE LOCATION MAP



NOTES/REMARKS

CTO: NAS Fallon
BORING ID:
MW ID: TT04-MW01
DATE: 11-10-07
LOGGED BY: R. Knapp

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Hand auger to 5'					
									1							
									2							
		0733								SP	Sand, brown (10YR 4/3), loose, dry			20	80	
									3							
		0735								SP	As above but coarser grained			40	60	
									4							
									5							
		0737	36/36													
									6	CL	Clay, silty, dark yellowish brown (10YR 4/4), st. ff, sl. damp					100
						0.3			7							
						0.4			8	SP	Sand, dark yellowish brown (10YR 4/6), loose, wet at 8'			30	70	
		0740														
						0.2			9							

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-10-01
LOGGED BY: R. Knapp

MW ID: TT14-MW01

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
										CL	Clay dark yellowish brown (10YR 4/4), med stiff, sl. plastic sl micaceous					100
									11							
		0742					3.6		12	CL	As above					
									13							
							0.9		14							
									15	SP	Sand, dark yellowish brown (10YR 4/4), med dense, wet			10	80	10
		0745					0.4		16	SP	Sand as above					
									17							
									18		TD = 18'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT14-MW01
PROJECT: RI Addendum
SITE: 14
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-10-07 TIME: 0730
WELL INSTALLATION BEGAN:
DATE: 11-10-07 TIME: 0745
WELL INSTALLATION FINISHED:
DATE: 11-10-07 TIME: 0850
DRILLING CO.: Gregg
DRILLER: J Neff
LICENSE: M2328
DRILL RIG: Mark MST
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: ~~2.067~~ 4.25 OD: ~~2.375~~ 8

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: PVC Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 5.3

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: PVC Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

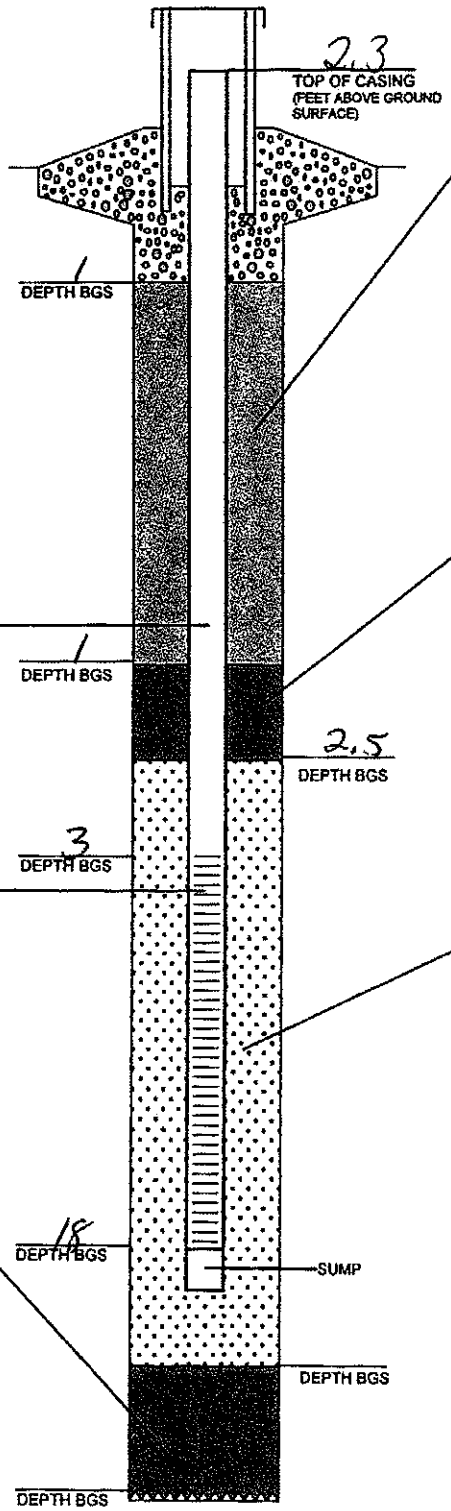
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [ ] PREPARED MIX
  - PRODUCT:
  - MFG. BY:

METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb.
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: 3/8
- [ ] OTHER:

PRODUCT: Holeplug
MFG. BY: Baroid
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED: 600 lb
- [x] SAND, SIZE: 2/16

PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL: 11.42
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO:

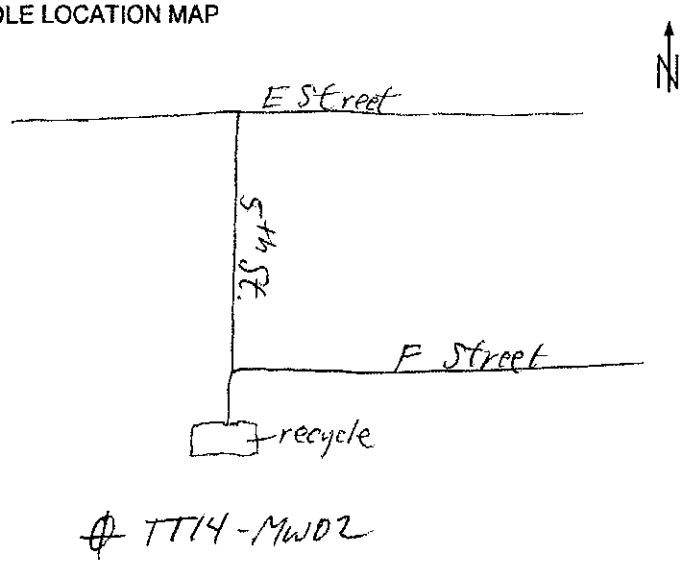
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT14-MW02	
Project Number: I4302300	Project Name: RI Addendum
Client: US Navy	
Site: 14	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg	
Drill Rig Type/Method: Mari MST / Hollow stem auger	
Sampler Type: Hand auger to 5', acetate sleeves to TD	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 11-10-07	Drill Start Time: 0910
Drill Finish Date: 11-10-07	Drill Finish Time: 0928
Total Borehole Depth (feet bgs): 18	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 4.2 ft	Date: 11-10-07 Time: 0916
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-10-07	Well Completion Time: 1020
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 8	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 5.1	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-10-01
LOGGED BY: R. Knapp

MW ID: TT14-MW02

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											"Hardpan" surface					
									1							
									2							
		0912								ML	Silt, sandy, dark olive brown (2.5Y 3/2), soft, damp			10	25	65
									3							
									4	SP	Sand, brown (10YR 5/3), loose, wet at ~4			26	3	5
									5							
		0917					1.6			SP	Sand as above					
							3.4		6	CL	Clay, silty, very dark gray (10YR 3/1) sl plastic, damp stiff				5	95
									7	ML	Silt, brown (10YR 4/3), medium stiff, wet, micaceous				10	90
		0919							8	SP	Sand, dark yellowish brown (10YR 4/4) med dense, wet			30	70	
							2.6		9							

Installation: NAS Fallon
CTO:
BORING ID:
MW ID: TT14-MW02
DATE: 11-10-07
LOGGED BY: R Knapp

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
									11							
	✓	0922					1.8		12	SP	As above			30	70	
									13							
							4.2		14	CL	Clay, silty, dark yellowish brown (10YR 3/4), med stiff, damp, sl plastic					100
									15	ML	Silt, sandy, dark yellowish brown (10YR 4/4), med stiff wet, micaceous				25	75
	✓	0928					2.1		16							
									17							
	✓								18		TD = 18'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT14-MW02
PROJECT: RI Addendum
SITE: 14
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-10-07 TIME: 0910
WELL INSTALLATION BEGAN:
DATE: 11-10-07 TIME: 0935
WELL INSTALLATION FINISHED:
DATE: 11-10-07 TIME: 1020
DRILLING CO.: Gregg
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Mad MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: ~~2.067~~ 4.25 OD: ~~2.375~~ 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT:
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 5.5

WELL SCREEN

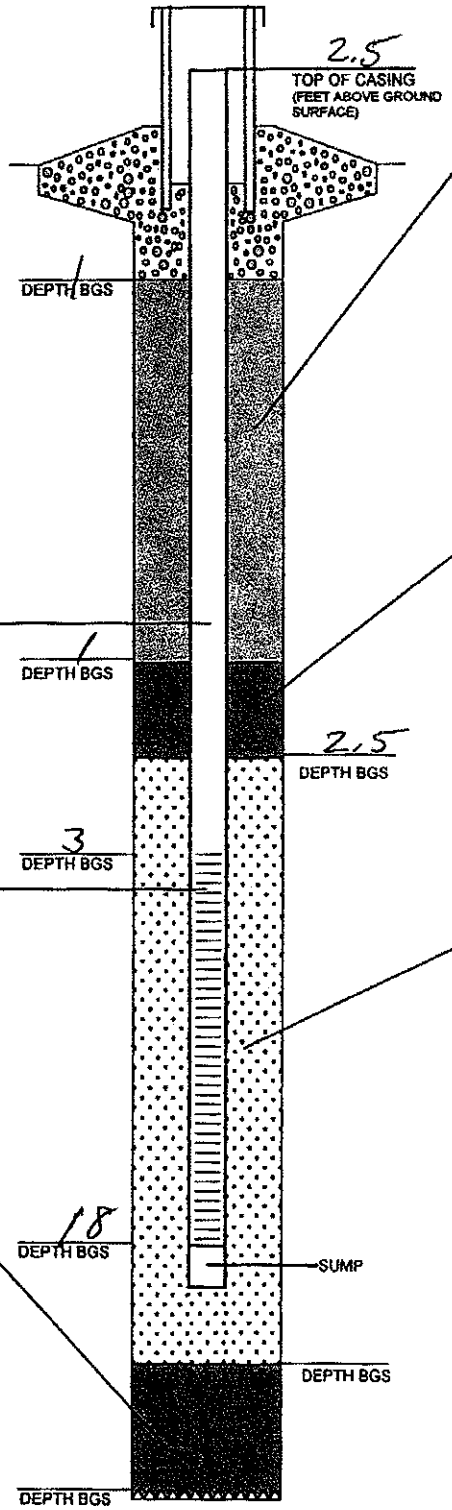
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND ~~WITH BUMPER POST~~
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Hydroplug
MFG. BY: Baroid
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 600 lb
☒ SAND, SIZE: 2/16
PRODUCT: Sapro Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL: 7.6
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

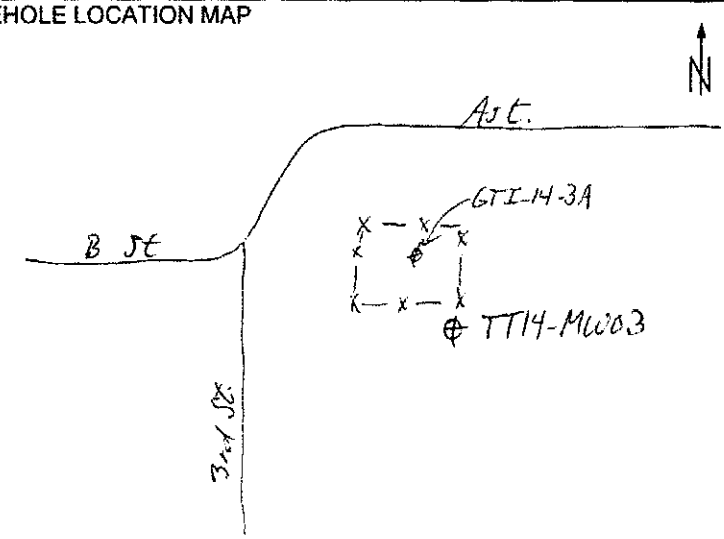
☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT14-MW03	
Project Number: I4302300	Project Name: RI Addendum
Client: US Navy	
Site: 14	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg	
Drill Rig Type/Method: Mad MST / Hollow Stem Auger	
Sampler Type: Handauger to 5 feet, acetate sleeves to TD	
Borehole Diameter (inches): 8	to: 18 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 11-11-07	Drill Start Time: 1030
Drill Finish Date: 11-11-07	Drill Finish Time: 1051
Total Borehole Depth (feet bgs): 18	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 8	Date: 11-11-07 Time: 1041
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-11-07	Well Completion Time:
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 7.95	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Designed to replace well GTI-14-3A.

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-11-01
LOGGED BY: R. Knapp

MW ID: TT14-MW03

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Hand auger to 5 feet					
									1							
		1031							2	ML	Silt, sandy, brown (10YR 4/3) soft, dry				30	70
									3							
		1034					2.4		4	CL	Clay, silty, dark yellowish brown (10YR 4/6), med stiff, sl plastic, moist				2	98
		1041	36/36						5	CL	Clay, dark yellowish brown (10YR 4/4) with orange mottles med stiff, sl plastic					100
									6							
							2.7		7							
		1043	48/48					▽	8	SP	Sand, dark grayish brown (10YR 4/2), med dense, wet				90	10
							3.4		9	SC	Sand, clayey, very dark grayish brown (2.5Y 4/2), dense, wet			10	60	30

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-11-01
LOGGED BY: R Knapp

MW ID: TT14-MW03

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
									11							
							15			SP	Sand, very dark gray (10YR 3/1), med dense, wet			20	80	
									12							
		1046														
									13							
									14							
							9			SP	Sand, very dark gray (10YR 3/1), loose, wet		5	70	25	
									15							
									16							
		1051					16			CL	Clay, silty, dark brown (10YR 3/3), sl plastic, stiff, damp					100
									17							
							1.7		18							
											TD = 18					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT14-MW03
PROJECT: RI Addendum
SITE: 14
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.1

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-11-07 TIME: 1030
WELL INSTALLATION BEGAN:
DATE: 11-11-07 TIME: 1055
WELL INSTALLATION FINISHED:
DATE: 11-11-07 TIME: 1155
DRILLING CO.: Gregg
DRILLER: J Neff
LICENSE: M2328
DRILL RIG: Mad MST
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: PVC Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 5.1

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: PVC Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15'

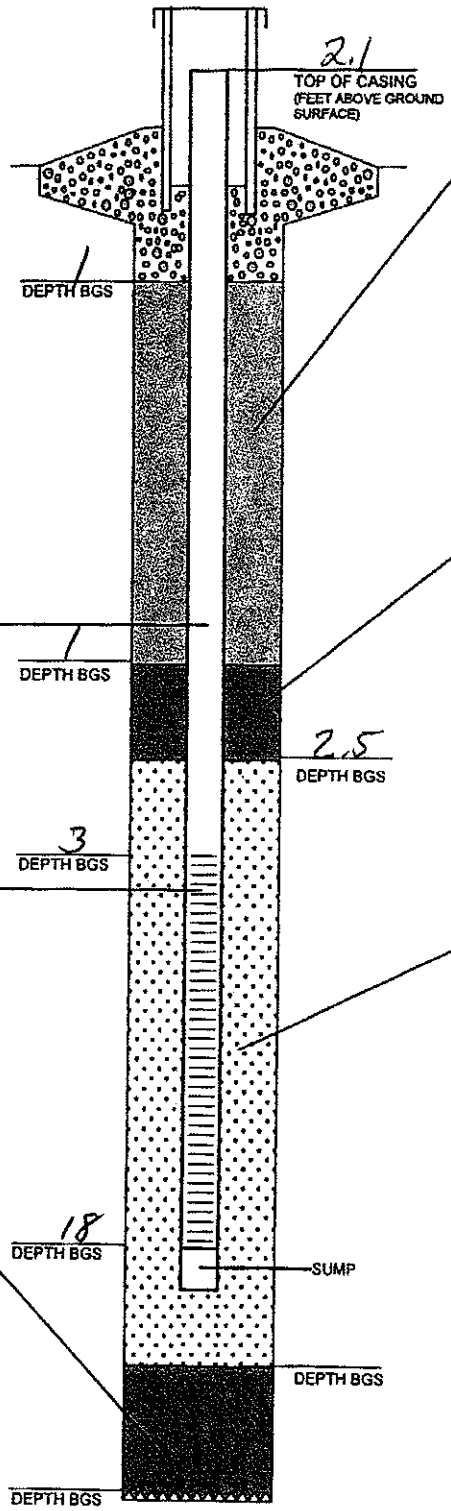
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [ ] PREPARED MIX
  - PRODUCT:
  - MFG. BY:

METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: 3/8
- [ ] OTHER:

PRODUCT: Hole plug
MFG. BY: Baroid
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED:
- [x] SAND, SIZE: 2/16

PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL: 10.05
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Site 16

Lithologic logs were not available for the following monitoring wells located at Site 16 during report development:

Well ID	Installation Date
DPZ-1	Apr-04
DPZ-2	Apr-04
DPZ-3	Apr-04
SPZ-1	Apr-04
SPZ-2	Apr-04
SPZ-3	Apr-04
TT16-MW18	Mar-08
TT16-MW18	Mar-08

Notes & Comments:

Well BAT-16-Q is of the construction shown on either of the next two pages, Figure G-1 or G-2. Specific well details are listed in the table (G.1-1) that immediately follows the above figures.

Figure G-1

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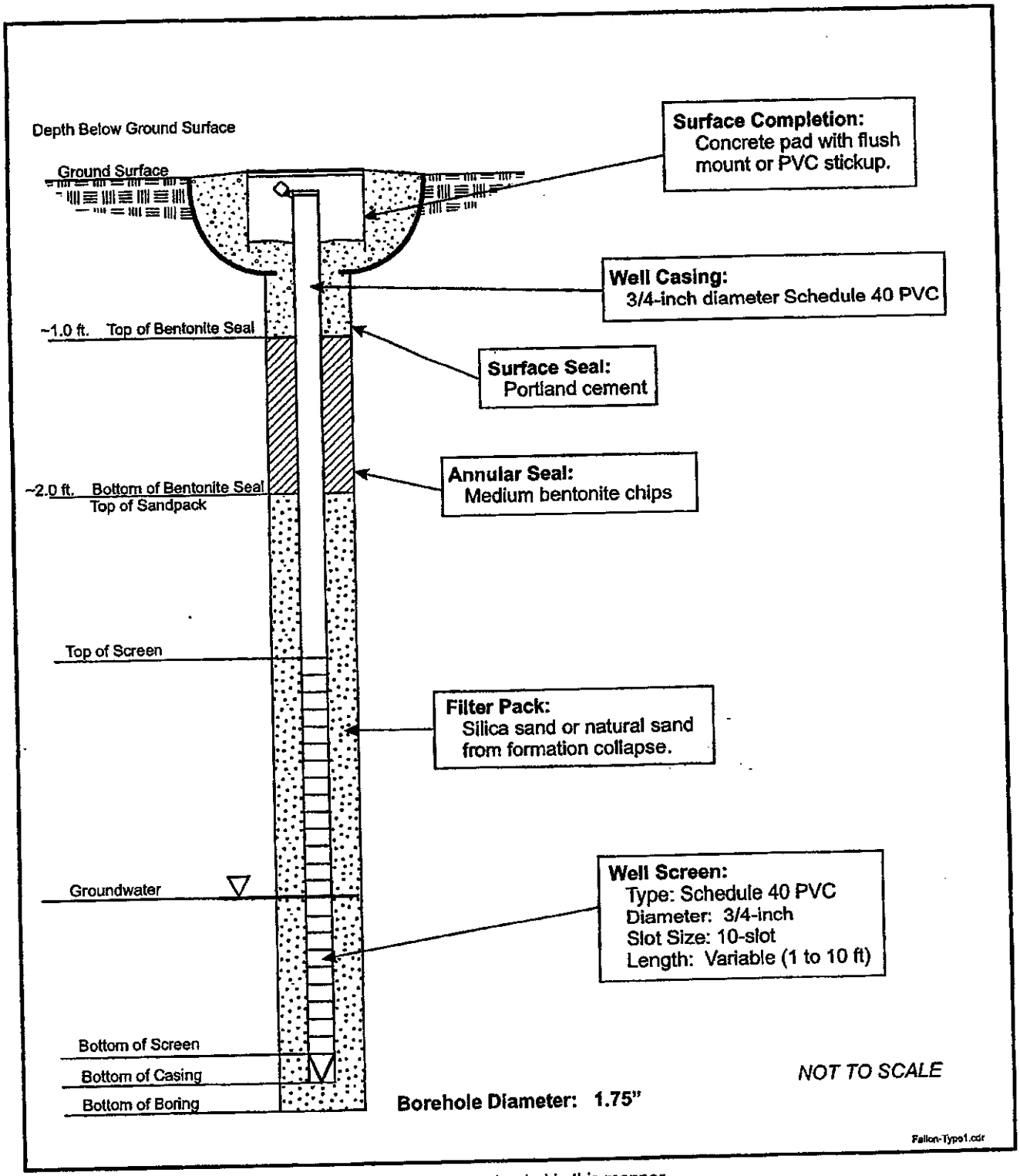
. . . Putting Technology To Work

WELL COMPLETION DIAGRAM SILICA/NATURAL SAND PACK[a]

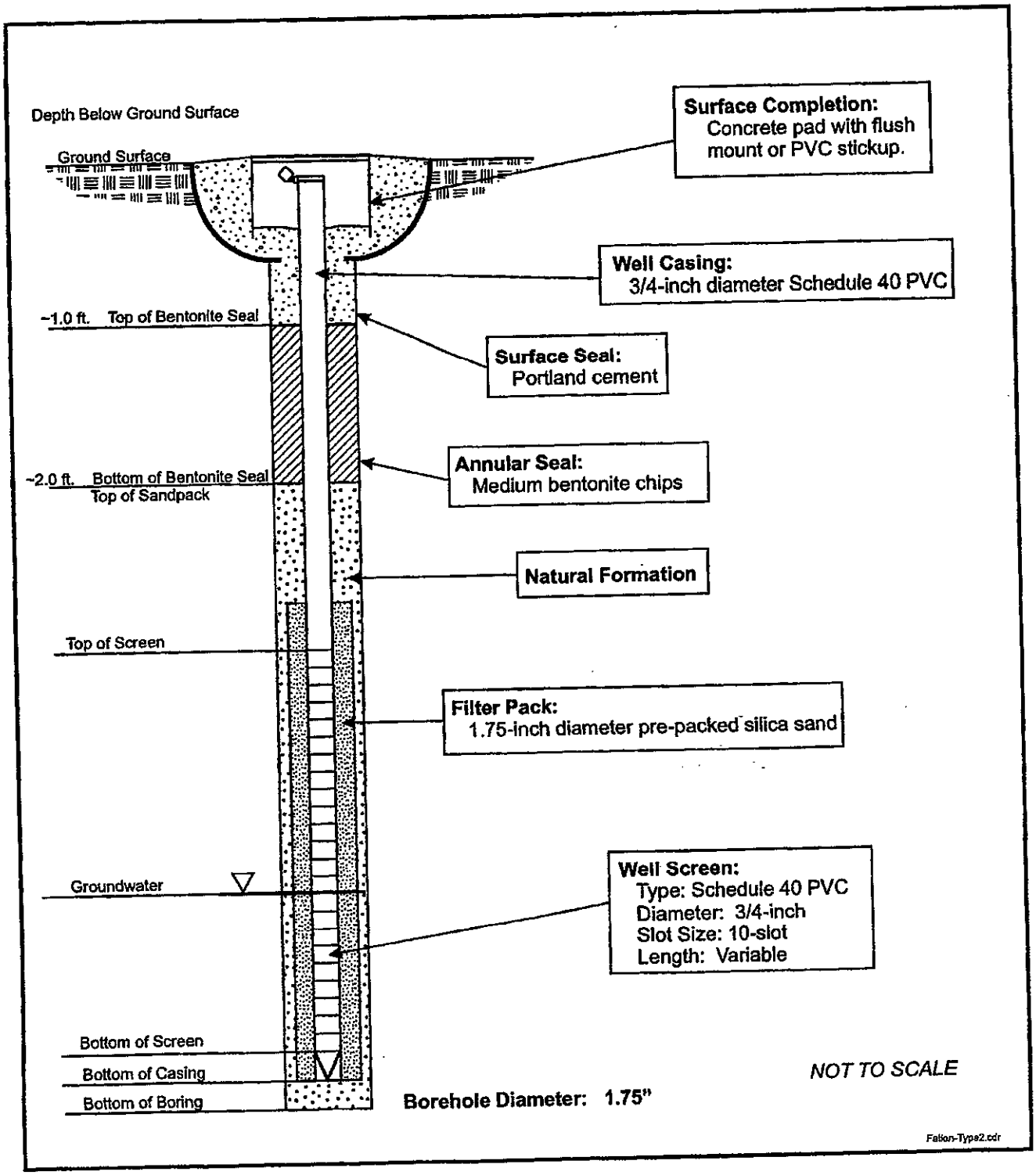


a) Note: all wells installed in September 1997 were constructed in this manner.

Battelle
. . . Putting Technology To Work

Figure G-2

WELL COMPLETION DIAGRAM PRE-PACKED SCREEN[a]



a) Note: all wells installed after September 1997 were constructed in this manner.

Battelle

NAS FALLON - SITE 16
BORING LOG - MW-16-2

Permit Number: 52846 Project Number: G601509 Boring Location: Site 16 Date Logged: 4/8/04 Geologist: M. Place Total Depth: 20'	Drilling Contractor: WESTEX Driller: G. Jensen Drilling Method: HSA Boring Diameter: 8 1/4" Sampler Type: NA Hammer Type: NA	Northing (NAD 83): Easting (NAD 83): Surface Elevation (NAVD 88): Borehole Abandoned: __ Yes X No Backfill Method: N/A Monitoring Device Installed: X Yes __ No Type:

Depth (feet bgs)	USCS Symbol	Sample Description	PID Readings (ppm)	Grading % Sand	% Silt	% Clay	Blow Counts	Coring Interval	Lithology	Well Completion
0	SP	SAND with silt and clay, light brown, dry, no odor		60	30	10				Surface seal: 0-2' Concrete
	SP	Same as above, dark brown, slightly moist, slight odor		60	30	10				Annular Seal: Medium Bentonite Chips, from 2'-4'
5										Filter Pack No. 2/12 Sand, from 4'-20'
	SP	Same as above, more gray in color, wet, no odor		60	30	10				
10										
	SP									Screened Interval: 0.010" slot size, from 5'-15'
15										
	CL	CLAY: rich, silt with sand, wet, no odor, relatively stiff, olive brown color.		20	40	40				
20		TD=20' bgs								
25										
30										

MW 16 2.LOG

Battelle

NAS FALLON - SITE 16
BORING LOG - MW-16-3

Permit Number: 52846 Project Number: G601509 Boring Location: Site 16 Date Logged: 4/8/04 Geologist: M. Place Total Depth 20'	Drilling Contractor: WESTEX Driller: G. Jensen Drilling Method: HSA Boring Diameter: 8 1/4" Sampler Type: NA Hammer Type: NA	Northing (NAD 83): Easting (NAD 83): Surface Elevation (NAVD 88): Borehole Abandoned: __ Yes X No Backfill Method: N/A Monitoring Device Installed: X Yes __ No Type:

Depth (feet bgs)	USCS Symbol	Sample Description	PID Readings (ppm)	Grading % Sand	% Silt	% Clay	Blow Counts	Coring Interval	Lithology	Well Completion
0	SP	SAND: with silt, dry light, no odor		75	25	0				Surface seal: 0-2' Concrete
	SP	more clay/silt than above, slightly moist, dark brown, no odor		60	20	20				Annular Seal: Medium Bentonite Chips, from 2'-4'
5										Filter Pack: No. 2/12 Sand, from 4'-20'
	SP	more sand, less silt/clay, wet, dark brown, no odor		75	15	10				
10										Screened Interval 0.010" slot size, from 5'-15'
15	CL	CLAY: with sand and silt, wet, relatively stiff, olive brown color, no odor		20	20	60				
20		TD=20' bgs								
25										
30										

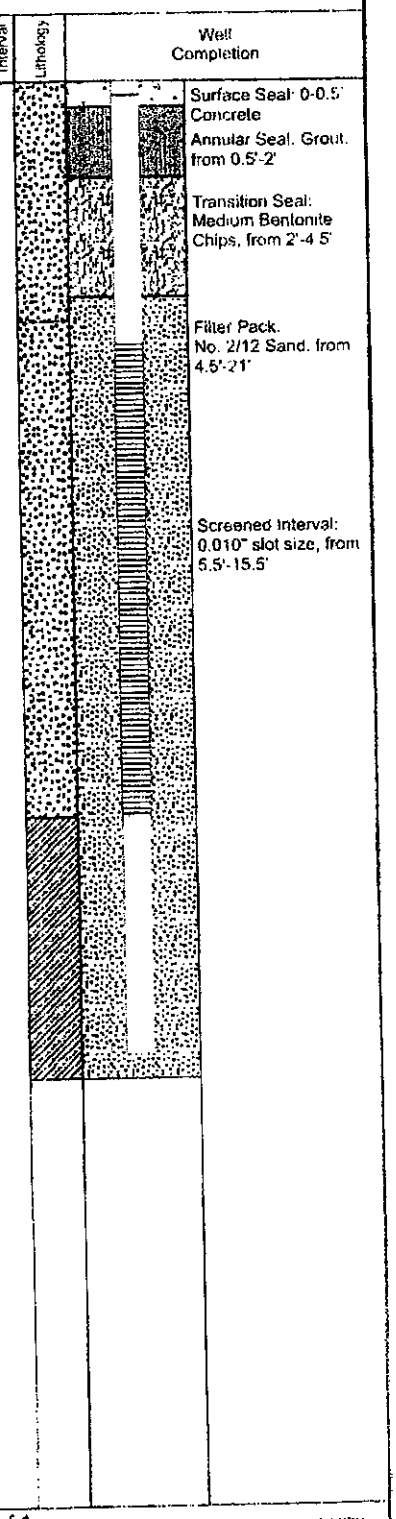
MW-16-3.CDR

Battelle

NAS FALLON - SITE 16
BORING LOG - MW-16-4

Permit Number: 52846 Project Number: G601509 Boring Location: Site 16 Date Logged: 4/8/04 Geologist: M. Place Total Depth: 21'	Drilling Contractor: WESTEX Driller: G. Jensen Drilling Method: HSA Boring Diameter: 8 1/4" Sampler Type: NA Hammer Type: NA	Northing (NAD 83): Easting (NAD 83): Surface Elevation (NAVD 88): Borehole Abandoned: __ Yes X No Backfill Method: N/A Monitoring Device Installed: X Yes __ No Type:

Depth (feet bgs)	USCS Symbol	Sample Description	PID Readings (ppm)	Grading % Sand	% Silt	% Clay	Blow Counts	Coring Interval
0	SP	SAND with silt and clay, brown, slighlly moist below 1 ft depth, no odor		80	15	5		
5	SP	SAND with more silt/clay than upper soils, brown, wet, no odor.		65	25	10		
15	CL	CLAY with sand and silt, wet, olive brown color, no odor.		20	20	60		
21		TD=21' bgs						



MW-16-4.CDR

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: Bob Schlosser Date: 3/9/91 Page: 1 OF 1

Hole No.: MW25L Casing Elevation: 3924.56' Ground Elevation: 3924.59'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 16

Auger Size: 8" O.D. Sample Type: NONE

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					NO SAMPLES TAKEN. SEE MW25U FOR LITHOLOGY
2					
4					AUGER TO 20'
6					
8					
10					CONCRETE 0'-1' SLOTTED 2" PVC SCREEN (0.010"), 13'-18' NEAT CEMENT (6/1), 1'-7' BENTONITE PELLETS (3/8"), 7'-10.5' FRAC SAND (8/20), 10.5'-19.0' NATIVE FILL 19'-20'
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

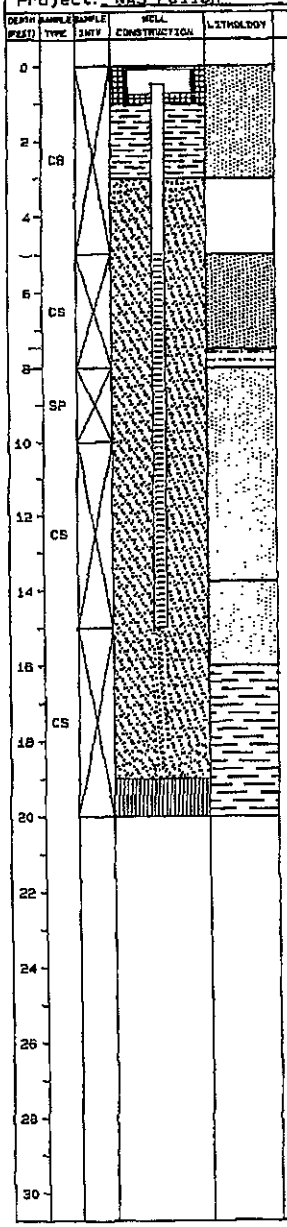
Prepared By: Bob Schlosser Date: 3/6/91 Page: 1 OF 1

Hole No.: MW25U Casing Elevation: 3924.30' Ground Elevation: 3924.59'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 16

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91



DESCRIPTION

SP SAND: yellowish brown (10YR6/4), subangular to subround, slightly calcareous

HIT WATER LINE, LOST SAMPLE, SKID RIG 10' SOUTH AUGER TO 5.0'

SP SAND: very dark gray (3.5YN3/), sample appears to have degraded fuel in it. HNU=185 ppm in hole

SM SANDY SILT: brown (10YR4/3), relatively tight

SP SAND: as above, less weathered looking fuel

SP SAND: as above, becoming coarse grained

SP SAND: yellowish brown, vfL, micaceous, slightly calcareous

CL CLAY: olive (5Y/3), mottled grey (5G5/1), at 19.5', strong oxidized, brownish yellow (10YR6/6) vfL sand, MARKER BED.

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20), 3'-19'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'
NATIVE FILL 19'-20'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

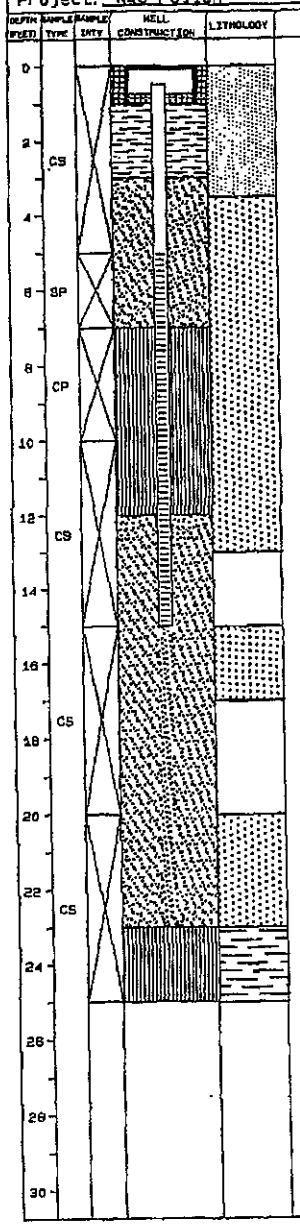
Prepared By: Bob Schlosser Date: 3/9/91 Page: 1 OF 1

Hole No.: MW26 Casing Elevation: 3924.05' Ground Elevation: 3924.31'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 15

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' Calif. Method' SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91



DESCRIPTION

SP SAND: yellowish brown (10YR5/4), abundant Fe staining or oxidation

SW SAND: color as above, fU-vcL, predominantly milky quartz, subrounded to occasionaly round abundant dark minerals, arkosic, slightly calcareous locally

SW SAND: color as above, fU-vcU, very well graded, some scattered 1-2 cm pebbles, abundant scattered fU basalt, arkosic, non calcareous

SW SAND: brown (10YR5/3), predominantly fL-cU smaller grained with depth

LOST 13'-15'

SW SAND: as above, fL-cL, some scattered 2-3 mm pebbles, abundant muscovite, slightly arkosic, and calcareous, predominantly subrounded, some well rounded

LOST 17'-20'

SW SAND: color as above, fL-vcU, abundant vfL basalt, subangular to subround, some calcite, strong oxidized zone at 21.0'

CL CLAY: olive brown (2.5Y5/6), soft, very calacareous

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20), 3'-7', 12'-23'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'
NATIVE FILL 7'-12', 23'-25'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

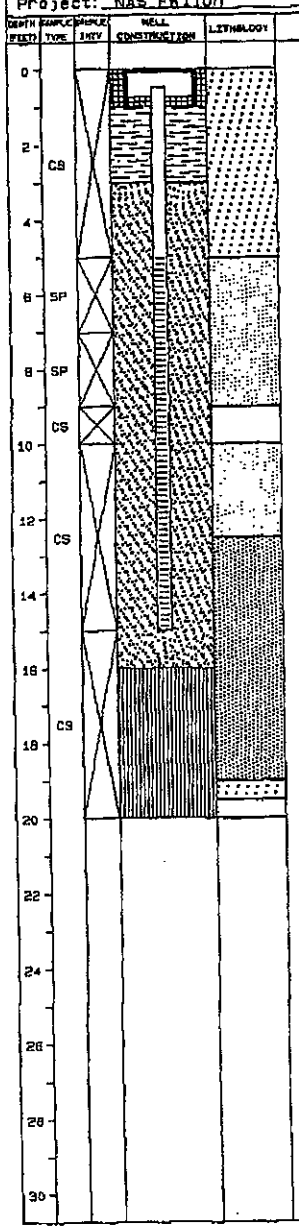
Prepared By: W.H. Burke Date: 3/10/91 Page: 1 OF 1

Hole No.: MW2B Casing Elevation: 3924.06' Ground Elevation: 3924.27'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Group III Sites

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2"Calif. Method" SS

Project: NAS Fallon Date Verified By: David Smuin Date: 3/22/91



DESCRIPTION

SP SAND: light yellowish brown (10YR6/4), mL-cL, subangular to subround, micaceous, dark accessory minerals

SP SAND: as above, vfU-fL, rounded

SP SAND: as above

LOST 9'-10'

SP SAND: brown (10YR5/3), vfU-vfL, some feldspar, dark accessory minerals, silty in part

SP SAND: olive (10YR5/4), as above

SP SAND: as above

SP SAND: very pale brown (10YR7/3), cU, subangular to subround

SP SAND: light brownish gray (2.5YR65/2), vfU, fining with depth

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20) 3'-16'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'
NATIVE SAND 16'-20'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

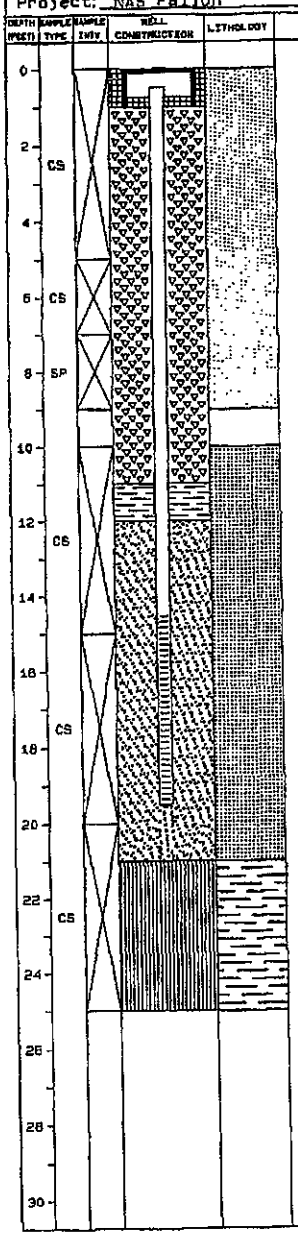
Prepared By: W.H. Burke Date: 9/10/91 Page: 1 OF 1

Hole No.: MW29L Casing Elevation: 3924.41' Ground Elevation: 3924.41'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Group III Sites

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91



DESCRIPTION

SP SAND: brown (10YR5/3), vfL, silty in part, sub-angular to subround, micaceous, calcareous

SP SAND: light yellowsih brown (10YR6/4), mU-mL

SP SAND: brown, fU-mL, micaceous, dark accessory minerals

SP SAND: as above

SP SAND: light gray (10YR7/1), vfU, subangular, very calcareous, arkosic, wet, HNU=10.2 ppm

LOST 9'-10'

SP SAND: brown (10YR5/3), vfU-vfL, some feldspar, non calcareous, silty in part

SP SAND: yellowish brown (10YR5/4), mL-fU, rounded

SP SAND: brown (10YR5/3), fU-fL, very calcareous

CL CLAY: light brownish gray (2.5Y6/2), CARSON RIVER LAHONTON LAKE contact, Fe stained vfL sand at approximately 22.5', MARKER BED

NEAT CEMENT 0'-11'
BENTONITE PELLETS (3/8") 11'-12'
FRAC SAND (8/20) 12'-21'
SLOTTED 2" PVC SCREEN (0.010") 14.5'-19.5'
NATIVE SAND 21'-25'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

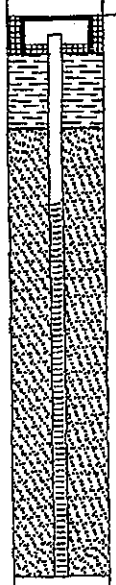
Prepared By: W.H. Burke Date: 3/10/91 Page: 1 OF 1

Hole No.: MW29U Casing Elevation: 3923.90' Ground Elevation: 3924.41'

Total Depth: 15.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Group III Sites

Auger Size: 8" O.D. Sample Type: NONE

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					NO SAMPLES TAKEN. SEE MW29L FOR LITHOLOGY
4					AUGER TO 15'
6					
8					
10					CONCRETE 0'-1.0' SLOTTED 2" PVC SCREEN (0.010") 5'-15' BENTONITE PELLETS (3/8") 1.0'-3.0' FRAC SAND (8/20) 3'-15'
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: W.H. Burke Date: 3/10/91 Page: 1 OF 1

Hole No.: MW30 Casing Elevation: 3923.50' Ground Elevation: 3923.81'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Group III Sites

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					SP SAND: grayish brown (10YR5/2), vfU, silty in part subangular to subround, micaceous, calcareous
2	CS				SM SANDY SILT: brown (10YR5/3), mU, calcareous
4					
6	SP				SP SAND: grayish brown (10YR5/2), fU-fL, micaceous, silty in part, non calcareous
8	CS				SP SAND: as above
					AUGER 9'-10'
10					SP SAND: brown (10YR5/3), as above
12	CS				SM SILTY SAND: grayish brown (10YR5/4), sand vfU
14					SP SAND: as above
16					
18	CS				SM SILTY SAND: light olive brown (2.5Y5/4), sand vf subangular to subround
20					NEAT CEMENT 0'-1' BENTONITE PELLETS (3/8") 1'-3' FRAC SAND (8/20), 3'-18' SLOTTED 2" PVC SCREEN (0.010") 5'-15' NATIVE SAND 18'-20'
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

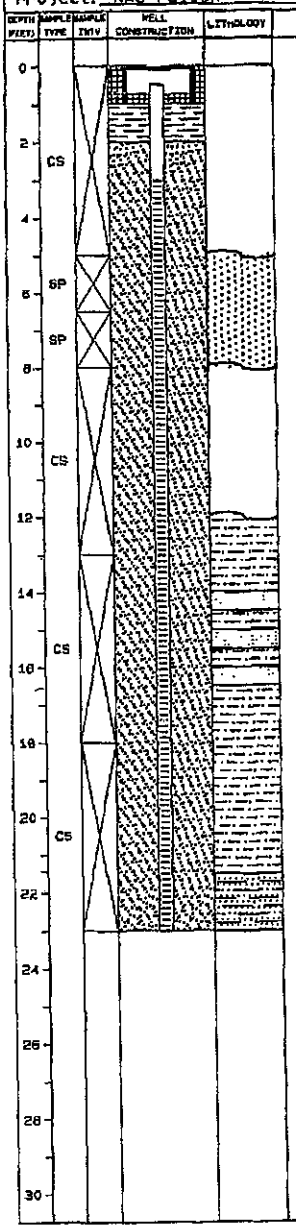
Prepared By: S.R. Sturm Date: 11/24/91 Page: 1 OF 1

Hole No.: MW23 Casing Elevation: 3924.17' Ground Elevation: 3924.54'

Total Depth: 23' No. of Compl.: 1 Rig Type: CME-75 Location: Site 11

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

LOST 0'-5'

SW SAND: light gray (10YR7/2), fL-cU, subangular, predominantly clear quartz, 5% mafics, loose.

SW SAND: as above, increasing grain size, fL-vcU, pebbles 2-6mm.

LOST 8'-13'

SM SILTY SAND: brown (10YR4/3), vfL-fL, common black Fe oxides and limonite stains on sand.

SP SAND: fL-mL, subangular, lenses in SILTY CLAY matrix

SM SILTY SAND: as above.

SP SAND: as above.

SM SILTY SAND: as above.

SP SAND: as above.

SM SILTY SAND: olive, micaceous, vfL, increasing fines, HNU SP/SM interface.

SM SILTY SAND: as above, MARKER BEDS at 21.1' and at 22.1', limonite stained SP sand.

CS SILTY CLAY: blocky, homogeneous, fat clay.

CONCRETE 0-1.0'
BENTONITE PELLETS (3/8") 1.0'-2.0'
FRAC SAND (#2), 2.0'-23'
SLOTTED 2" PVC SCREEN (0.010") 3'-23'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

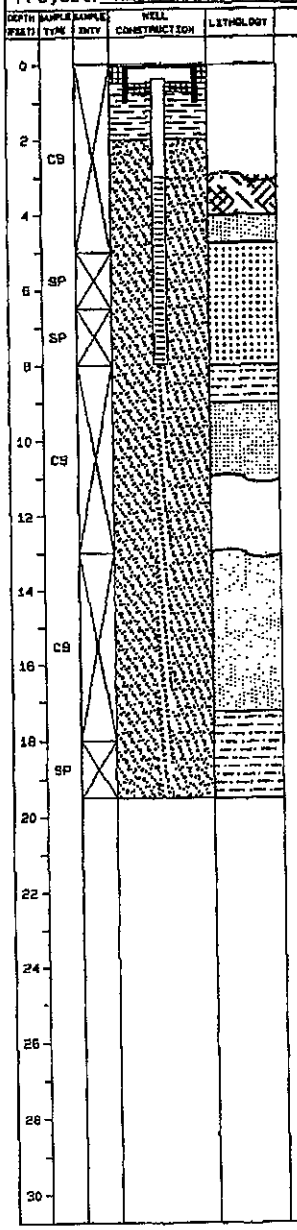
Prepared By: S.R. Sturm Date: 11/25/91 Page: 1 OF 1

Hole No.: MW65 Casing Elevation: 3923.13' Ground Elevation: 3923.19'

Total Depth: 19.5' No. of Compl.: 1 Rig Type: CME-75 Location: Site 16

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

LOST 0'-3'

FILL: road base

SP SAND: fL-fU, clear quartz, silty.

SW SAND: fL-cU, subangular, saturated, product evident, predominantly clear quartz, sand stained from product, pebbles 2-6mm.

SM SILTY SAND: brown (10YR4/3), vfL-fL, subangular, common black Fe oxides, cohesive, wet.

SP SAND: brown (10YR5/2), fL-fU, subangular, wet, evidence of product.

LOST 11'-13'

SP SAND: as above.

SM SILTY SAND: olive, vfL, moist, abundant mica.

CONCRETE 0-.5'
BENTONITE PELLETS (3/8") .5'-2.0'
FRAC SAND (#2) 2.0'-19.5'
SLOTTED 2" PVC SCREEN (0.010") 3.0'-8.0'

Battelle

NAS FALLON - SITE 16
BORING LOG - MW-65A

Permit Number: 52846 Project Number: G601509 Boring Location: Site 16 Date Logged: 4/8/04 Geologist: M. Place Total Depth 20'	Drilling Contractor: WESTEX Driller: G. Jensen Drilling Method: HSA Boring Diameter: 10" Sampler Type: NA Hammer Type: NA	Northing (NAD 83): Easting (NAD 83): Surface Elevation (NAVD 88): Borehole Abandoned: _ Yes X No Backfill Method: N/A Monitoring Device Installed: X Yes _ No Type:

Depth (feet bgs)	USCS Symbol	Sample Description	PID Readings (ppm)	Grading % Sand	% Silt	% Clay	Blow Counts	Coring Interval	Lithology	Well Completion
0	SP	SAND: with gravel, some silt/clay, dark brown, slightly moist, no odor		70	20	10				Surface seal. 0-2 Concrete
	SP	SAND. some silt/clay, slightly moist to 7 ft. bgs, wet below 7 ft . gray-brown color, slight odor.		70	20	10				Annular Seal Medium Bentonite Chips. from 2'-4'
5	SP									Filter Pack. No. 2/12 Sand. from 4'-21'
10	SP	SAND. medium. minor silt/clay. black, wet, slight odor		80	10	10				Screened Interval: 0.010" slot size, from 5'-20'
15	SP	SAND fine increasing silt, gray, wet, no odor.		60	30	10				
20	CL	CLAY: with silt and sand. olive brown, wet, no odor.		20	20	60				Medium Bentonite Chips. from 21'-23'
		TD=23' bgs								
25										
30										

MW-65A.COR

Driller: Gordon A. Jensen

Total Depth: 22' Ground Surface El:

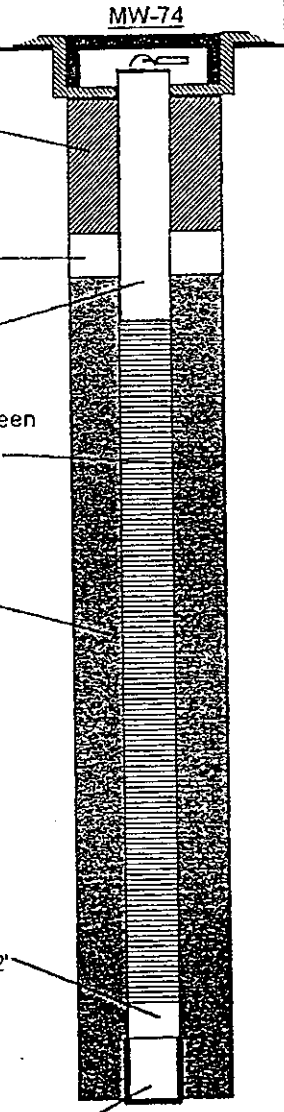
Date Began: 3/19/96 Top of Casing El: 3922.48

Date Finished: 3/19/96

Depth Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	
0						Trash, soil with high alkaline content Drums on north and west side
1	SP/01	18/18	38 30	CL		Dark brown silty sand to tan in color with silt stone fragment - Moist
2 3						
5	SP/02	18/18	10 12	ML		Water at 4.0' bs - Clean Clean fine graded sand grey to brown in color Saturated
10	SP/03	18/18	11 23	SM		Silty fine brown sand
	SP/04	18/18	9 25	SM		Yellow to grey silty sand 50%/50%
20	SP/05	18/18	9 41	OL		Yellow to grey clayey silt with some sand
25						

All samples are grabs

WELL SUMMARY



Bottom of hole at 22' bs

Well set at 22' bs

Readings taken after Well Devolpement

pH: 6.66

Temperature: 54.0

Conductivity: Conductivity is higher than range on meter

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

Client: Engineering Field Activity, West

Location: Naval Air Station Fallon, Nevada

bs - Below Grade Surface

▼ Denotes Water Table

WELL SUMMARY

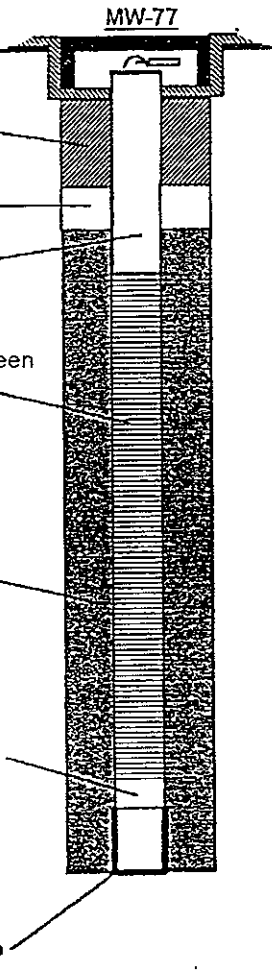
Driller: Gordon A. Jensen

Total Depth: 17' Ground Surface El:

Date Began: 3/13/96 Top of Casing El: 3922.96

Date Finished: 3/13/96

Depth Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	
0						Appears to be located in drainage ditch Light vegetation
1	SP/01	18/18	5 24			Brown silty sand with light organics, some silt bedding
2 3 4						
	SP/02	18/18	9 24	SW		Water at 5.0' bs, impacted Brown sand medium in grade, some clay layers Soil stained, fuel odor
10	SP/03	18/18	9 24	SC		Soil has fuel odor, coarse grained sand, some silt grey in color
				SM		Sand interbeded with with silty sand
	SP/04		9 24	CL		Silty clay brown in color with some sand
20						
25						



Bottom of hole at 17' bs

Well set at 17' bs

Readings taken after Well Devolpement

pH: 6.56

Temperature: 58.7

Conductivity: Conductivity is higher than range on meter

All samples are grabs

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

Client: Engineering field Activity, West

Location: Naval Air Station Fallon, Nevada

bs - Below Ground Surface

▼ Denotes Water Table

Driller: Gordon A. Jensen

Total Depth: 22' Ground Surface El:

Date Began: 3/14/96 Top of Casing El: 3922.88

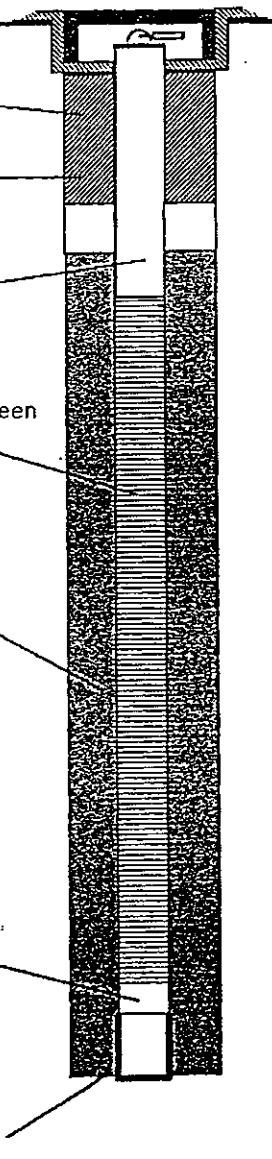
Date Finished: 3/14/96

Depth Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	
0						Trash piles, pallets, fill area, low lying
1	SP/01	18/18	12 42	OL		Sandy loam, dark brown Light brown to tan silty sand, organics present
2						
3						
4				SM		Water at 5.2' bs
	SP/02	18/18	15 20			Interbeded with silts and sands, mottled in appearance, Moist
10	SP/03	18/18	17 59			Sandy silt and silty, fine in grain size, brown in color Moist
						Sandy silt, mottled in color, Brown to grey Fine grained - Saturated
	SP/04	18/18	12 58	CL		Clayey silt, yellow to orange in color, trace of fine grained sand
20	SP/05	18/18	14 51			
25						

All samples are grabs

WELL SUMMARY

MW-78



Bottom of hole at 22' bs

Well set at 22' bs

Readings taken after Well Devolpement

pH: 6.48

Temperature: 62.3

Conductivity: Conductivity is higher than range on meter

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

Client: Engineering field Activity, West

Location: Naval Air Station Fallon, Nevada

bs - Below Ground Surface

Denotes Water Table

Driller: Gordon A. Jensen

Total Depth: 22' Ground Surface El:

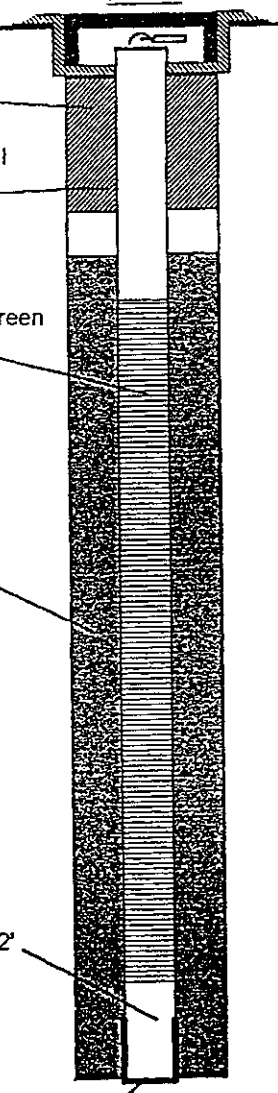
Date Began: 3/14/96 Top of Casing El: 3923.60

Date Finished: 3/14/96

Depth in Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	Description
						Minor vegetation, graded
0	SP/01	18/18	6 13	ML		Moderate brown silty sand, fine grained Moist
1						
2						
3						
4						Water at 5.3' bs
	SP/02	18/12	12 31			Silty sand, brown, 10% silt, 90% fine sand Saturated
						Light brown to tan finely graded sand with trace of silt Saturated
0	SP/03	18/12	4 13			
				SM		Flowing sands, very fine (not silt) Grey to brown with some organics Saturated
	SP/04	18/18	12 29			
0	SP/05	18/18	8 22	ML		Tan to blue-grey silty clay interbeded with grey sands and silts Moist
5						

WELL SUMMARY

MW-79



Bottom of hole at 22' bs

Well set at 22' bs

Readings taken after Well Devolpement

pH: 7.05

Temperature: 52.2

Conductivity: Conductivity is higher than range on meter

All samples are grabs

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

Client: Engineering field Activity, West

on: Naval Air Station Fallon, Nevada

bs - Below Ground Surface

▼ Denotes Water Table

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M.Schlosser Date: 12/7/91 Page: 1 OF 1

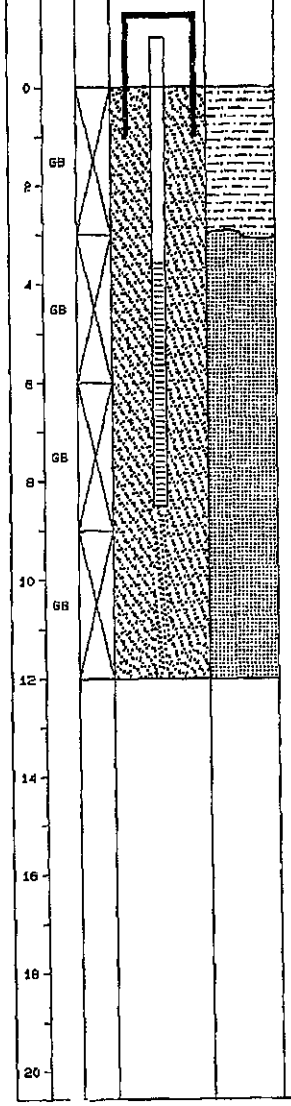
Hole No.: PZ16-11 Casing Elevation: 3923.47 Ground Elevation: 3922.69

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 16

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 12/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE ENTY	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				SM SILTY SAND: medium brown.
6					
8	GB				SP SAND: light brown, medium grained, weathered dark gray from product staining.
10	GB				Frac sand (8/20), 0'-12'. PVC (.010") screen, 1.5", 7'-8'. 4" PVC surface casing cemented in place.
12					
14					
16					
18					
20					



Battelle

NAS FALLON - SITE 16
BORING LOG - RW-16-1

Permit Number: 52846 Project Number: G601509 Boring Location: Site 16 Date Logged: 4/8/04 Geologist: M. Place Total Depth: 22'	Drilling Contractor: WESTEX Driller: G. Jensen Drilling Method: HSA Boring Diameter: 10" Sampler Type: NA Hammer Type: NA	Northing (NAD 83): Easting (NAD 83): Surface Elevation (NAVD 88): Borehole Abandoned: __ Yes X No Backfill Method: N/A Monitoring Device Installed: X Yes __ No Type:

Depth (feet bgs)	USCS Symbol	Sample Description	PID Readings (ppm)	Grading % Sand	% Silt	% Clay	Blow Counts	Coring Interval	Lithology	Well Completion
0	SP	SAND: fine with silt and clay, some pebbles in upper 2 ft, light brown, dry no contamination.		60	30	10				Surface seal: 0-2 Concrete
	SP	Same as above, greater moisture.		50	20	30				Annular Seal Medium Bentonite Chips, from 2'-4.5'
5										Filter Pack: No. 2/12 Sand, from 4.5'-21.5'
	SP	Increasing clay content, cuttings form balls, can form ribbons, slight contaminant odor, brown.		50	20	30				
10		Same as above, wet, no odor, grayish brown in color.		50	20	30				Screened Interval: 0.010" slot size, from 5.5'-20.5'
15	SP									
20										
	CL	CLAY: rich, silt with sand, wet, no odor, relatively stiff, olive brown color.		20	40	40				Medium Bentonite Chips, from 21.5'-22'
		TD=22' bgs								
25										
30										

RW-16-1.CDR

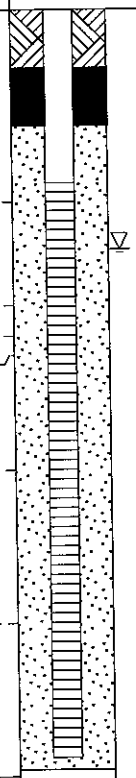
BORING NUMBER TT16-MW01

SulTech

CLIENT U.S. Navy
PROJECT NAME Site 16
PROJECT NUMBER CTO 050
PROJECT LOCATION NAS Fallon
DATE STARTED 8/13/07 COMPLETED 8/13/07
GROUND ELEVATION
HOLE SIZE 8 inches
DRILLING CONTRACTOR RSI Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger to 5 ft Direct Push to 20 ft
AT TIME OF DRILLING 6.3 ft
LOGGED BY T.A. McRae CHECKED BY S. DeGross
AT END OF DRILLING ---
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	PID (ppm)	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION
0			SM		**Silty Sand** light yellowish brown (2.5 Y 6/3), fine grained, minor gravel, dry, loose Olive brown (2.5 Y 4/3), slightly moist Dark grayish brown (2.5 Y 4/2) Olive brown (2.5 Y 4/3), no gravel, moist Minor clay, soil is more cohesive, very moist
5			SP		5.0 **Sand** dark grayish brown (2.5 Y 4.2), fine grained, poorly graded, loose, moist to wet Medium grained near base of unit
			ML		7.7 **Silt** dark grayish brown (2.5 Y 4/2)
			CL		8.5 **Silty Clay** Cohesive
10			SP		9.0 **Sand** dark grayish brown (2.5 Y 4/2), fine grained with minor clay lens (10' - 10'9"), loose, wet Minor clay in fine sand and silt. More cohesive
15			ML		12.0 **Clayey Silt** with thin silt lenses, light olive brown (2.5 Y 5/3), soft, moist Color change to olive (5 Y 5/3)
20			CL-ML		16.0 **Clayey Silt** olive (5 Y 5/3), soft, moist, increasing silty clay with depth, friable in places, 20.0

WELL DIAGRAM



Well completed aboveground with 2'6" stickup in monument. Total Depth of Direct Push Sampling = 20 feet. Soils were logged with direct push continuous core from 5 to 20 feet below ground surface. Well was drilled and installed using 8 inch hollow stem augers.

Bottom of hole at 20.0 feet.

ENVIRONMENTAL BH V3 B117-003.GPJ GINT US LAB.GDT 9/5/07

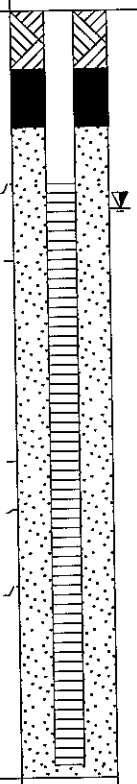
BORING NUMBER TT16-MW02

SulTech

CLIENT U.S. Navy
PROJECT NAME Site 16
PROJECT NUMBER CTO 050
PROJECT LOCATION NAS Fallon
DATE STARTED 8/13/07 COMPLETED 8/14/07
GROUND ELEVATION
HOLE SIZE 8 inches
DRILLING CONTRACTOR RSI Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger to 5 ft Direct Push to 20 ft
AT TIME OF DRILLING ---
LOGGED BY T.A. McRae CHECKED BY S. DeGross
AT END OF DRILLING ---
NOTES
AFTER DRILLING 5.2 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	PID (ppm)	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION
0					**Sand** light olive brown (2.5 Y 5/3), fine grained, minor gravel, loose, dry
					Dark grayish brown (2.5 Y 4/2), trace clay, slightly moist
			SP		No gravel below 2 feet, sand is poorly graded, minor silt
					4.5 Very fine grained sand, trace clay, very moist
5			CL		**Silty Clay** dark grayish brown (2.5 Y 4/2), plastic, soft, moist
					6.5
					Silt and Clayey Silt dark grayish brown (2.5 Y 4/2), soft, very moist to wet, 4 inch lens of sandy silt
					Dark grayish brown (2.5 Y 4/2), alternating zones of silt and clayey silt with thin (< 4 inches) zones of sandy silt, wet
			ML		
10					
					11.8
			SP		**Sand** dark grayish brown (2.5 Y 4/2), minor silt, mica, fine grained, poorly graded, wet
					13.0
			ML		**Clayey Silt** with thin clay lens, dark grayish brown (2.5 Y 4/2)
15					15.0 3 inch fine sand lens at base of unit
					Clay and Silty Clay olive (5 Y 5/3), plastic, moist, minor silt lenses, minor brown iron staining
			CL		Distinct color change at 15 feet.
20					20.0

WELL DIAGRAM



Well completed aboveground with 2'11" stickup in monument. Total Depth of Direct Push Sampling = 20 feet. Soils were logged with direct push continuous core from 5 to 20 feet below ground surface. Well was drilled and installed using 8 inch hollow stem augers.

Bottom of hole at 20.0 feet.

ENVIRONMENTAL BH V3 B117-003.GPJ GINT US LAB.GDT 9/5/07

SulTech

BORING NUMBER TT16-MW03

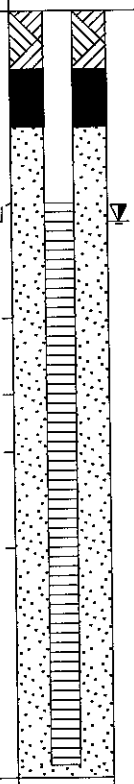
CLIENT U.S. Navy
PROJECT NAME Site 16
PROJECT NUMBER CTO 050
PROJECT LOCATION NAS Fallon
DATE STARTED 8/14/07 **COMPLETED** 8/14/07
GROUND ELEVATION ____ **HOLE SIZE** 8 inches
DRILLING CONTRACTOR RSI Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger to 5 ft Direct Push to 20 ft
AT TIME OF DRILLING ---
LOGGED BY T.A. McRae **CHECKED BY** S. DeGross
AT END OF DRILLING ---
NOTES
AFTER DRILLING 5.5 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	PID (ppm)	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION
0		0.3			**Clayey Silt** olive brown (2.5 Y 4/3), trace sand, friable, soft, dry
		0.1			Dark grayish brown (2.5 Y 4/2), slightly moist to moist
		0	ML		
		0			**Silt** dark grayish brown (2.5 Y 4/2), trace clay, friable, soft, moist
5		0.1			5.0 Very moist at 5 feet
		0.1	SP		**Sand** dark grayish brown (2.5 Y 4/2), fine grained, poorly graded, loose, very moist to wet with 1-4 inch lenses of silt and silty clay which are soft and friable but more cohesive than sand
			CL		8.0 **Silty Clay** dark grayish brown (2.5 Y 4/2), plastic, soft, moist, friable in places with increased silt
10		0			10.0
		0.1	SP		**Sand** fine grained with trace clay, minor silt increasing with depth, loose, wet
		0	CL-ML		11.5 **Clayey Silt and Silty Clay** with minor silt and fine sand lenses, dark grayish brown (2.5 Y 4/2), minor iron staining, plastic, soft, moist to wet
15		0	ML		14.0 **Clayey Silt** with minor fine grained sand and silt lenses, friable, fine laminations, minor iron staining especially in fine sand lenses, no obvious water. Color change at 14 feet to olive (5 Y 4/3) - consistent color to base of boring
20					20.0

Well completed aboveground with 2'7" stickup in monument. Total Depth of Direct Push Sampling = 20 feet. Soils were logged with direct push continuous core from 5 to 20 feet below ground surface. Well was drilled and installed using 8 inch hollow stem augers.

Bottom of hole at 20.0 feet.

WELL DIAGRAM



SulTech

BORING NUMBER TT16-MW04

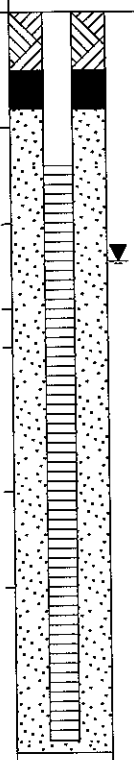
CLIENT U.S. Navy
PROJECT NAME Site 16
PROJECT NUMBER CTO 050
PROJECT LOCATION NAS Fallon
DATE STARTED 8/15/07 **COMPLETED** 8/15/07
GROUND ELEVATION ____ **HOLE SIZE** 8 inches
DRILLING CONTRACTOR RSI Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger to 5 ft Direct Push to 20 ft
AT TIME OF DRILLING ---
LOGGED BY T.A. McRae **CHECKED BY** S. DeGross
AT END OF DRILLING 6.5 ft
NOTES
AFTER DRILLING ---

DEPTH (ft)	SAMPLE TYPE NUMBER	PID (ppm)	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION
0			SM		**Sandy Silt** with trace clay, olive brown (2.5 Y 4/3), loose, dry to slightly moist Dark grayish brown (2.5 Y 4/2)
3.0			ML		**Clayey Silt** with trace sand, dark grayish brown (2.5 Y 4/2), moderately cohesive, moist **Silt** with minor clay, dark grayish brown (2.5 Y 4/2), mica flakes, soft, very moist
5			SM		**Sandy Silt / Silty Sand** dark grayish brown (2.5 Y 4/2), sand is fine grained and poorly graded, 2 - 3 inch interbeds of soil types with some more clayey lenses, very moist to wet
5.5			ML		**Clayey Silt** dark grayish brown (2.5 Y 4/2) soft, wet
7.8			SM		**Sand Silt / Silty Sand** dark grayish brown (2.5 Y 4/2), sand is fine grained with slight increase in grain size with depth, poorly graded, wet two 3 - 4 inch zones of clayey silt
8.8			CL-ML		**Clayey Silt and Silty Clay** interbeds, dark grayish brown (2.5 Y 4/2), alternating soft and stiffer zones, moist
10			CL		**Clay and Silty Clay** color change at 15 feet to olive (5 Y 5/3) which is consistent to base of boring, stiff, hard in places depending on silt content, dry
12.5					
15					
15.0					
20.0					

Well completed aboveground with 2'9" stickup in monument . Total Depth of Direct Push Sampling = 20 feet. Soils were logged with direct push continuous core from 5 to 20 feet below ground surface. Well was drilled and installed using 8 inch hollow stem augers.

Bottom of hole at 19.5 feet.

WELL DIAGRAM



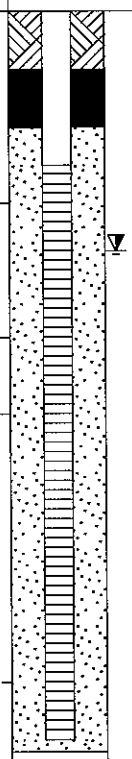
ENVIRONMENTAL BH V3 B117-003.GPJ GINT US LAB.GDT 9/5/07

SulTech

BORING NUMBER TT16-MW05

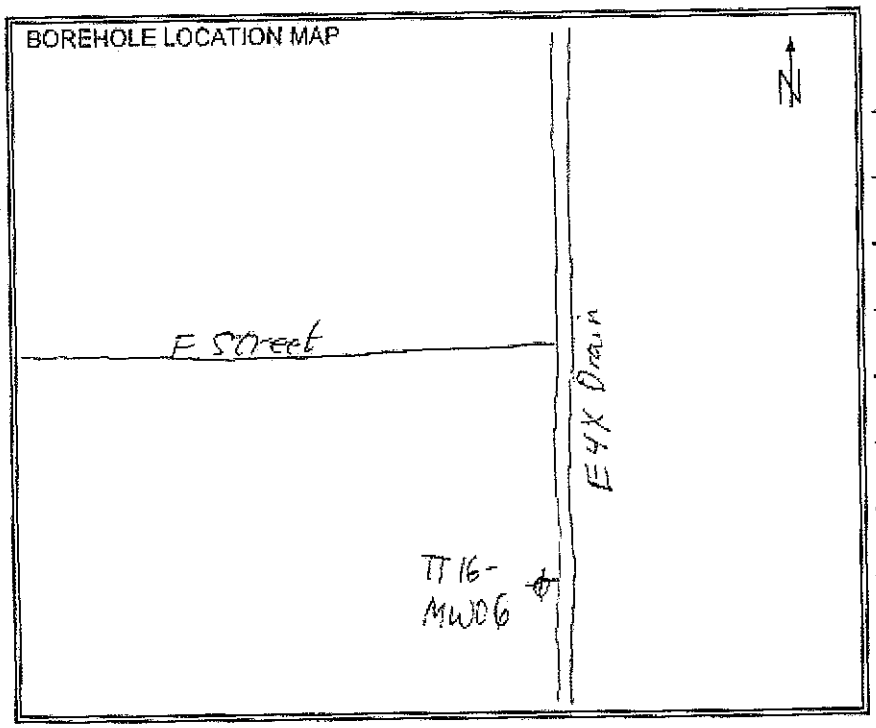
CLIENT U.S. Navy
PROJECT NAME Site 16
PROJECT NUMBER CTO 050
PROJECT LOCATION NAS Fallon
DATE STARTED 8/14/07 **COMPLETED** 8/14/07
GROUND ELEVATION ____ **HOLE SIZE** 8 inches
DRILLING CONTRACTOR RSI Drilling
GROUND WATER LEVELS:
DRILLING METHOD Hand Auger to 5 ft Direct Push to 20 ft
AT TIME OF DRILLING ---
LOGGED BY T.A. McRae **CHECKED BY** S. DeGross
AT END OF DRILLING ---
NOTES
AFTER DRILLING 6.3 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	PID (ppm)	USCS	GRAPHIC LOG	MATERIAL DESCRIPTION	WELL DIAGRAM
0			SM		**Silty Sand** light olive brown (2.5 Y 5/3), fine grained, poorly graded, loose, dry to slightly moist	
					Sandy Silt and Silt trace clay near base of unit, light olive brown (2.5 Y 5/3), moderately loose Dark grayish brown (2.5 Y 4/2)	
5			CL	5.0	**Silty Clay** dark grayish brown (2.5 Y 4/2), plastic, moist	
			SC	8.5	**Clayey Sand** olive brown (2.5 Y 4/3), fine to medium grained, moderatley stiff but soft in places, wet	
10			SP	10.5	**Sand** dark grayish brown (2.5 Y 4/2), fine and very fine grained with grain size increasing slightly with depth, loose	
15			CL	17.5	**Clay and Silty Clay** olive (5 Y 5/3), minor 1/2 inch silt layer and some iron staining, plastic. Grades down into clayey silt which is soft, friable, with fine laminations.	
				20.0	Well completed aboveground with 2'9" stickup in monument. Total Depth of Direct Push Sampling = 20 feet. Soils were logged with direct push continuous core from 5 to 20 feet below ground surface. Well was drilled and installed using 8 inch hollow stem augers. Bottom of hole at 19.5 feet.	



Boring ID:	
Monitoring Well ID: TT16-MW06	
Project Number: I4302300	Project Name: CI Addendum
Client: US Navy	
Site: 16	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: MarlMST All Terrain	
Sampler Type: Hand auger to 5', acetate sleeve to TD	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): N/A	to: feet bgs
Drill Start Date: 10-12-07	Drill Start Time: 1340
Drill Finish Date: 10-12-07	Drill Finish Time: 1358
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date: N/A	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 9.5	Date: 10-12-07 Time: 1350
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-12-07	Well Completion Time:
Screen Interval (feet bgs): 5-20	Total Well Depth (feet bgs): 20
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BORING ID: MW ID: T16-MW06

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Hand auger to 5'					
		1340							1	CL	Silty clay brown (10YR 4/3) moist, stiff plastic, calc.				10	90
									2							
									3							
									4							
		1347	36/36						5	SM	Silty sand, dark greyish brown (10YR 4/2), med dense, non calc				65	35
							0.2		6	ML	Silt, clayey dark greyish brown (10YR 4/2), non calc, stiff				1	99
									7							
		1350	48/48						8	ML	as above					
							0.5		9	SP	Sand dark greyish brown (10YR 4/2), med dense, sl calc			2	93	5
									10							

BORING ID: MW ID: TT16-MW06 Page 3 of 3

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
									11	ML	Same as 6-9 feet					
		1353	48/48				0.3		12	SP	Sand, dark grayish brown (10YR 4/2), loose, wet			30	65	5
									13							
									14							
							0.4		15	CL	clay, dark grayish brown, med. stiff, wet, non calc silty			2	10	88
		1358	48/48						16	SP	Sand as from 12-15					
									17							
							0.4		18							
									19							
											TD = 20'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT16-MW06
PROJECT: RI Addendum
SITE: 16
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 22.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-12-07 TIME: 1340
WELL INSTALLATION BEGAN:
DATE: 10-12-07 TIME: 1400
WELL INSTALLATION FINISHED:
DATE: 10-12-07 TIME: 1555
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M-2328
DRILL RIG: Mark MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 22.5

WELL SCREEN

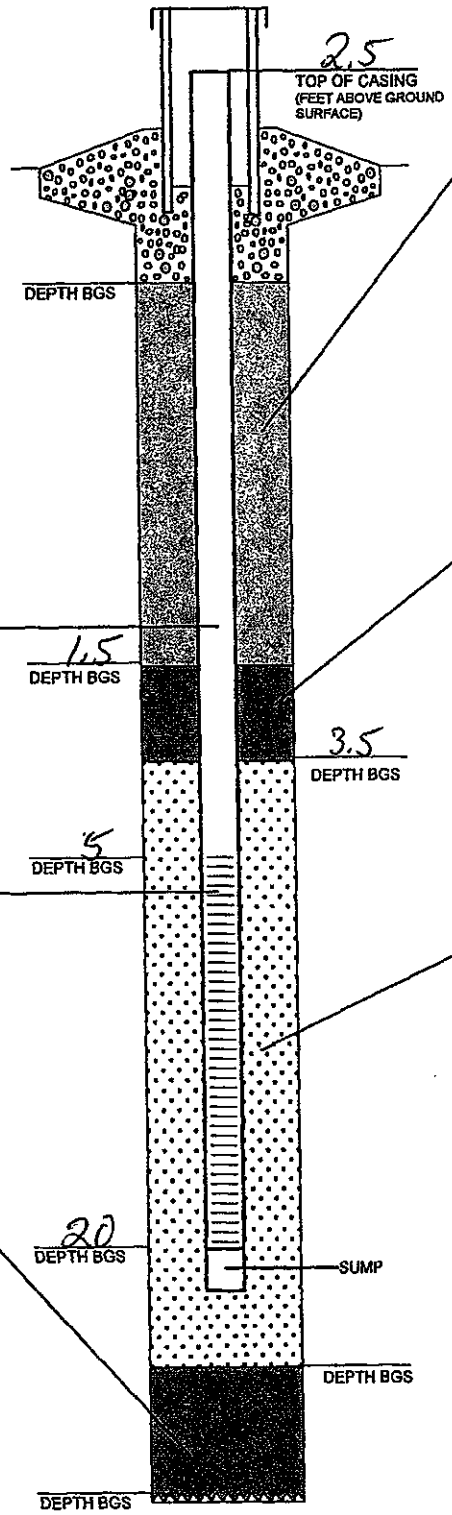
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED: None
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: N/A
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☒ PREPARED MIX
PRODUCT: Sakrete
MFG. BY:
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 50 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: medium
☐ OTHER:
PRODUCT: Pure Gold
MFG. BY: CETCO
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED:
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL: 8.41
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

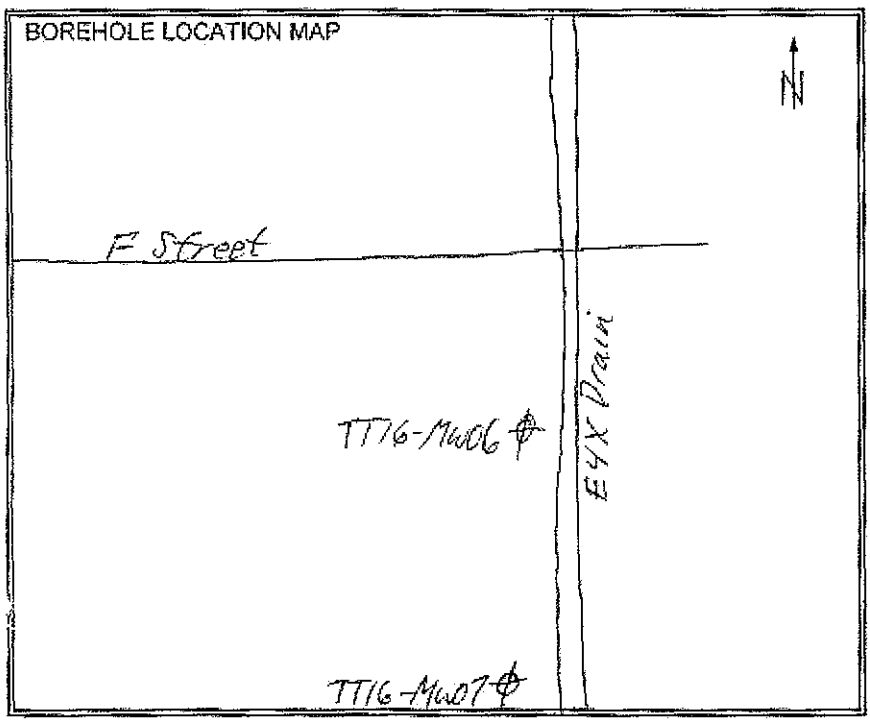
☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT16-MW07	
Project Number: E4302300	Project Name: RI Addendum
Client: US Navy	
Site: 16	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mari MST All Terrain	
Sampler Type: Hand auger to 5', continuous core with acetate sleeves to TD	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 10-13-07	Drill Start Time: 0740
Drill Finish Date: 10-13-07	Drill Finish Time: 0815
Total Borehole Depth (feet bgs): 18	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6.5	Date: 10-13-07 Time: 0756
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-13-07	Well Completion Time:
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Hand auger to 5 feet					
Hand Auger									1							
		0740							2	SM	Silty sand, brown (10YR 4/3), med dense, dry			15	55	40
									3							
		0850							4							
Split spoon		0856							5	CL	Clay, silty, brown (10YR 4/3) very st. RF				1	99
							0		6							
									7	ML	Silt, very dark greyish brown (10YR 3/2), soft, moist, sl micaceous				5	95
		0800					0		8							
							0		9	SP	Sand, brown (10YR 4/3), med dense, wet			1	95	4

BORING ID: MW ID: TT16-MW07

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
									11							
									12							
		0805					0			SP	Sand as above					
									13	SP	Sand, brown (10YR 4/3), loose, wet			40	60	
									14							
									15	SP	Sand, brown (10YR 4/3), med dense, wet			1	94	5
		0813							16							
									17							
									18		TD = 18'					
									19							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT16-MW07
PROJECT: RI Addendum
SITE: 16
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-13-07 TIME: 0740
WELL INSTALLATION BEGAN:
DATE: 10-13-07 TIME: 0815
WELL INSTALLATION FINISHED:
DATE: 10-13-07 TIME: 0930
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mark MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 20.5

WELL SCREEN

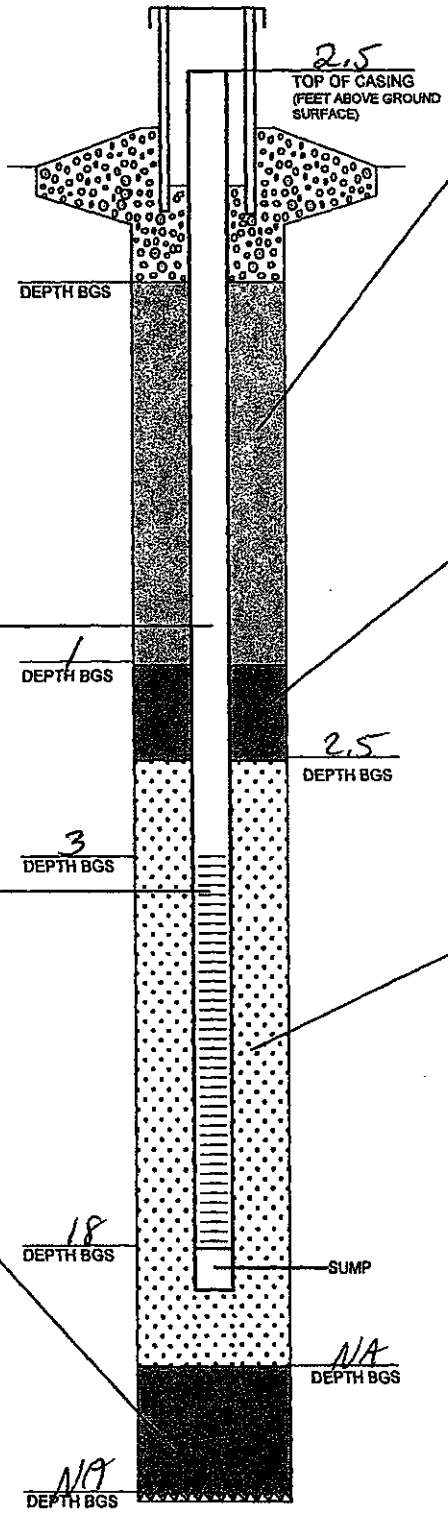
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED: None
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☒ PREPARED MIX
PRODUCT: Sakrete
MFG. BY:
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: medium
☐ OTHER:
PRODUCT: Pure gold
MFG. BY: CETCO
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 500 lb
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL: 8.96
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

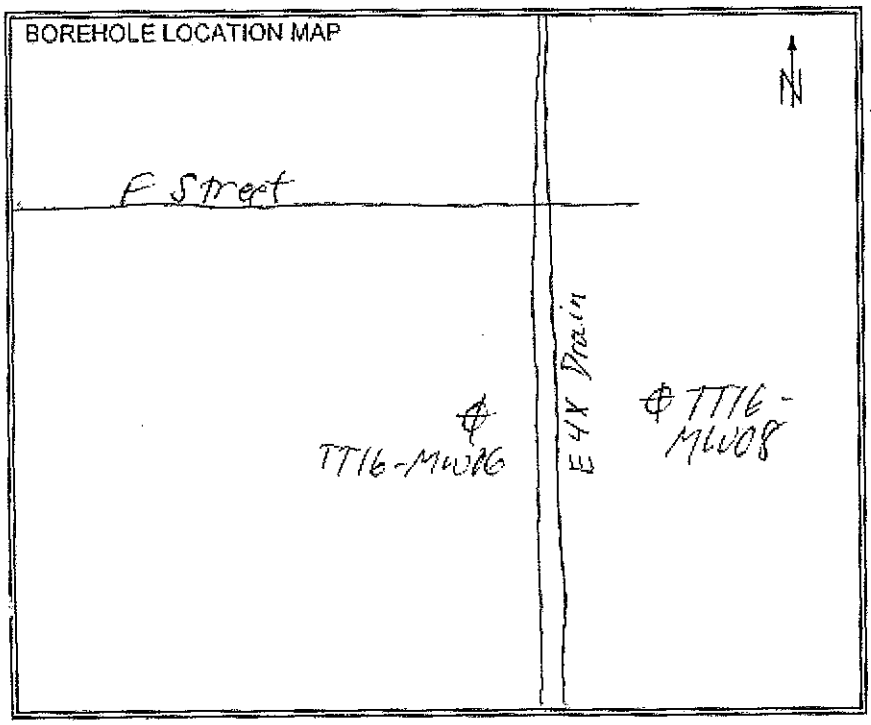
☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT16-MW08	
Project Number: I 4302300	Project Name: RI Addendum
Client: US Navy	
Site: 16	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mdl MST All Terrain	
Sampler Type: Hand Auger to 5', continuous sample with acetate sleeves to TD	
Borehole Diameter (inches): 8	to: 18 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 10-13-07	Drill Start Time: 0942
Drill Finish Date: 10-13-07	Drill Finish Time: 1000
Total Borehole Depth (feet bgs): 18	
Soil Boring Backfill Date: ~~10-13-07~~ NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 8	Date: 10-13-07 Time: 0950
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-13-07	Well Completion Time: 1130
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Hand auger to 5'					
									1							
									2							
									3	SM	Silty sand, brown (10YR 4/3) med dense, dry			10	70	20
									4							
									5							
	1	0950								CL	Clay, silty, brown (10YR 4/3) stiff, # sl. moist				3	97
									6							
							0		7							
									8							
		1953								SP	Sand, dark grey is4 brown (10YR 4/2), med. dense			5	90	5
									9							

BORING ID: MW ID: TT16-MW08 K. Niapp

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
							0.1									
									11	ML	Silt, brown (10YR 4/3), sl micaceous, wet					100
	✓								12							
		957					0			SP	Sand, as above			5	90	5
									13	SP	Sand, brown (10YR 4/3), loose, wet			35	65	
									14							
							0									
									15	SP	Sand, brown (10YR 4/3), med dense, wet				95	5
	✓	1000	9/24						16		No recovery					
									17							
	✓								18		TD = 18 feet					
									19							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT-MW08
PROJECT: RI Addendum
SITE: 16
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-13-07 TIME: 0942
WELL INSTALLATION BEGAN:
DATE: 10-13-07 TIME: 1000
WELL INSTALLATION FINISHED:
DATE: 10-13-07 TIME: 1130
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mark MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 20.3

WELL SCREEN

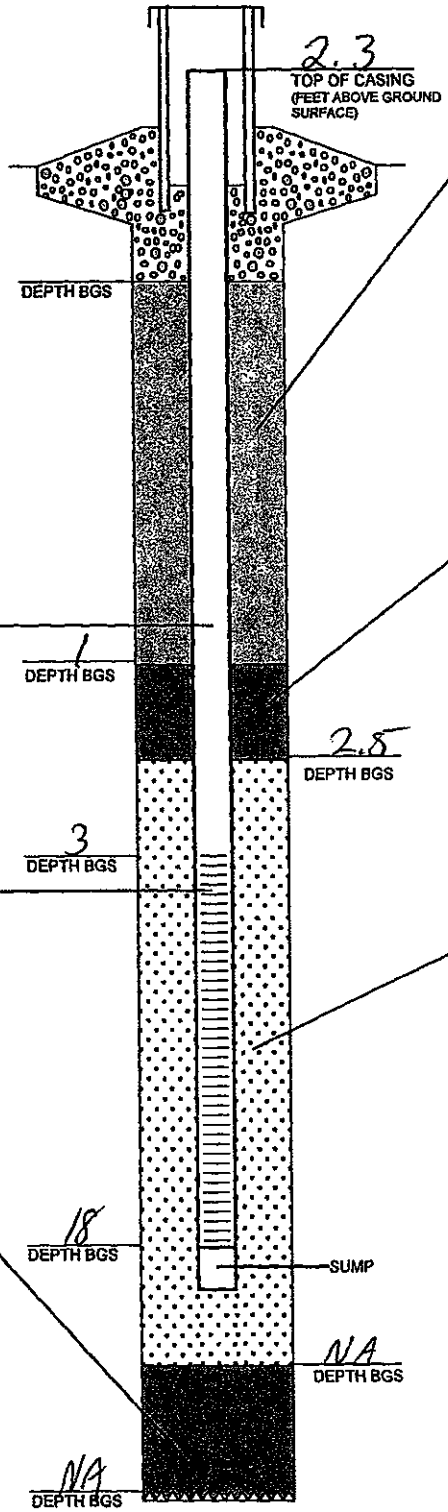
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED: None
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☒ PREPARED MIX
PRODUCT: Sakrete
MFG. BY:
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 30 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: medium
☐ OTHER:
PRODUCT: Pure gold
MFG. BY: CETCO
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 3 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 500 lb
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL: 7.48
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Installation: NAS Fallon
CTO:
BORING ID: ——

DATE: 10/28/07
LOGGED BY: J. Vaughn

MW ID: TT16-MW09

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1215												5		95
										CL	Clay, silty, very dark grayish brown (10YR 3/2), damp.					
									1							
							1.2		2							
									3							
							1.4		4							
		1218	1						5	SM	Sand, silty, clayey, brown (10YR 4/3), damp.		5		65	30
									6 ▽	SM	Sand, silty, clayey, brown (10YR 4/3), wet to saturated		5		65	30
									7	CL	Clay, grayish brown (2.5Y 5/2), damp					100
		1220	~~1220~~						8							
									9							
									10	SM	Sand, silty, clayey, olive brown (2.5Y 4/3) saturated.				80	20

Installation: NAS Fallon
CTO:
BORING ID: ——— MW ID: TT16-MW09

DATE: 10/28/07
LOGGED BY: J. Vaughn

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
									10	SM	sand as described above at 9.5 ft.				80	20
									11							
	✓	1224							12							
									13							
									14							
									15	SM	sand, silty, clayey, grayish brown (2.5Y 5/2), saturated.			75	10	15
	✓	1227							16							
									17							
									18							
	✓	1232							19		TD at 19.0 ft bgs					
	✓	~~1232~~ W							20							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT16-MW09
PROJECT: NAS Fallon Drill+Install
SITE: 16
BOREHOLE NO.: ——
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10/28/07 TIME:
WELL INSTALLATION BEGAN:
DATE: 10/28/07 TIME:
WELL INSTALLATION FINISHED:
DATE: 10/28/07 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Rhino D27
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: monitor pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING:

WELL SCREEN

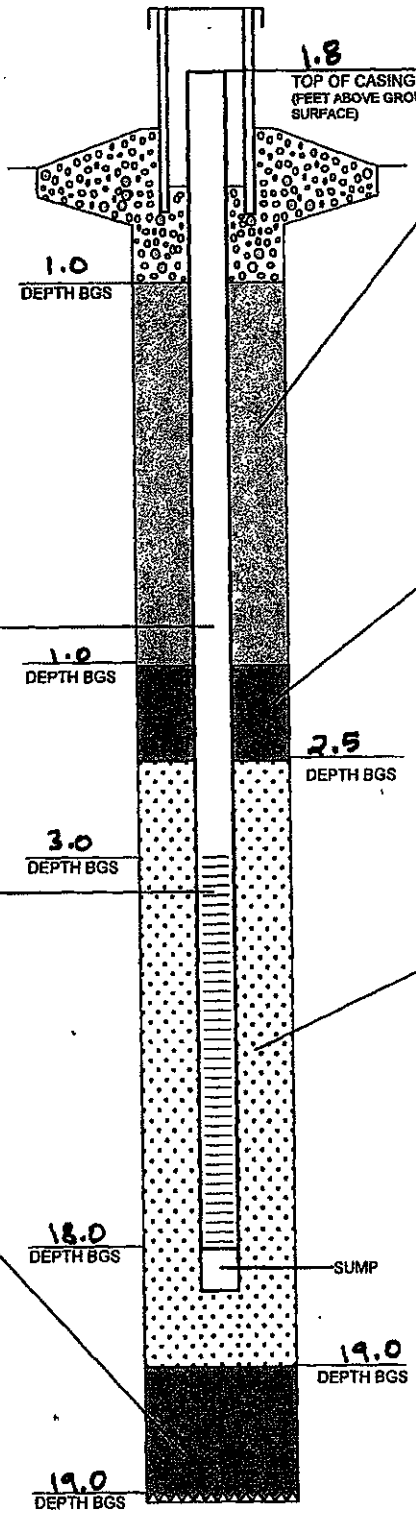
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: monitor screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15 ft.

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 0.5 ft³
AMOUNT USED: 0.5 ft³
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: medium
☐ OTHER:
PRODUCT: bentonite chips
MFG. BY: Pure Gold
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 3 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 5.3 ft³
AMOUNT USED: 5 ft³
☑ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 8.08 @ 1340 on 10/28/0
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

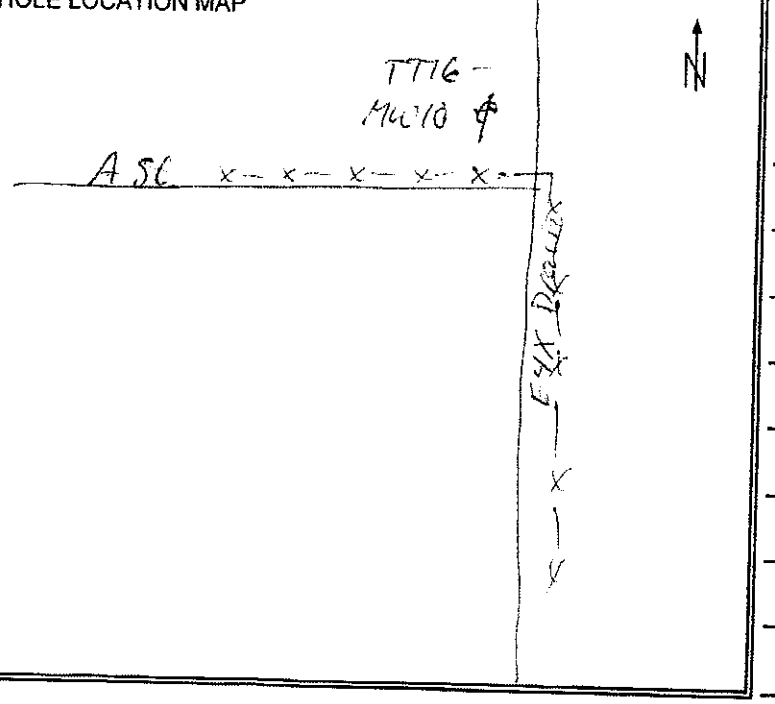
☐ YES ☑ NO; completed insta auger
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT16-MW10	
Project Number: I4302300	Project Name: RI Addendum
Client: US Navy	
Site: 16	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg	
Drill Rig Type/Method: Mall MST / Hollow Stem Auger	
Sampler Type: Hand auger to 5 feet, acetate sleeves to TD	
Borehole Diameter (inches): 8	to: 14 feet bgs
Overdrilled Diameter (inches): N/A	to: feet bgs
Drill Start Date: 11-8-07	Drill Start Time: 1318
Drill Finish Date: 11-8-07	Drill Finish Time: 1344
Total Borehole Depth (feet bgs): 14	
Soil Boring Backfill Date: N/A	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 5.5	Date: 11-8-07 Time: 1333
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-8-07	Well Completion Time: 1430
Screen Interval (feet bgs): 3-13	Total Well Depth (feet bgs): 13
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs): 5.94	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-8-07
LOGGED BY: R Knapp

MW ID: TT16-MW10

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Hand auger to 5'					
										ML	Silt, sandy, very pale brown (10YR 7/3), loose, dry		5	10	20	65
									1							
									2							
		1320								SP	Sand, dark yellowish brown (10YR 3/4), loose, dry			60	35	5
									3							
									4							
											Becomes finer grained			95	50	5
		1332							5	ML	Silt, sandy, dark yellowish brown (10YR 3/4), soft, nonplastic moist				15	85
		1333	18/36				4.3		6	SP	Sand, very dark grayish brown (10YR 3/2), loose, wet			60	40	
										SM	Silty Sand (?)					
									7	SM	Silty sand, dark grayish brown (10YR 4/2), med dense, wet, sl micaceous			10	65	25
		1338							8							
									9							
							5.1									

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-8-07
LOGGED BY: R Knapp

MW ID: TT16-MW10

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
										CL	Clay, silty, dark greyish brown (10YR 4/2) very stiff, sl plastic damp				1	99
									11	ML	Silt, sandy, dark brown (10YR 3/3) med stiff, sl plastic, wet				20	80
	↓	1349					46		12	SP	Sand, very dark greyish brown (10YR 3/2), med dense, wet, sl micaceous			10	90	10
							33		13							
	↓								14		TD = 14'					
									15							
									16							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT6-MW10
PROJECT: RI Addendum
SITE: 16
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 15.4

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-8-07 TIME: 1318
WELL INSTALLATION BEGAN:
DATE: 11-8-07 TIME: 1344
WELL INSTALLATION FINISHED:
DATE: 11-8-07 TIME: 1430
DRILLING CO.: Gregg
DRILLER: J Neff
LICENSE: M2328
DRILL RIG: Mari MST
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4¼ OD: 8

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: PVC Monitor Screen
MFG. BY: Board Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 5.4

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: PVC Monitor Screen
MFG. BY: Board Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 10

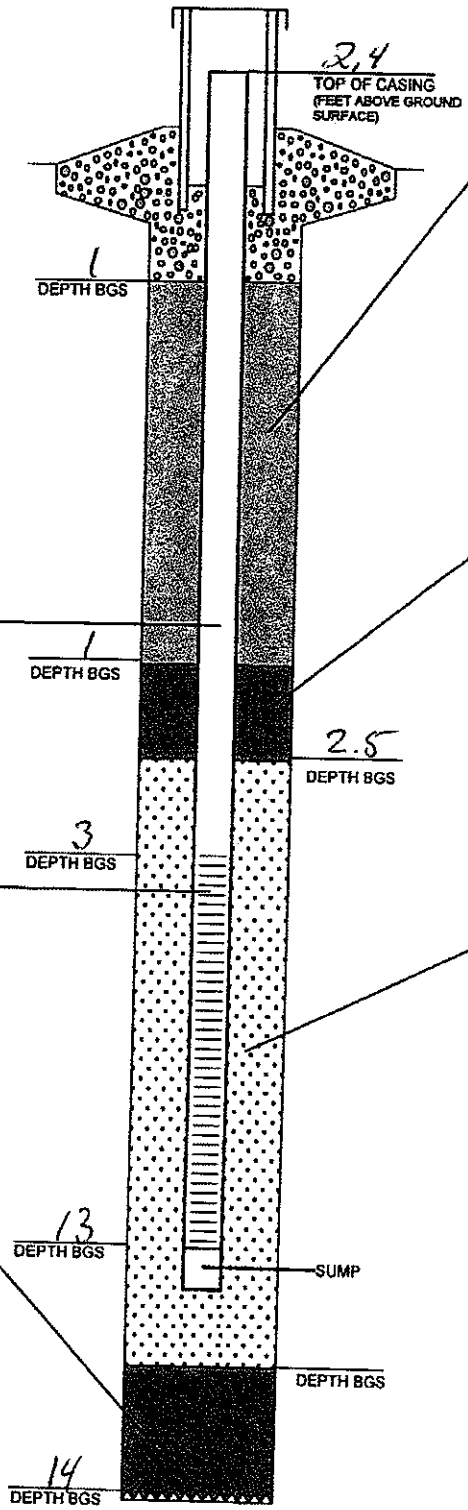
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND ~~WITH BUMPER POST~~
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [ ] PREPARED MIX
  - PRODUCT:
  - MFG. BY:

METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: 3/8
- [ ] OTHER:

PRODUCT: Holeplug
MFG. BY: Baroid
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED:
- [x] SAND, SIZE: 2/16

PRODUCT: Lapis Lustre
MFG. BY: Crucep
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL: 8.34
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO:

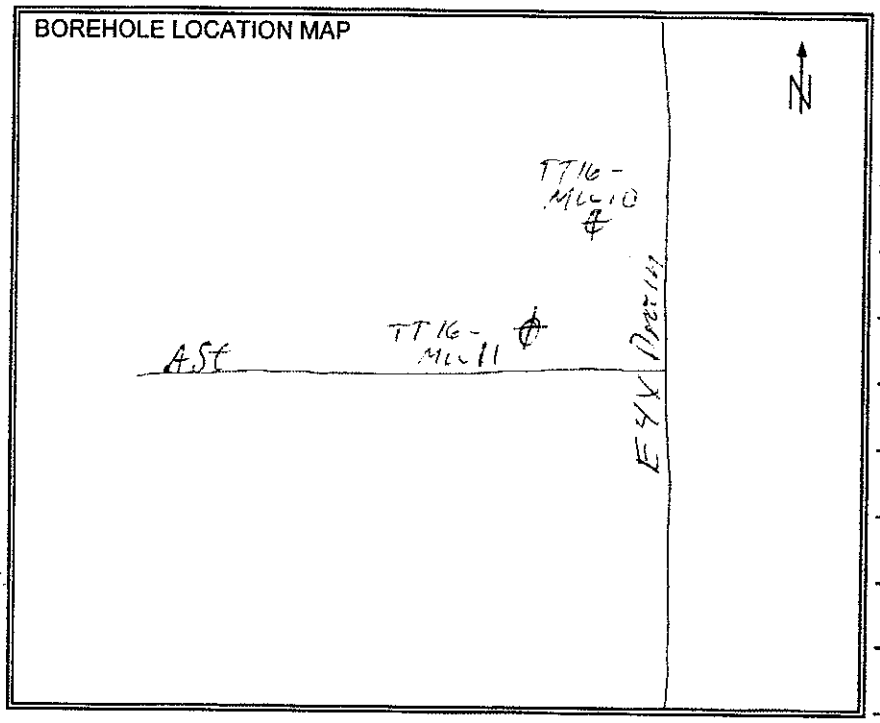
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT16-MW11	
Project Number: I4302300	Project Name: KI Addendum
Client: US Navy	
Site: 16	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg	
Drill Rig Type/Method: Mari MST / Hollow stem auger	
Sampler Type: Hand auger - to 5 feet, acetate sleeves to TD	
Borehole Diameter (inches): 8	to: 18 feet bgs
Overdrilled Diameter (inches): N/A	to: feet bgs
Drill Start Date: 11-9-07	Drill Start Time: 0755
Drill Finish Date: 11-9-07	Drill Finish Time: 0820
Total Borehole Depth (feet bgs): 18	
Soil Boring Backfill Date: N/A	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6	Date: 11-9-07 / Time: 0809
Depth to Other Water-Bearing Zones (feet bgs): N/A	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11-9-07	Well Completion Time:
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-9-07
LOGGED BY: R Knapp

MW ID: T716-MW11

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Hand auger to 5 feet					
										ML	Silt, sandy, very pale brown (10YR 7/3), loose, dry			15	20	65
									1							
									2							
		0857								SW	Sand, very dark grayish brown (10YR 4/2), loose, dry			30	60	10
									3							
									4							
									5							
		0864	36/36							SM	Silty sand, dark yellowish brown (10YR 4/4), med dense, becomes wet ~6'			10	75	15
							1.8		6							
									7							
		0809	42/48				1.6		8	ML	Silt, sandy, very dark grayish brown (10YR 3/2), soft, wet			15	85	
									9							

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 11-9-07
LOGGED BY: R. Knapp

MW ID: TT16-MW11

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
							3.2									
									11	SP	Sand, dark yellowish brown (10YR 4/4), loose, wet			20	75	5
	✓															
		0813	48/48				3.2		12							
									13							
									14							
							2.6									
									15	CL	Clay olive (5Y 5/2), very stiff, plastic, damp					60
	✓															
		0820	24/24				1.3		16							
									17							
	✓								18		TD=18'					
									19							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT16-MW11
PROJECT: R.I. Addendum
SITE: 16
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11-9-07 TIME: 0755
WELL INSTALLATION BEGAN:
DATE: 11-9-07 TIME: 0820
WELL INSTALLATION FINISHED:
DATE: 11-9-07 TIME: 0930
DRILLING CO.: Gregg
DRILLER: J Neff
LICENSE: M2328
DRILL RIG: Mari MST
DRILLING METHOD:
☒ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: ~~2.067~~ 4.25 OD: ~~2.375~~ 8

WELL CASING

☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor pipe
MFG. BY: Beart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING:

WELL SCREEN

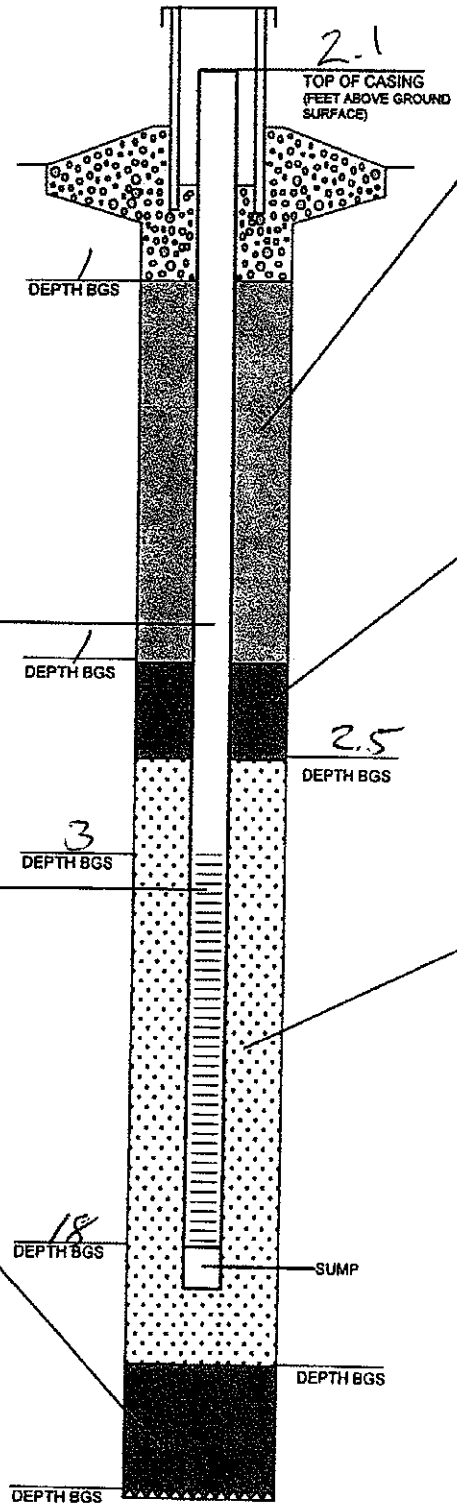
☒ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: PVC Monitor Screen
MFG. BY: Beart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☒ ABOVE GROUND ~~WITH BUMPER POST~~
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☒ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Hole plug
MFG. BY: Baroid
METHOD INSTALLED:
☒ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 600 lb
☒ SAND, SIZE: 2/16
PRODUCT: Lapis Lustre
MFG. BY: Cemex
METHOD INSTALLED:
☐ POURED ☒ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☒ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Installation: NAS Fallon
CTO:
BORING ID: _____

DATE: 10/28/07
LOGGED BY: J. Vaughn

MW ID: TT16 - MW12

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1005								SM	sand, silty, brown (10YR 5/3), dry	5	10	60	5	20
									1							
									2							
									3							
									4							
	✓	1008					2.2		5	SW	sand, light brownish gray (2.5Y 6/2), damp.		80	15		5
									6							
									~~7~~	SW	sand, yellowish brown (10YR 5/6), wet to saturated,		80	15		5
									7							
	✓	1010					2.6		8							
									9							
									10							

Installation:
CTO:
BORING ID:

DATE:
LOGGED BY: J. Vaughn

MW ID: TT16-MW12

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
										SM						
									11							
	↓	1012							12							
									13							
									14	CL	clay, grayish brown (10YR 5/2), wet.				15	85
									15							
	↓	1015							16	SW	sand, yellowish brown (10YR 5/6), saturated.		80	15		5
									17							
	↓	~~1019~~							18		TD at 18.5					
	↓	1019														
									19							
									20							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: T116-MW18
PROJECT: NAS Fallon Drill + Install
SITE: 16
BOREHOLE NO.: N4
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10/28/07 TIME: 1005
WELL INSTALLATION BEGAN:
DATE: 10/28/07 TIME: 10:20
WELL INSTALLATION FINISHED:
DATE: 10/28/07 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Rhino 027
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: pvc monitor pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING:

WELL SCREEN

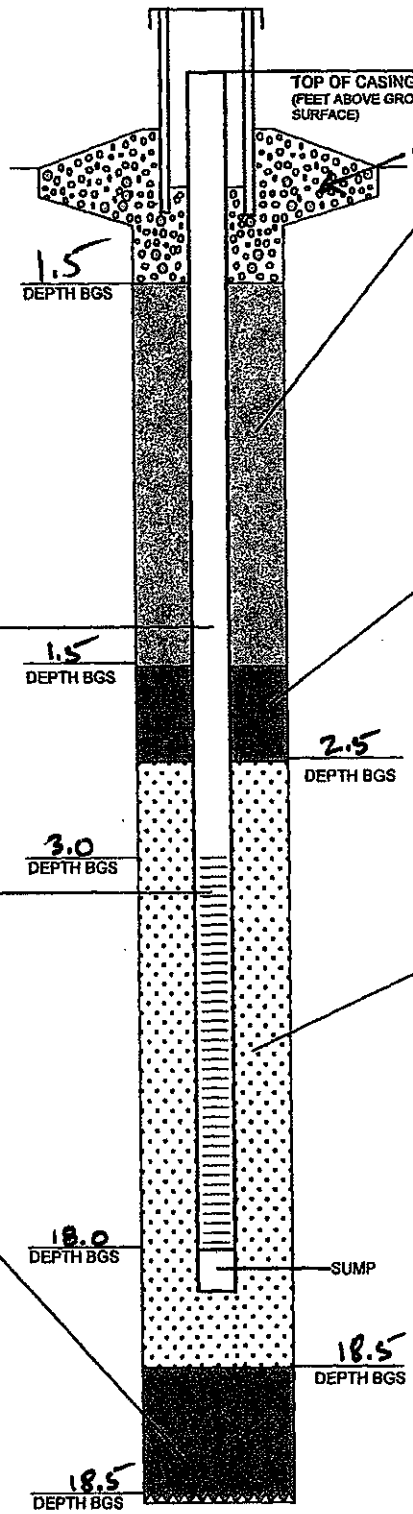
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: monitor screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT: N/A
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 0.5 ft²
AMOUNT USED: 0.5 ft²
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: medium
☐ OTHER:
PRODUCT: bentonite chips
MFG. BY: Pure Gold
METHOD INSTALLED:
☑ POURED inside augers ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 3 gal.

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 5.3 ft²
AMOUNT USED: 5 ft²
☑ SAND, SIZE: #2/16
PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED inside augers ☐ TREMIE
☐ OTHER:
WATER LEVEL: 8.66' BTOC
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

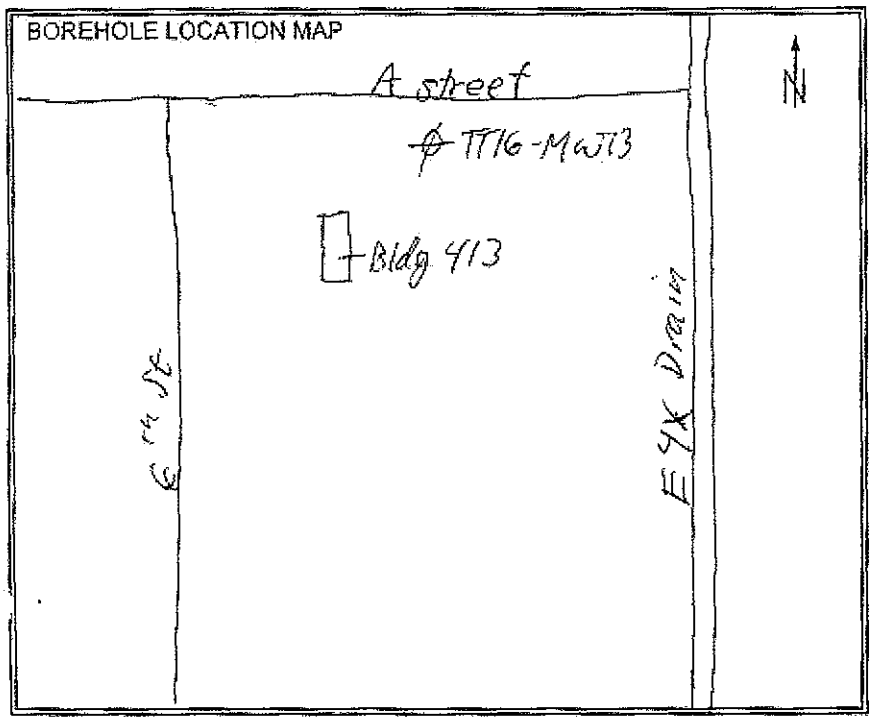
☐ YES ☑ NO; inside augers
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT16-MW13	
Project Number: T4302300	Project Name: RI Addendum
Client: US Navy	
Site: 16	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mark MST All Terrain	
Sampler Type: Hand auger to 6', split spoon to TD	
Borehole Diameter (inches): 8	to: feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 10-13-07	Drill Start Time: 1235
Drill Finish Date: 10-13-07	Drill Finish Time: 1303
Total Borehole Depth (feet bgs): 15	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 5.5	Date: 10-13-07 Time: 1248
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 10-13-07	Well Completion Time:
Screen Interval (feet bgs): 3-15	Total Well Depth (feet bgs): 15
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BORING ID: MW ID: TT16-MW13 K. Knapp

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
											Hand auger to 6'					
									1							
		1238							2	SM	Silty Sand, dark brown (10YR 3/3) loose, dry			30	40	30
									3							
									4							
									5	SP	Sand greyish brown (10YR 5/2) loose, damp, mostly quartz and K-spar, subang-subrnd, damp			70	30	
		1252	18/24				0		6	SP	Sand, as above except slightly coarser and wet			80	20	
							0.2		7							
		1259	40/48				0.2		8	SP	Sand, as above			80	20	
									9							

BORING ID: MW ID: TT16-MW13

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
									11							
							0			SP	Sand, brown (10YR 4/3), med dense, wet			15	80	5
									12							
		1303	0/36								No recovery					
									13							
									14							
									15		TD = 15'					
									16							
									17							
									18							
									19							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT16-MW13
PROJECT: RI Addendum Active Sites
SITE: 16
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: ~~RE2.34~~ 17.3

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10-13-07 TIME: 1235
WELL INSTALLATION BEGAN:
DATE: 10-13-07 TIME: 1310
WELL INSTALLATION FINISHED:
DATE: 10-13-07 TIME: 1430
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MST
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375
LENGTH OF CASING: 17.3

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Monitor Screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 12

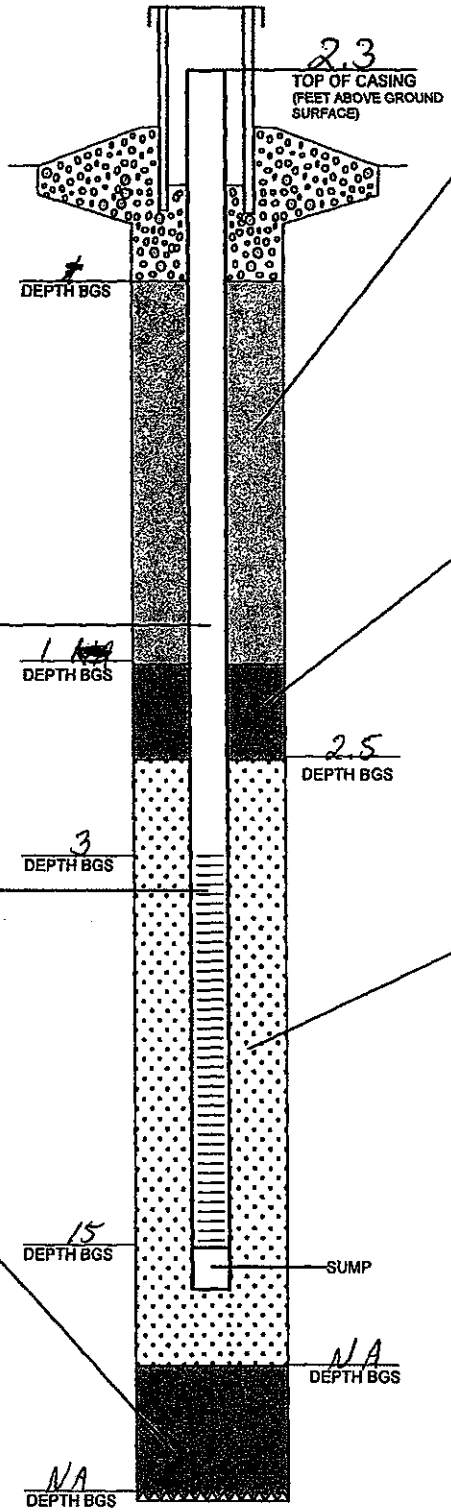
BOREHOLE BACKFILL

AMOUNT CALCULATED: None
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED: NA
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [x] PREPARED MIX
  - PRODUCT: Sakrete
  - MFG. BY:

METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb.
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: medium
- [ ] OTHER:

PRODUCT: Pure gold
MFG. BY: CETCO
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 2.5 gal

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED: 400 lb
- [x] SAND, SIZE: 2/16
- [ ] PRODUCT: Lapis Lustre
- [ ] MFG. BY: Cemex

METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL: 7.31
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Installation: NAS Fallon
CTO:
BORING ID: ——
MW ID: TT16-MW14

DATE: 10/28/07
LOGGED BY: J. Vaughn

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0800								ML	silt, sandy, light brownish gray (10YR 6/2), heterolithic, loose, dry.		5	5	30	60
									1							
									2							
									3							
									4							
	↓	0813					109		5	SP	sand, very dark gray to black (10YR 3/1 – 10YR 2/1), damp, petroleum product staining		40	40	15	5
									6 ▽	SP	sand, black (10YR 2/1), wet, staining, possible free product.		40	50	10	
							148		7							
	↓	0820							8							
									9							
									10							

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 10/28/07
LOGGED BY: J. Vaughn

MW ID: TT16-MW14

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
										ML	Silt, sandy, dark gray (2.5Y 4/1), ~~wet.~~ saturated.		15		20	65
									11	SM	Sand, silty, light olive brown (2.5Y 5/4) to very dark gray (2.5Y 3/1), ~~wet.~~ saturated, staining from 12 to 14, minor staining above + below, sheen on free water		50	15	10	25
	↓	0824							12							
									13							
									14							
									15	ML	Silt, sandy, olive brown (2.5Y 4/2), wet.				35	65
	↓	0831							16	SM	Sand, silty, dark grayish brown (2.5Y 4/2), saturated, sheen on free water.		20	50	5	25
									17							
	↓	~~0835~~							18		~~TD~~					
									19							
	↓	0835							20		TD at 20.0					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT16-MW14
PROJECT: NAS Fallon Drill+Install
SITE: 16
BOREHOLE NO.: ——
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 10/28/07 TIME: 08:08
WELL INSTALLATION BEGAN:
DATE: 10/28/07 TIME: 0835
WELL INSTALLATION FINISHED:
DATE: 10/28/07 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: J. Neff
LICENSE: M2328
DRILL RIG: Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: pvc monitor pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375
LENGTH OF CASING:

WELL SCREEN

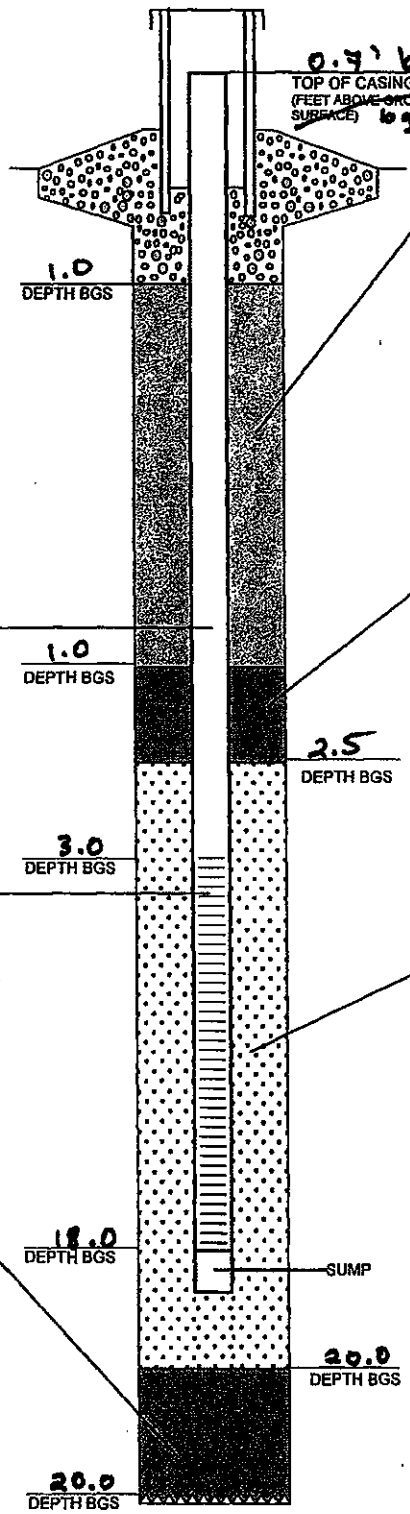
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: pvc monitor screen
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15 ft

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☑ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 0.5 ft²
AMOUNT USED: ½ sack (25 lbs) 0.5 ft²
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: medium
☐ OTHER:
PRODUCT: bentonite chips
MFG. BY: Pure Gold
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED:

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 5.8 ft²
AMOUNT USED: 5 100 lb sacks (5 ft²)
☑ SAND, SIZE: #2/16
PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

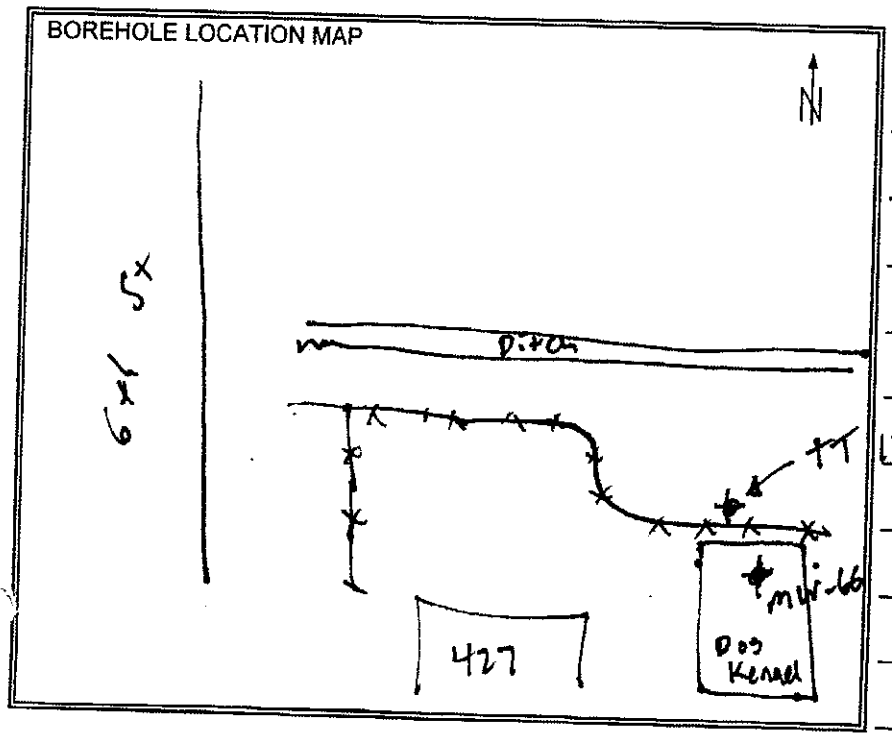
☐ YES ☑ NO; placed 1-stick weights
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TT16-MW16	
Project Number:	Project Name: RI Addendum
Client: US Navy	
Site: Site	
Borehole Location (Township, Range, Section):	
Logged By: D. Berestka	
Reviewed By:	Review Date:
Drilling Contractor: Gregg	
Drill Rig Type/Method: HSA	
Sampler Type: 4" Acetate sleeve	
Borehole Diameter (inches): 8	to: 18.5 feet bgs
Overdrilled Diameter (inches): NA	to: NA feet bgs
Drill Start Date: 11/13/07	Drill Start Time: 1025
Drill Finish Date: 11/13/07	Drill Finish Time: 1040
Total Borehole Depth (feet bgs): 18.5	
Soil Boring Backfill Date: NA	Soil Boring Backfill Time: NA
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): ≈ 9	Date: / Time:
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 11/13/07	Well Completion Time: 1145
Screen Interval (feet bgs): 3-18 ft bgs	Total Well Depth (feet bgs): 18.5
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Replacement well for MW-66

16-MW16

Installation: NAS KALIUN
CTO:
BORING ID:

DATE: 11/3/07
LOGGED BY: D. Beerstka

MW ID: TT16-MW16

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
									3							
		1025					5.6		4	CL	CLAY, STIFF (5YR 3/1) NO HC ODOR				10	90
							9.5	5.9	7	SC	CLAYEY SAND, FINE TO MEDIUM (5YR 4/1)		30	50	20	
							240		9	SC	CLAYEY SAND TURNS GRAY HC ODOR (GLEY 1 3/N) MOIST		30	50	20	
							3.7		10	CL	GRAY CLAY, STIFF (GLEY 1 4/N)				10	90
									12	CL	SANDY CLAY (7.5YR 4/1) PLASTIC, STAINING DISSIPATES		10	10	80	
									13	SC	CLAYEY SAND, MED TO FINE WET (7.5YR 4/1)		30	40	30	
							13		14							
									16	CL	SANDY CLAY		10	20	70	
							17		17		CLAYEY SAND, MED TO FINE (7.5 YR 4/1		30	40	30	
									18							
		1040							18.5 TD							

Water

ACETATE SLEEVE

NO FREE PRODUCT LIKELY, RESIDUAL ONLY

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

3/3

MONITORING WELL

MONITORING WELL NO.: TT16-MW16
PROJECT: R1 Addendum
SITE: 16
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 18.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 11/13/07 TIME: 1025
WELL INSTALLATION BEGAN:
DATE: 11/13/07 TIME: 1040
WELL INSTALLATION FINISHED:
DATE: 11/13/07 TIME: 1145
DRILLING CO.: Gregg
DRILLER: J Neff
LICENSE: M2328
DRILL RIG: MARL MST
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT:
MFG. BY: Boart
CASING DIAMETER:
ID: OD: 2"
LENGTH OF CASING: 3'

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT:
MFG. BY: Boart
CASING DIAMETER:
ID: OD: 2"
SLOT SIZE: 0.010" (10 slot)
LENGTH OF SCREEN: 15

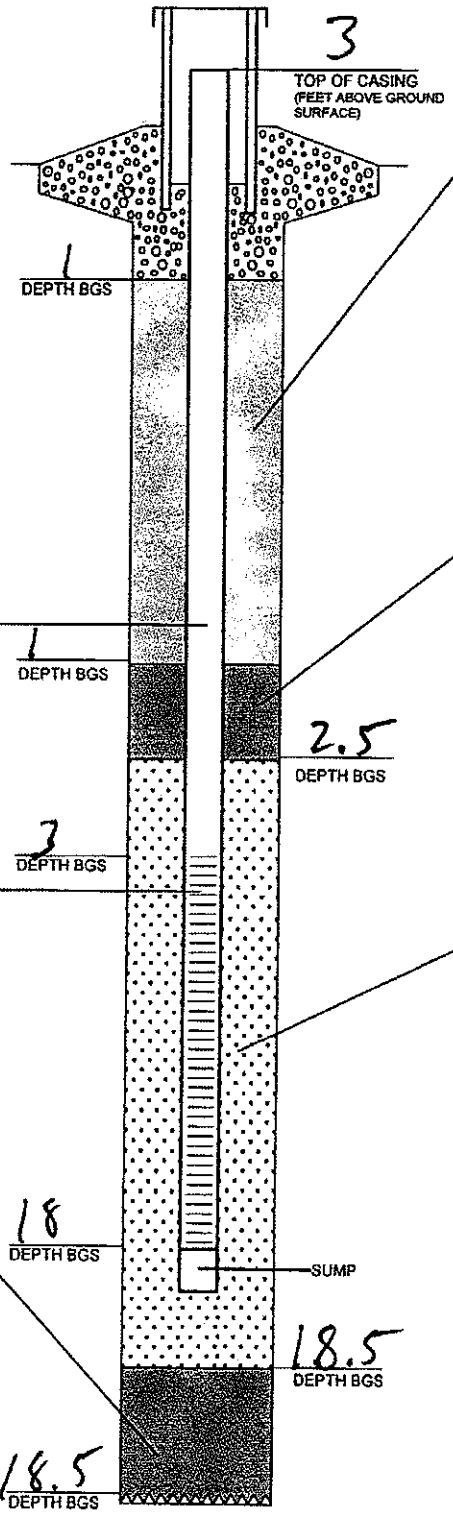
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [ ] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [ ] PREPARED MIX
  - PRODUCT:
  - MFG. BY:

METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: 3/8
- [ ] OTHER:

PRODUCT: HOLE PLUG
MFG. BY: BAROID
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 2 GAL

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED:
- [x] SAND, SIZE: 2/16

PRODUCT: LAPIS LUSTRE
MFG. BY: CEMEX
METHOD INSTALLED:
- [ ] POURED
- [x] TREMIE
- [ ] OTHER:

WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

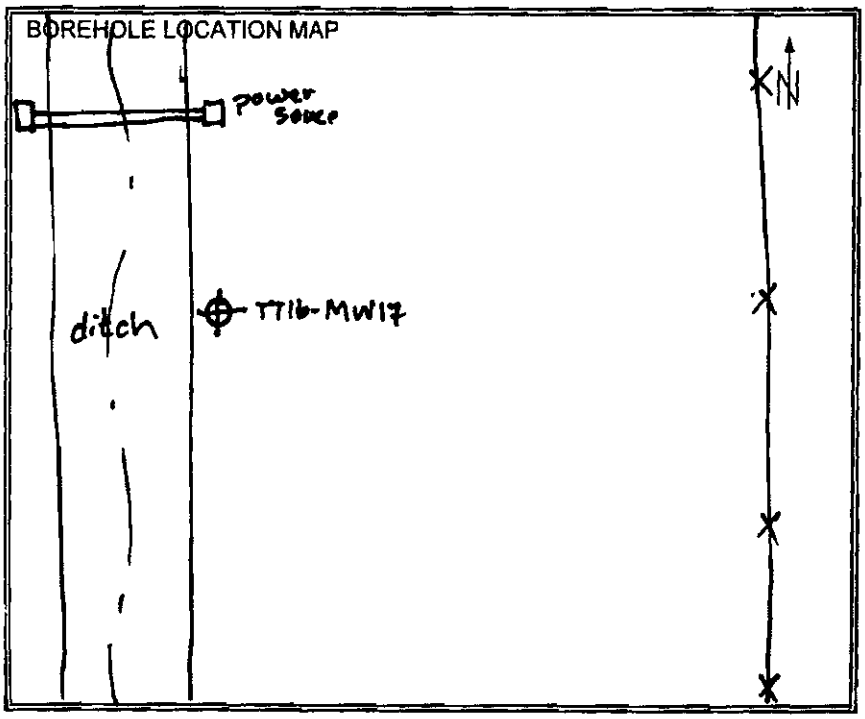
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID: —	
Monitoring Well ID: TT16-MW17	
Project Number: 4302.300	Project Name: NAS Fallon Drill + Install
Client: Navy	
Site: 16	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Marl M5 Rhino	
Sampler Type: direct push w/ sleeves	
Borehole Diameter (inches): 8.0"	to: 20.0 feet bgs
Overdrilled Diameter (inches):	to: feet bgs
Drill Start Date: 3-16-08	Drill Start Time: 0724
Drill Finish Date: 3-16-08	Drill Finish Time: 0749
Total Borehole Depth (feet bgs): 20.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 10.0	Date: 3-16-08 Time: 0740
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-16-08	Well Completion Time: 0848
Screen Interval (feet bgs): 4.5 - 19.5	Total Well Depth (feet bgs): 20.0
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID: MW ID: TT16-MW17

DATE: ~~3-15-08~~ 3-16-08
LOGGED BY: Jordan Vaughn

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0724								SM	0.0-5.5 silty sand, olive brown (2.5Y 4/3), ~~soft~~ loose, low plasticity, moist, subangular qtz, feld, volc. lithics.		5	5	60	30
									1							
									2							
									3							
									4							
									5							
		0735							6	CL	5.5-6.7, clay, olive brown (2.5Y 4/3), stiff, low plasticity, moist.					100
									7	SP	6.7-10.0, sand, light olive brown (2.5Y 5/4), very loose, non plastic, moist. subrounded qtz, feld, volc. lithics.		60	40		
		0737							8							
									9							
									10 ▽							
									11	SP	10.0-10.5, sand, light olive brown (2.5Y 5/4) very loose, non plastic, wet, sub-round qtz, feld, volc. lith.		60	40		
		0740								CL	10.5-11.5, clay, olive brown (2.5Y 4/3), stiff, plastic, wet.					100
									12	SC	11.5-14.5, clayey sand, olive brown (2.5Y 4/3), ~~soft~~ loose, plastic, wet, subangular qtz, felds.			20	50	30
									13							
									14							
									15	SW	14.5-20.0, sand, light olive brown (2.5Y 5/3) loose, non-plastic, wet, subangular qtz, felds, volc lithics, dist.		5	20	70	5
		0743							16							
									17							
									18							
									19							
		0749							20		TD at 20.0					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT16-MW17
PROJECT: NAS Fallon
SITE: 16
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 19.9'

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-16-08 TIME: 0725
WELL INSTALLATION BEGAN:
DATE: 3-16-08 TIME: 0755
WELL INSTALLATION FINISHED:
DATE: 3-16-08 TIME: 0848
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bert Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 4.4'

WELL SCREEN

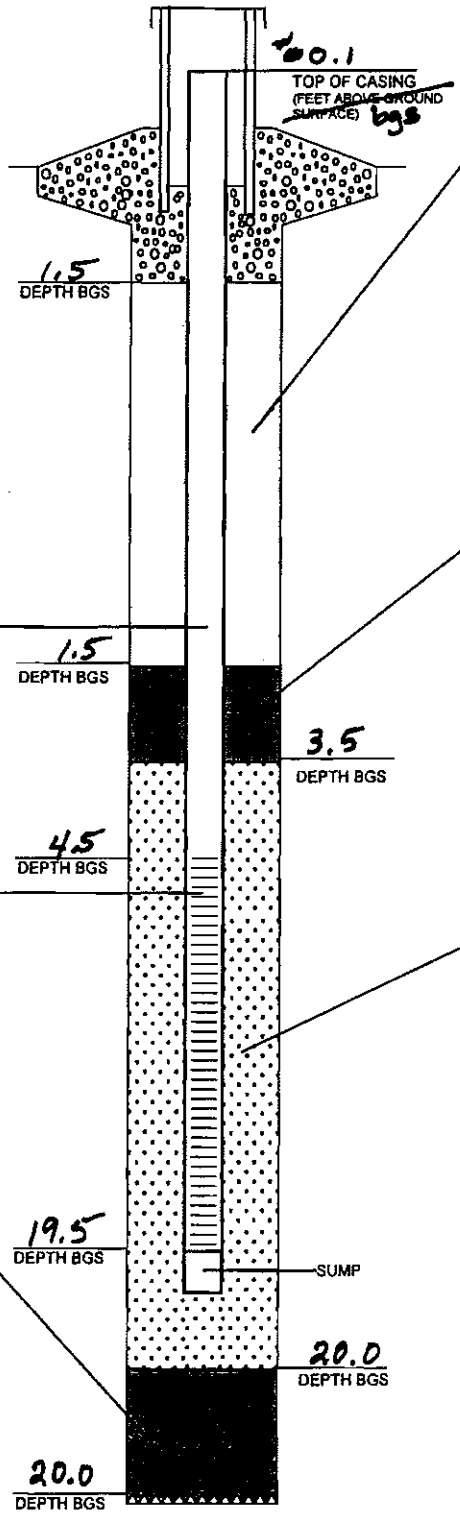
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Manofiex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
FG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☑ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.6 ft³
AMOUNT USED: 1 x 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: bentonite chips
MFG. BY: Baroid Holeplug
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 21.5 ft³
AMOUNT USED: 5½ x 100 lb SACKS
☑ SAND, SIZE: 2/16
PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 10.0
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO; installed in augers
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Site 18

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

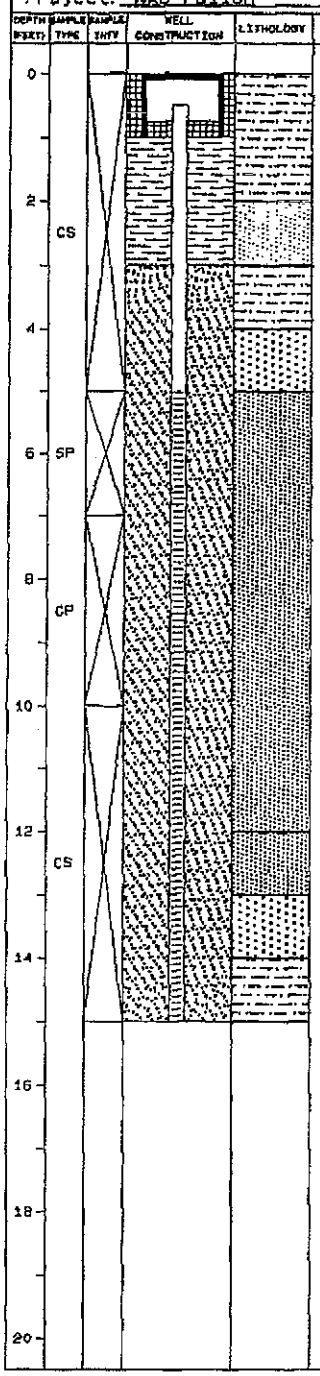
Prepared By: Bob Schlosser Date: 3/9/91 Page: 1 OF 1

Hole No.: MW32 Casing Elevation: 3921.98' Ground Elevation: 3922.15'

Total Depth: 15.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 9 and 18

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91



DESCRIPTION

SM SILTY SAND: very dark grayish brown (10Y3/2), stiff, sand very fine grained

SP SAND: dark grayish brown (10YR4/2), vfu subangular to subround, silty in part

SM SANDY SILT: as above, higher percent sand

SW SAND: very pale brown (10YR7/3), vfL-mL, subangular to subrounded, micaceous, abundant dark accessory minerals

SP SAND: pale brown (10YR6/4), mL, subangular to subrounded, very calcareous

SP SAND: yellow brown (10YR5/4), fU-mU, some vfU basalt, abundant dark accessory minerals, slightly calcareous

SP SAND: as above

SP SAND: color as above, silty in part

SW SAND: mL-vcU, well graded, calcareous

SM SILTY SAND: light olive, some vfU gray mottled dark olive around root vesicles

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20) 3'-15'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'

Site 20

Lithologic logs were not available for the following monitoring wells located at Site 20 during report development:

Well ID	Installation Date
BA20-MW01	1/30/2007
BA20-MW02	1/31/2007
BA20-MW03	1/29/2007
BA20-MW04	1/30/2007
BA20-MW05	1/31/2007

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

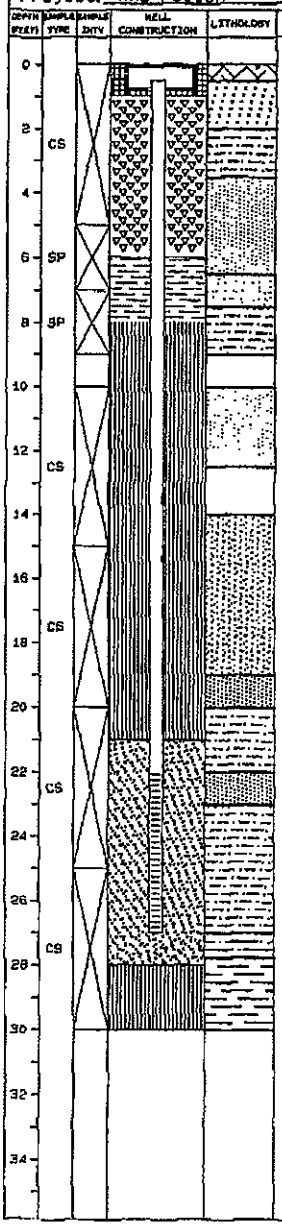
Prepared By: Bob Schlosser Date: 3/11/91 Page: 1 OF 1

Hole No.: MW33L Casing Elevation: 3925.82' Ground Elevation: 3926.17'

Total Depth: 30.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 20

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91



DESCRIPTION

FILL: sand and gravel

SP SAND: yellowish brown (10YR5/6), cL-cU, subangular-subround, dry

SM SANDY SILT: very dark brown (10YR2/2), abundant oxidation and root hairs

SP SAND: color as above, some arkosic content

SW SAND: yellow brown (10YR5/4), fL-cU, loosely consolidated, abundant basalt, arkosic

SM SANDY SILT: dark yellowish brown (10YR4/6), abundant root hairs, micaceous

AUGER 9'-10'

SP SAND: brownish yellow, fU-cL, fining downward mottled olive occasionally around root hairs

SW SAND: grayish brown (10YR5/2) fL-cU, angular to subangular, predominantly clear quartz

LOST 14'-15'

SW SAND: color as above, fL-vcU, some scattered 3-4 mm pebbles, very well graded, micaceous, micaceous, arkosic, very slightly calcareous

SP SAND: yellowish brown (10YR5/4), fU-mL, clear and milky quartz

SM SANDY SILT: brown (10YR5/3), soft, some oxidation

SP SAND: color as above fL-mL

SM SANDY SILT: as above

SC SILTY CLAY: wet

CL CLAY: olive, silty in part, blocky at 29.5' calacareous

CONCRETE 0'-1'
NEAT CEMENT (6/1) 1'-6'
BENTONITE PELLETS (3/8") 6'-8'
FRAC SAND (8/20) 21'-28'
SLOTTED 2" PVC SCREEN (0.010") 22'-27'
NATIVE FILL 8'-21', 28'-30'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

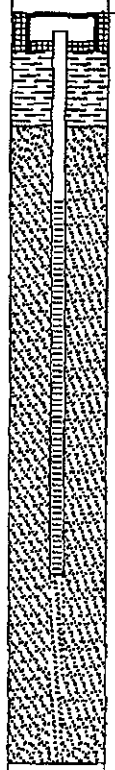
Prepared By: Bob Schlosser Date: 3/12/91 Page: 1 OF 1

Hole No.: MW33U Casing Elevation: 3925.86' Ground Elevation: 3926.17'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 20

Auger Size: 8" O.D. Sample Type: NONE

Project: NAS Fallon Data Verified By: David Smyth Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					NO SAMPLES TAKEN. SEE MW33L FOR LITHOLOGY AUGER TO 20' CONCRETE 0'-1' SLOTTED 2" PVC SCREEN (0.010"), 5'-15' BENTONITE PELLETS (3/8"), 1'-3' FRAC SAND (8/20), 3'-20'
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

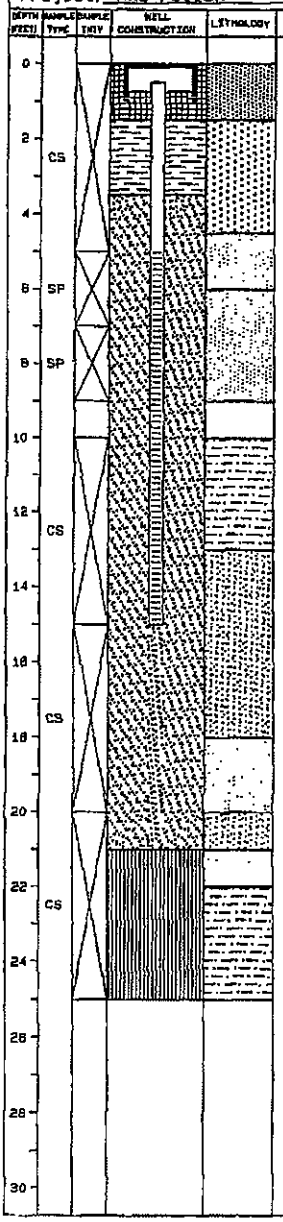
Prepared By: Bob Schlosser Date: 3/12/91 Page: 1 OF 1

Hole No.: MW35 Casing Elevation: 3929.22' Ground Elevation: 3928.43'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 20

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smyth Date: 3/22/91



DESCRIPTION

SP SAND: brown (10YR4/3), fU-mL

SW SAND: light yellowish brown (10YR6/4), mL-vcU, subangular to subrounded, abundant dark accessory minerals

SP SAND: as above, fL-mL

SP SAND: dark grayish brown, some organics and Fe staining locally

SP SAND: as above, fU, silty in part

AUGER TO 10'

SM SANDY SILT: very dark gray brown (10YR3/2), mottled very dark gray (2.5YN3/)

SW SAND: grayish brown (10YR5/2), fU-vcL, micaceous, loosley consolidated, calcareous in part

SW SAND: as above, becoming vfL-cL

SP SAND: brown (10YR5/3), fU, abundant dark accessory minerals, micaceous, non calcareous

SW SAND: dark gray, mL-vcL, very calcareous

SP SAND: brown (10YR5/3), fL, very calcareous

SM SILTY SAND: dark yellowish brown, tight

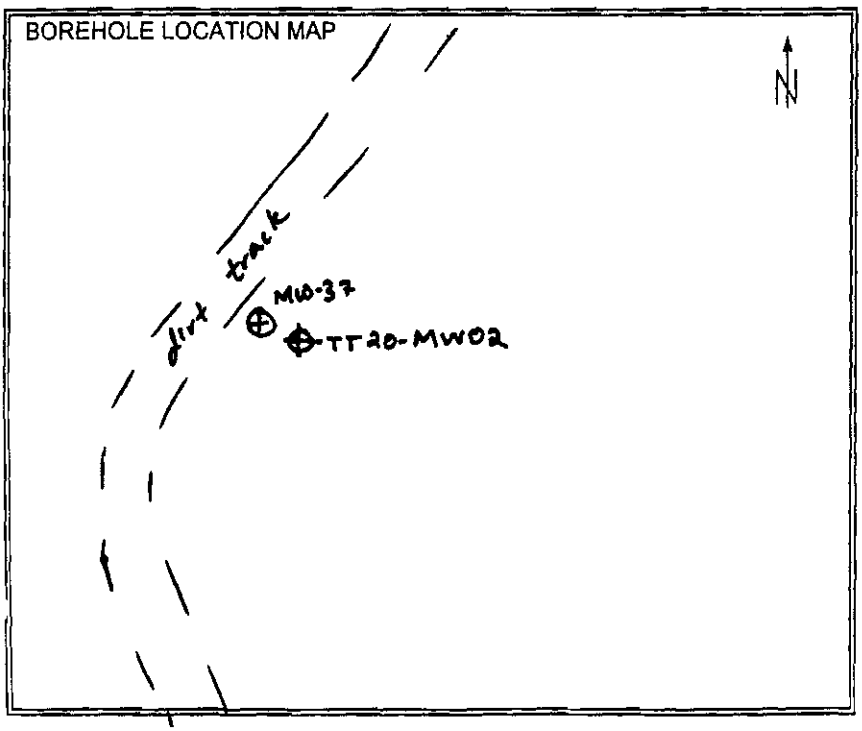
CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1.'-3.'
FRAC SAND (8/20) 3'-15.5'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'
NATIVE FILL 15.5'-25'

BOREHOLE LOG

Tt

Boring ID: —	
Monitoring Well ID: TT20-MW02	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill & Install
Client: Navy	
Site: 20	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaugh	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Marl MS Rhino	
Sampler Type: direct pushing sleeve liner	
Borehole Diameter (inches): 8.0	to: 18.5 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-15-08	Drill Start Time: 0734
Drill Finish Date: 3-15-08	Drill Finish Time: 0800
Total Borehole Depth (feet bgs): 18.5	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 5.0	Date: 3-15-08 Time: 0745
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-15-08	Well Completion Time: 0848
Screen Interval (feet bgs): 3.0-18.0	Total Well Depth (feet bgs): 18.5
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs): 5.0'	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Replacement well for MW-37

BOREHOLE LOG

Installation: ~~NT~~ NAS Fallon
CTO:
BORING ID:

DATE: 3/15/08
LOGGED BY: Jordan Vaughn

MW ID: TT20-MW-02

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0744								SM	0-0-5.0 silty sand, dark grayish brown (2.5Y 4/2), loose, low plasticity, moist, subangular qtz, felsp, volc. lithics, biot.				80	20
									1							
									2							
									3							
									4							
		0745							5							
										SM	5.0-6.5. silty sand, dark grayish brown (10YR 4/2), ~~soft~~ loose, low plasticity, wet, subangular qtz, felds, biot, volc. lithics.				75	25
									6							
									7							
		0747							8	SP	6.5-10.5, sand, yellowish brown (10YR 5/4), very loose, non plastic, subangular qtz, felds, volc. lithics, biot.	50	40	5	5	
									9							
									10							
									11	SC	10.5-~~12.0~~ 11.5 clayey sand, dark grayish brown (10YR 4/2), ~~soft~~ loose, mod. plasticity, wet, subangular qtz, felds, biot.			60	40	
		0749							12	CL	11.5-12.0, clay, dark grayish brown (10YR 4/2), stiff, low plasticity, moist.					100
									13							
									14	SW	12.0-18.5, sand, yellowish brown (10YR 5/4), very loose, non plastic, subangular qtz, felds, volc. lithics, biot.	30	70			
									15							
		0752							16							
									17							
		0800 ~~0800~~							18		TD at 18.5'					
									19							
									20							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT20-MW02
PROJECT: NAS Fallon
SITE: 20
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.0

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-15-08 TIME: 0734
WELL INSTALLATION BEGAN:
DATE: 3-15-08 TIME: 0810
WELL INSTALLATION FINISHED:
DATE: 3-15-08 TIME: 0838
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riserpipe
MFG. BY: Bart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 5.0'

WELL SCREEN

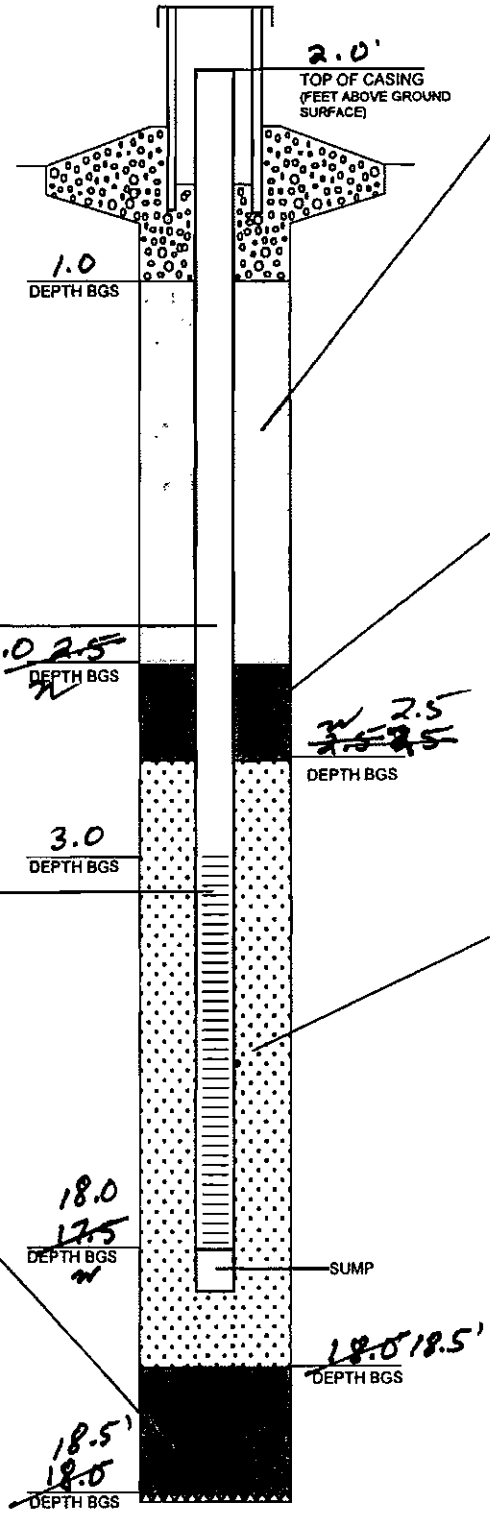
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND ~~WITH BUMPER POST~~
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: ½ x 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8 bentonite
☐ OTHER:
PRODUCT: Holeplug Bentonite Chips
MFG. BY:
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 20.8 ft³
AMOUNT USED: 6 x 100 lb sacks
☑ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 5.0
(~~BTOC~~ bgs AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO; completed inside augers
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Site 21

Lithologic logs were not available for the following monitoring wells located at Site 21 during report development:

Well ID	Installation Date
MW-94	3/28/1996
BA21-MW01	2/6/2007
BA21-MW02	2/6/2007
BA21-MW03	2/6/2007
BA21-MW04	2/1/2007
BA21-MW05	2/5/2007

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

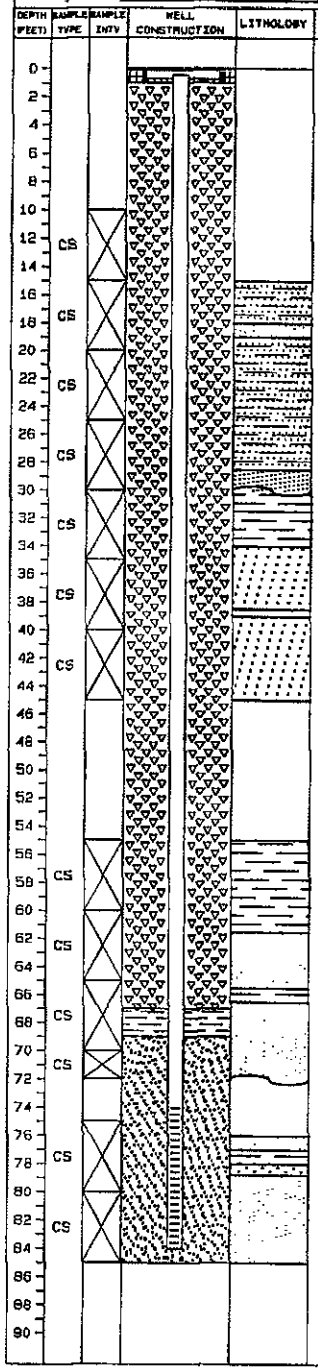
Prepared By: Bob Schlosser Date: 7/11-13/90 Page: 1 OF 1

Hole No.: MW12L Casing Elevation: 3930.20' Ground Elevation: 3930.45'

Total Depth: 85.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Group II upgradient

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2" Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 7/14/90



DESCRIPTION

AUGER TO 15' AND BEGIN SAMPLING. SEE MW12U FOR LITHOLOGY

CL CLAY: silty in part, blocky, micaceous, limonite staining on partings, damp

SP SAND: very fine grained, with clay interbedded

CL CLAYEY SILT: with 4-5 cm very fine sand at 21', strong limonite staining. CARSON RIVER-LAHONTON LAKE contact but not well developed.

CL CLAYEY SILT: light olive gray, (5y6/2) with interbedded very fine grained sand

SP SAND: fine to medium grained, limonite stained

CL CLAY: dark greenish gray, fU sand, mottled black

CL CLAY: black, plastic, tight, mottled with clay greenish gray, 4 cm gypsum bed at 34.5'

SP SAND: dark grenish gray (5GY4/1), medium to coarse grained, micaceous, subangular to rounded mostly clear quartz, some dark accessory mins., grading to SW SAND, medium to coarse grained (mL-cU) scattered vcL, very angular

SP SAND: as above

PROBLEMS WITH AUGER, RUN IN HOLE WITH CENTER BIT TO CLEAN OUT HOLE. CENTER BIT HUNG UP IN AUGER. TRIP OUT OF HOLE. REPLACE AUGER. CLEAN OUT HOLE WITH CENTER BIT. NO SAMPLES FROM 45'-55'

SP SAND: very dark gray (5Y4/1), medium grained, micaceous

CL CLAY: varigated, thin beds of very dark gray green and black

SP SAND: very dark gray (5Y5/1), fine grained

CL CLAY: black as above, sticky, fish bones

SP SAND: very fine grained (10YRN3/), predominantly fine grained, rounded, thin beds of evaporites on bedding planes, appear varved.

NO SAMPLE 72'-75' auger cuttings appear to be SP SAND as above.

CL CLAY: black, silty in part, sandy in part

SW SAND: very dark gray, medium to coarse grained (mL-cL), loosly consolidated

CL CLAY: black, thinly bedded, very stiff

SLOTTED PVC SCREEN (0.010") 74'-84'
BENTONITE PELLETS (1/4") 67'-69'
CEMENT BENTONITE GROUT (6/1) 1'-67'
FRAC SAND (8/12) 69'-85'

Site 22

Lithologic logs were not available for the following monitoring wells located at Site 22 during report development:

Well ID	Installation Date
BA22-MW01	2/5/2007
BA22-MW02	2/1/2007
BA22-MW03	2/1/2007
BA22-MW04	2/5/2007

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT22-MW01
PROJECT: NAS Fallon
SITE: 22
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.5'

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3/14/08 TIME: 1220
WELL INSTALLATION BEGAN:
DATE: 3/14/08 TIME: 1251
WELL INSTALLATION FINISHED:
DATE: 3/14/08 TIME: 1420
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bert Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 5.0'

WELL SCREEN

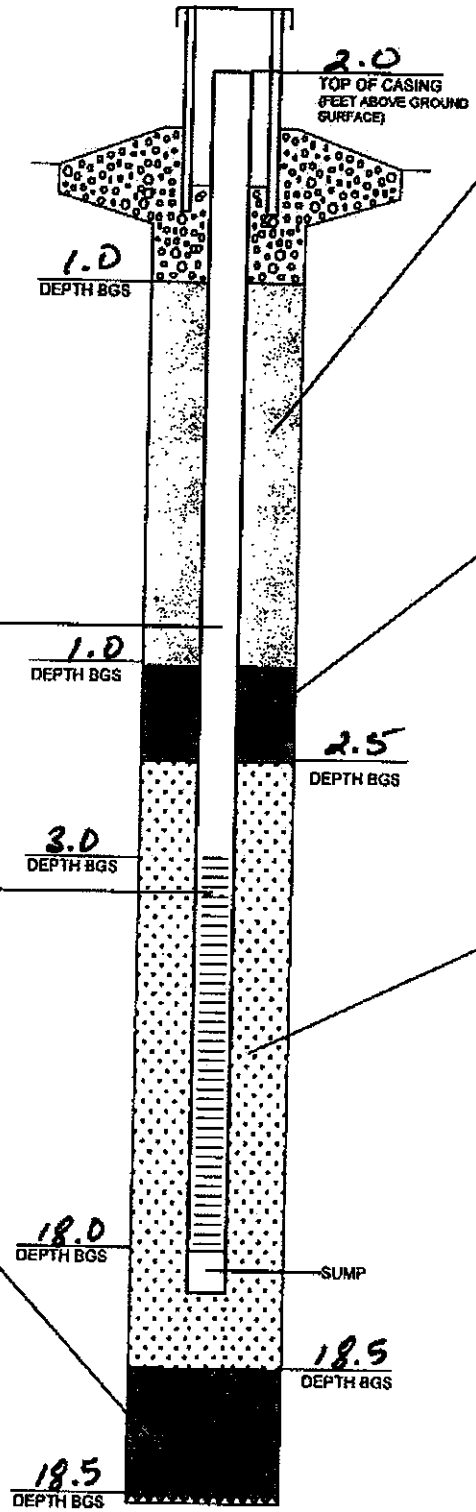
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Menoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND ~~WITH BUMPER POSTS~~
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: ½ x 50 lb bags
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Holeplug Bentonite chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 20.8 ft³
AMOUNT USED:
☑ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: Flemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 3.5
(~~BTOC~~ BGS AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO: installed in augers
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT22-MW02
PROJECT: NAS Fallon
SITE: 22
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-13-08 TIME: 1210
WELL INSTALLATION BEGAN:
DATE: 3-13-08 TIME: 1245
WELL INSTALLATION FINISHED:
DATE: 3-13-08 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: well riser
MFG. BY: Bart longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 5.0'

WELL SCREEN

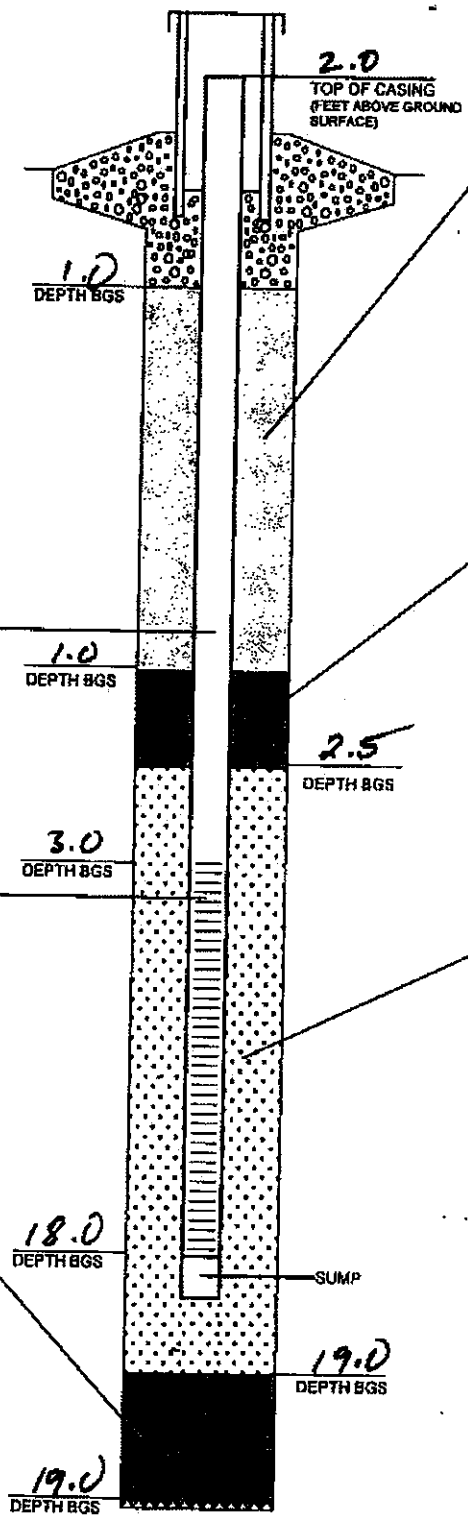
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND ~~WITH BUMPER POST~~ W
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: ½ x 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8 coarse
☐ OTHER:
PRODUCT: Hole plug bentonite
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: ~~22.0 ft³~~ 21.5 ft³
AMOUNT USED: 5 x 100 lb sacks
☑ SAND, SIZE: #2/16
PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 5.0
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO; install in augers
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Hot Pit

Lithologic logs were not available for the following monitoring wells located at the Hot Pit during report development:

Well ID	Installation Date
BA-HP3-MW1	unknown
BA-HP3-MW2	unknown
BA-HP3-MW3	unknown

MONITORING WELL DESIGN, INSTALLATION AND DEVELOPMENT

CLEAN SOP: 5
Rev: 4
Date: 7/30/04
Attachment: D

One Page Attachment

WELL DEVELOPMENT
WELL DEVELOPMENT

PROJECT: 5106-018 | WELL NO.: MW1
PROJECT: Hot Pit #3 | WELL NO.:
JOB NO.: | SITE: NAS FALLON

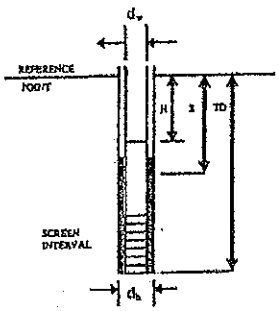
PREPARED BY
Name: PARVEEN KUMAR
Signature: Parveen

CHECKED BY
Name: MIKE SAYRE
Signature:

DEVELOPMENT CRITERIA: PURGED WATER <10 NTU & CLEAR OF SAND.

REMARKS: TURBIDITY: E3 INDICATES OUT OF CALIBRATION RANGE

BOREHOLE DIAMETER d_b = 0.854 feet
WELL CASING:
INSIDE DIAMETER d_{wID} 0.3355 feet
OUTSIDE DIAMETER d_{wOD} 0.375 feet
REFERENCE POINT: TOC
DEPTH TO:
WATER LEVEL H = 6.02 feet
BASE OF SEAL S = 2.0 feet
TOP OF SCREEN = 4.1 feet
BASE OF SCREEN = 13.1 feet
BASE OF WELL TD = 13.55 feet
ESTIMATED FILTER PACK POROSITY P = 30 %



WELL VOLUME CALCULATION
CASING VOLUME (VC)
$V_C = \pi \left(\frac{d_{wID}}{2}\right)^2 (TD - H) = 0.67\ ft^3$
FILTER PACK PORE VOLUME (VF)
$V_F = \pi \left[\left(\frac{d_b}{2}\right)^2 - \left(\frac{d_{wOD}}{2}\right)^2\right](TD - S \text{ or } H)(P) = 1.04\ ft^3$
(IF S < H, USE H. IF S > H, USE S)
TOTAL WELL VOLUME (VT)
$V_T = V_C + V_F = 1.71\ ft^3$
$ft^3 \times \frac{7.48 \text{ gallons}}{ft} = 12.8$ gallons

DEVELOPMENT LOG					CUMULATIVE TOTAL REMOVED		WATER QUALITY PARAMETERS (mS/cm)					
Date	Time Begun	Time Finished	Method	Water Removed	Gallons	Well Volumes	Turbidity (Visual or NTU)	pH	Temperature (°F) °C	Electrical Conductivity (µmhos)	Dissolved Oxygen (% or mg/L)	COMMENTS
1/31	9:30	10:40	Bailer	16	16	1.25	E3	8.71	12.70	8.876	5.11	Dark Muddy water
1/31	10:42	11:00	Bailer	6	22	1.7	E3	—	—	—	—	Surged & Bailed water out. Still Muddy
1/31	11:00	11:15	Bailer	8.5	30.5	2.4	E3	8.94	12.16	10.16	5.43	Surged & Bailed - Muddy water
1/31	11:15	11:35	Surging only				—	—	—	—	—	Surging only.
1/31	11:35	11:40	Bailer	8.0	38.5	3.0	—	—	—	—	—	Muddy water - a little bit sand.
1/31	11:40	12:10	Bailer	11.5	50	3.9	769	8.96	14.17	11.41	4.90	light muddy - clearing out
1/31	12:10	12:41	Bailer	10	60	4.7	132	8.97	14.22	12.33	4.60	Little yellow
1/31	12:41	1:42	Bailer	15	75	5.9	176	8.99	14.3	10.67	4.84	
1/31	2:54	3:20	Pump	20	95	7.4	78	8.98	14.75	10.23	3.82	
1/31	3:21	3:29	Pump	10	105	8.2	17.5	8.98	14.77	12.15	2.76	Clear
1/31	3:29		Pump	5	110	8.6	3.72	8.98	14.67	11.77	2.85	Clear

Surged & Bailed 2 times
~~12:41 PUMP 7:30~~

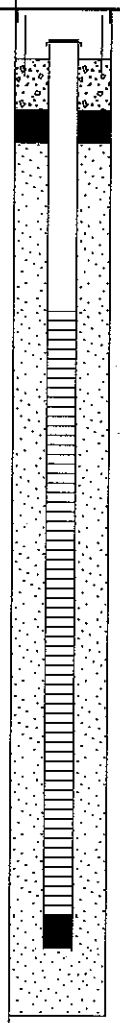
Barajas & Associates, Inc.
839 W. Harbor Dr., Suite 1
San Diego, CA 92101
Telephone: 619-338-0798
Fax: 619-338-0617

WELL NUMBER MW2

CLIENT NAVFAC SW
PROJECT NAME Hot Pit #3
PROJECT NUMBER 5106-018
PROJECT LOCATION Naval Air Station Fallon, Nevada
DATE STARTED 2/7/07 **COMPLETED** 2/7/07
GROUND ELEVATION 3933.6 ft **HOLE SIZE** 2.5 inches
DRILLING CONTRACTOR RSI Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push - Geoprobe 6620DT
AT TIME OF DRILLING 6.5 ft / Elev 3927.1 ft
LOGGED BY M.E.Sayre **CHECKED BY** Eli Vedagiri
AT END OF DRILLING ---
NOTES Drilled out to 15' w/ 10" HSA and completed as well MW2
AFTER DRILLING 6.9 ft / Elev 3926.7 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	MATERIAL DESCRIPTION	PID (ppm)
0				CONCRETE SLAB: Approximately 6 inches thick. (0.5; 3933.1)	
	HA		SM	ALLUVIUM: Gray-brown, moist to wet, medium dense, SILTY SAND; with some fine gravel. (1.1; 3932.5)	
			CL	Gray, moist, firm, sandy CLAY. (1.9; 3931.7)	
			SM	Brown-gray, moist, loose to medium dense, SILTY SAND; fine-grained with about 25% non-plastic fines. (2.7; 3930.9)	
			CL	Brown-gray to gray-brown, moist to wet, firm, fine sandy CLAY.	0.6
5	DT	90		@ 6.5': Changes to saturated. (6.9; 3926.7)	
			SW-SM	Gray, saturated, loose, WELL-GRADED SAND with a trace of silt; fine to coarse-grained. (7.7; 3925.9)	16.7
			SP	Gray-brown, saturated, loose, POORLY-GRADED SAND; fine to medium-grained with a slight fuel odor. (9.4; 3924.2)	
10	DT	96	SM	Brown, saturated, loose to medium dense, SILTY SAND; fine-grained with a moderate fuel odor. (10.2; 3923.4)	440
			CL	Brown, saturated, soft to firm, fine sandy CLAY. (11.1; 3922.5)	
			SM	Brown, saturated, loose to medium dense, SILTY SAND; fine to medium-grained. (12.0; 3921.6)	1300
15	DT	90	SP	Brown-gray, saturated, loose to medium dense, POORLY-GRADED SAND; fine to medium-grained. (15.4; 3918.2)	2.6
			SM	Brown, saturated, medium dense, SILTY SAND; fine-grained. (16.0; 3917.6)	2.2

Bottom of hole at 16.0 feet.



One Page Attachment

WELL DEVELOPMENT

PROJECT: 5106-018	WELL NO.: MW-2.
PROJECT: HOT PIT #3	WELL NO.:
JOB NO.:	SITE: Hot Pit #3

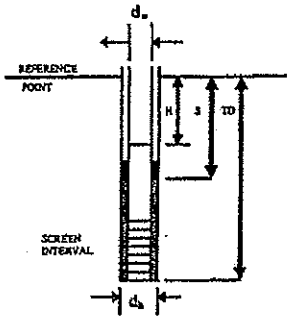
PREPARED BY
Name: PARVEEN KHOOR
Signature: Parveen

CHECKED BY
Name: MIKE SAYRE
Signature:

DEVELOPMENT CRITERIA:
PURGED WATER < 10NTU & Clear of Sand.

REMARKS:
E3 INDICATES TURBIDITY OUT OF RANGE

SOREHOLE DIAMETER d_h = 0.854 feet
WELL CASING:
INSIDE DIAMETER $d_w ID$ = 0.3355 feet
OUTSIDE DIAMETER $d_w OD$ = 0.375 feet
REFERENCE POINT: TOC
DEPTH TO:
WATER LEVEL H = 6.60 feet
BASE OF SEAL S = 2.0 feet
TOP OF SCREEN = 4.5 feet
BASE OF SCREEN = 13.5 feet
BASE OF WELL TD = 14.0 feet
ESTIMATED FILTER PACK POROSITY P = 30 %



WELL VOLUME CALCULATION

CASING VOLUME (Vc)

$Vc = \pi \left(\frac{d_w ID}{2}\right)^2 (TD - H) =$ ___ ft^3 0.654

FILTER PACK PORE VOLUME (VF)

$VF = \pi \left[\left(\frac{dh}{2}\right)^2 - \left(\frac{dwOD}{2}\right)^2\right](TD - S \text{ or } H)(P) =$ ___ ft^3 1.027

(IF S < H, USE H, IF S > H, USE S)

TOTAL WELL VOLUME (VT)

VT = VC + VF = ___ ft^3 1.681

$ft^3 \times \frac{7.48 \text{ gallons}}{ft} =$ ___ gallons 12.6

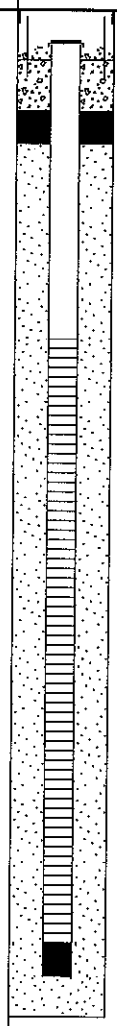
DEVELOPMENT LOG					CUMULATIVE TOTAL REMOVED		WATER QUALITY PARAMETERS mS/cm					
Date	Time Begun	Time Finished	Method	Water Removed	Gallons per-liter	Well Volumes	Turbidity (Visual or NTU)	pH	Temperature (°F) °C	Electrical Conductivity (umhos)	Dissolved Oxygen (% or mg/L)	COMMENTS
02/26	0945	1040	Bailing	10	10	0.8	E3	8.30	13.73	9.969	5.72	Surged & Bailed. — Dark brown clay color
02/26	10:45	11:22	Bailing	10	20	1.6	E3	8.61	14.43	12.32	4.86	Surged & Bailed
02/26	11:32	11:45	Bailing	10	30	2.4	E3	8.72	14.70	14.15	4.38	Surged & Bailed.
02/26	12:01	12:12	Pumping	5	35	2.8	346	8.72	14.73	14.29	2.72	Light yellow color
02/26	12:13	12:30	Pumping	5	40	3.2	56.2	8.71	14.23	14.92	1.59	Clear water - Light yellow
02/26	12:30	12:38	Pumping	5	45	3.6	4.8	8.72	14.41	14.78	1.48	Light yellow - Clear water

Barajas & Associates, Inc.
839 W. Harbor Dr., Suite 1
San Diego, CA 92101
Telephone: 619-338-0798
Fax: 619-338-0617

WELL NUMBER MW3

CLIENT NAVFAC SW
PROJECT NAME Hot Pit #3
PROJECT NUMBER 5106-018
PROJECT LOCATION Naval Air Station Fallon, Nevada
DATE STARTED 2/8/07 **COMPLETED** 2/8/07
GROUND ELEVATION 3933.4 ft **HOLE SIZE** 2.5 inches
DRILLING CONTRACTOR RSI Drilling
GROUND WATER LEVELS:
DRILLING METHOD Direct Push - Geoprobe 6620DT
AT TIME OF DRILLING 6.5 ft / Elev 3926.9 ft
LOGGED BY M.E.Sayre **CHECKED BY** Eli Vedagiri
AT END OF DRILLING ---
NOTES Drilled out to 15' w/ 10" HSA and completed as well MW3
AFTER DRILLING 6.8 ft / Elev 3926.6 ft

DEPTH (ft)	SAMPLE TYPE NUMBER	RECOVERY %	U.S.C.S.	GRAPHIC LOG	MATERIAL DESCRIPTION	PID (ppm)
0					0.5 CONCRETE SLAB: Approximately 6 inches thick. 3932.9	
			SM		ALLUVIUM: Gray-brown, moist to wet, medium dense, SILTY SAND; with some fine gravel. 1.5 3931.9	
	HA		SC		Gray-brown, moist, medium dense, CLAYEY SAND; about 45% plastic fines. 2.6 3930.8	
			SM		Brown-gray, moist, medium dense, SILTY SAND.	0.0
5					4.7 3928.7	0.0
	DT	90	CL		Brown, moist to wet, firm, fine sandy CLAY. ▽ ▼ @ 6.5': Changes to saturated. 7.2 3926.2	
			SC		Brown, saturated, loose to medium dense, CLAYEY SAND; with a slight fuel odor. 8.3 3925.1	5.6
10	DT	96	SM		Brown, saturated, loose to medium dense, SILTY SAND; fine-grained with a slight fuel odor.	1.3
					12.5 3920.9	0.6
			SP-SM		Gray-brown, saturated, loose, POORLY-GRADED SAND; fine-grained. 13.3 3920.1	
	DT	90	SM		Gray-brown, saturated, loose, SILTY SAND; fine-grained. 14.1 3919.3	0.3
15			SP-SM		Gray-brown, saturated, loose, POORLY-GRADED SAND; fine to medium-grained. 16.0 3917.4	0.9
					Bottom of hole at 16.0 feet.	



One Page Attachment

WELL DEVELOPMENT

PROJECT: S106-018	WELL NO.: MW-3
PROJECT: Hot Pit #3	WELL NO.:
JOB NO.:	SITE: Hot Pit #3

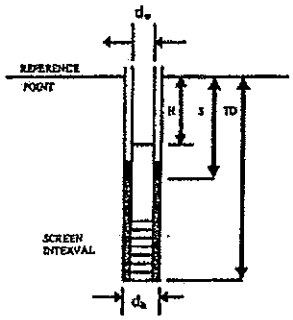
PREPARED BY
Name: PARVEEN KUMAR
Signature: Parveen

DEVELOPMENT CRITERIA:
PURGED WATER < 10 NTU & Clear of Sand.

CHECKED BY
Name: MIKE SAYRE
Signature:

REMARKS:
E3 INDICATES TURBIDITY OUT OF RANGE.

BOREHOLE DIAMETER d_b = 0.854 feet
WELL CASING:
INSIDE DIAMETER d_wID = 0.3355 feet
OUTSIDE DIAMETER d_wOD = 0.375 feet
REFERENCE POINT: TOC
DEPTH TO:
WATER LEVEL H = 5.98 feet
BASE OF SEAL S = 2.0 feet
TOP OF SCREEN = 4.9 feet
BASE OF SCREEN = 13.9 feet
BASE OF WELL TD = 14.35 feet
ESTIMATED FILTER PACK POROSITY P = 30 %



WELL VOLUME CALCULATION

CASING VOLUME (Vc)

$$Vc = \pi\left(\frac{d_w ID}{2}\right)^2 (TD - H) = __ ft^3 \quad 0.740$$

FILTER PACK PORE VOLUME (VF)

$$VF = \pi\left[\left(\frac{d_h}{2}\right)^2 - \left(\frac{d_w OD}{2}\right)^2\right](TD - S \text{ or } H)(P) = __ ft^3 \quad 1.162$$

(IF S < H, USE H. IF S > H, USE S)

TOTAL WELL VOLUME (VT)

$$VT = VC + VF = __ ft^3 \quad 1.901$$

$$ft^3 \times \frac{7.48 \text{ gallons}}{ft} = __ \text{gallons} \quad 14.2$$

DEVELOPMENT LOG					CUMULATIVE TOTAL REMOVED		WATER QUALITY PARAMETERS mg/cm					
Date	Time Begun	Time Finished	Method	Water Removed	Gallons per Liter	Well Volumes	Turbidity (Visual or NTU)	pH	Temperature (°F) °C	Electrical Conductivity (µmhos)	Dissolved Oxygen (% or mg/L)	COMMENTS
2/26	12:59	1:45	Bailing	15	15.	1.1	E3	8.93	13.85	8.842	5.93	Surged & Bailed
2/26	1:46	2:28	Bailing	15	30	2.1	E3	9.04	13.81	9.698	5.79	Surged & Bailed
2/26	2:59	3:07	Bailing	10	40	2.8	1000	9.08	13.91	10.00	5.05	Surged & Bailed - No Sand.
2/26	3:16	3:32	Pumping	5	45	3.2	64.7	9.16	13.57	8.283	4.96	
2/26	3:32	3:40	Pumping	5	48	3.4	13.6	9.13	13.62	8.643	4.59	Clear water - yellow in color
2/26	3:46	4:02	Pumping	2	50	3.5	5.1	9.14	13.43	8.438	3.3	Clear water - yellow in color

Basewide

WELL SUMMARY

Driller: Gordon A. Jensen

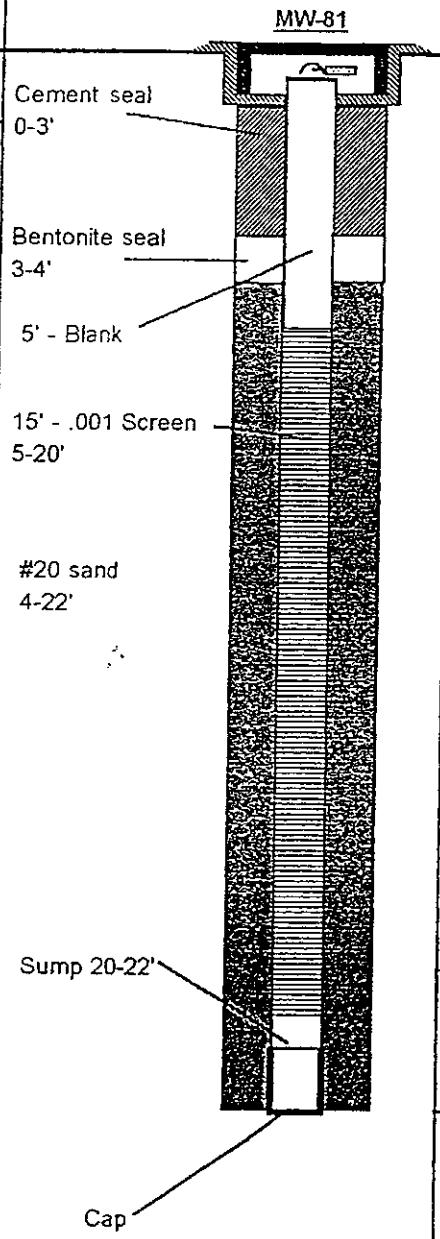
Total Depth: 22' Ground Surface El:

Date Began: 3/20/96 Top of Casing El: 3938.29

Date Finished: 3/20/96

Depth in Feet	Sample Type & Number	Recovery/drive (inches)	Blows per Foot	USCS	Profile	
0						Rolling mounds with vegetation to 4' tall
-1	SP/01	18/12	5 17	SP		Clean very poorly graded sand interbeded with silty sands, dark brown in color Damp
-5	SP/02	18/18	6 18	SW		Clean granity sand, no silt apparent - Moist Very coarse grained sand, almost to pea gravel Moist Water at 7.0' bs
10	SP/03	18/18	8 23	SP		Clean very poorly graded sand, very coarse Saturated
	GRAB		NA			Sand heaving in agers to 5' Install wood plug and drill to 22' - Installed well Sample from augers at 15.0'
						Sand as above
20	GRAB		NA	CL		Sample from augers at 20.0' yellow to grey silty clay
25						

All samples are grabs



Readings taken after Well Devolpement

pH: 7.29

Temperature: 57.1

Conductivity: 4.46

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

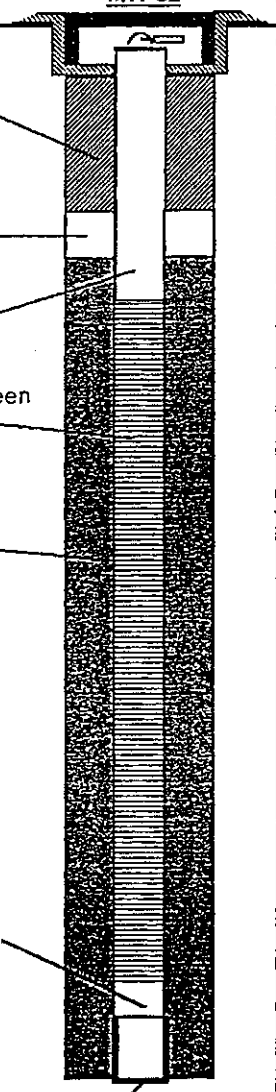
Client: Engineering field Activity, West

on: Naval Air Station Fallon, Nevada

bs - Below Ground Surface

Denotes Water Table

Depth Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	WELL SUMMARY	USCS	Profile	
							Graded lot with minor vegetation
0				Cement seal 0-3'			
1	SP/01	18/18	12 32		SW		Brown silty sand, well graded, possible fill Dry
2							
3				Bentonite seal 3-4'			
4							Silty sand, dark brown with organics, roots, ect. Moist
5	SP/02	18/18	14 15	5' - Blank			
▼				15' - .002 Screen 5-20'	SW		Water at 7.1' bs
							Clean well graded sand, grey to brown in color Saturated
10	SP/03	18/18	4 16	#20 sand 4-22'			
					SM		
	SP/04	18/18	4 16				Clean sands, brown in color, fine to medium grain trace of silt Saturated
				Sump 20-22'			
20	SP/05	18/18	14 37		CL		Yellow to grey-green clayey silt, mottled Moist
				Cap			
25				Bottom of hole at 22' bs Well set at 22' bs			



All samples are grabs

Driller: Gordon A. Jensen

Total Depth: 22' Ground Surface El:

Date Began: 3/21/96 Top of Casing El: 3936.57

Date Finished: 3/21/96

Readings taken after Well Devolpement

pH: 7.14

Temperature: 60.9

Conductivity: 9.46

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

Engineering field Activity, West

Naval Air Station Fallon, Nevada

bs - Below Ground Surface

▼ Denotes Water Table

Driller: Gordon A. Jensen

Total Depth: 22' Ground Surface El:

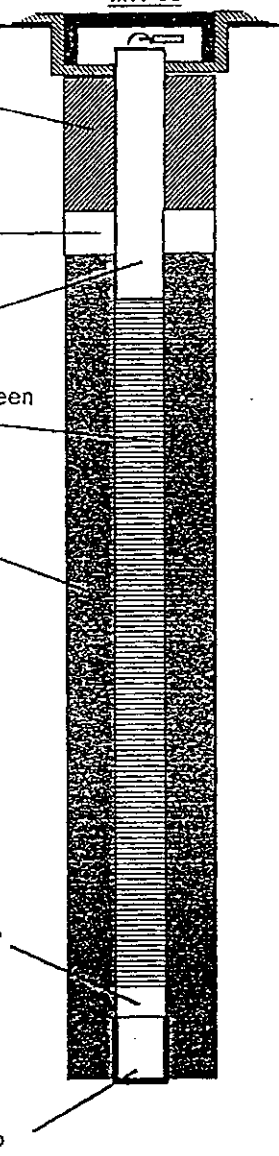
Date Began: 3/22/96 Top of Casing El: 3936.62

Date Finished: 3/22/96

Depth Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	
0						Base rock, roadside
1	SP/01	18/12	12 47	SM		Clean sand with trace silt, poorly graded from fine to medium - Moist
2						
3						
4				SP		Clean poorly graded tan to brown sand fine to coarse Moist
5	SP/02	18/12	18 55			Water at 6.3' bs
				ML		Clean sand, brown in color, fine in grade Pulled augers, install plug and drill out to 22' bs Heaving Sands
10	SP/03	18/12	12 33			
	Grab From Augers			SP		Clean poorly graded sand, more sand apparent Saturated
20	Grab From Augers			CL		Yellow to grey clayey silt Moist
25	All samples are grabs					

WELL SUMMARY

MW-83



Bottom of hole at 22' bs

Well set at 22' bs

Readings taken after Well Devolpement

pH: 6.42

Temperature: 53.6

Conductivity: 10.62

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

Engineering field Activity, West

Naval Air Station Fallon, Nevada

bs - Below Ground Surface

Denotes Water Table

Driller: Gordon A. Jensen

Total Depth: 22' Ground Surface El:

Date Began: 3/21/96 Top of Casing El: 3924.06

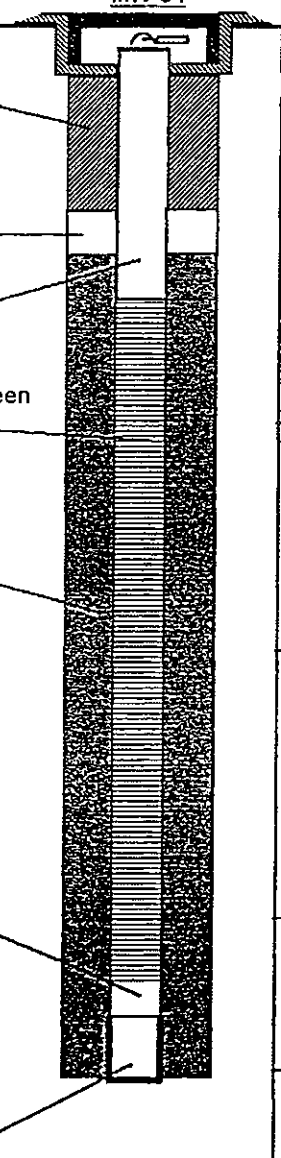
Date Finished: 3/21/96

Depth Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot	USCS	Profile	
0						Rolling mounds with vegetation, brown sandy loam
1	SP/01	18/6	12 31			
2				ML		Light brown silty sand
3						Light brown silty sand, very fine, with some organics Dry
4						
5	SP/02	18/12	5 28			Tan silty sand, fine grain - Moist Mottled with organics
▼						Water at 7.3' bs
10	SP/03	18/18	6 24	ML		Brown mottled silty sand, very fine grain Saturated
	SP/04	18/18	6 31	ML		Fine grain sand with trace silt Saturated
20	SP/05	18/18	6 26	CL		Yellow to grey silty clay interbeded with fine sands Moist
25						

All samples are grabs

WELL SUMMARY

MW-84



Bottom of hole at 22' bs

Well set at 22' bs

Readings taken after Well Devolpement

pH: 6.48

Temperature: 61.4

Conductivity: Conductivity is higher than range on meter

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

t: Engineering field Activity, West

tion: Naval Air Station Fallon, Nevada

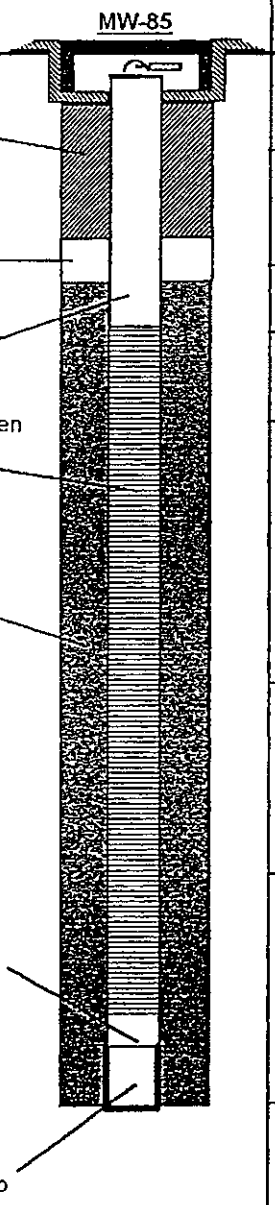
bs - Below Ground Surface

▼ Denotes Water Table

Depth Feet	Sample Type & Number	Recovery/drive (Inches)	Blows per Foot
	SP/01	18/18	8 21
	SP/02	18/18	7 22
	SP/03	18/18	7 22
	SP/04	18/18	4 13
	SP/05	18/18	5 18

All samples are grabs

WELL SUMMARY



Bottom of hole at 22' bs
Well set at 22' bs

Driller: Gordon A. Jensen

Total Depth: 22' Ground Surface El:

Date Began: 3/19/96 Top of Casing El: 3936.62

Date Finished: 3/19/96

USCS	Profile	
		Sandy, gravelley loam with vegetation present
SP		Poorly graded silty sands, light to dark brown in color Dry to Moist
OL		Clayey silt with organics, turning to clean sand at 5.0' bs - Moist
SM		Interbeded silty sands to clean sands Water at 6.3' bs
ML		Clean well graded fine sands with trace of silt Saturated
ML		Yellow to grey silty sands Saturated
CL		Yellow to grey clayey silt

Readings taken after Well Devolpement

pH: 6.52

Temperature: 61.7

Conductivity: Conductivity is higher than range on meter

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.

Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457

Engineering field Activity, West

Naval Air Station Fallon, Nevada

bs - Below Ground Surface

▼ Denotes Water Table

Depth Feet	Sample Type & Number	Recovery/drive (inches)	Blows per Foot	WELL SUMMARY	USCS	Profile	Driller: Gordon A. Jensen Total Depth: 22' Ground Surface El: Date Began: 3/21/96 Top of Casing El: 3923.86 Date Finished: 3/21/96
0				MW-86			Rolling mounds, silty sand - vegetation
1	SP/01	18/18	6 22	Cement seal 0-3'	SM		Brown silty sand to sandy sily interbeded Moist
2 3 4				Bentonite seal 3-4' 5' - Blank			
5	SP/02	18/18	5 12		SM		Brown silty sand with organics present Damp
				15' - .002 Screen 5-20'	SM		Water at 7.5' bs Broke Hammer Cable
10	SP/03	18/18	6 24	#20 sand 5-22'			Brown clean sand, very fine in grain size, some silt Organics with tan staining Saturated
					ML		
	SP/04	18/18	8 26		CL		
20				Sump 20'-22'			Yellow to grey clayey silt interbeded sands very fine Moist
				Cap			
25				Bottom of hole at 22' bs Well set at 22' bs			
	All samples are grabs						Readings taken after Well Devolpement pH: 6.40 Temperature: 53.5 Conductivity: Conductivity is higher than range on meter

Drill Method: Hollow Stem Auger, 8.25" O.D. X 4.25" I.D.
Sampling Method: California Modified Sampler/Grab

Project No: N62474-95-D-3457
Engineering field Activity, West
Naval Air Station Fallon, Nevada

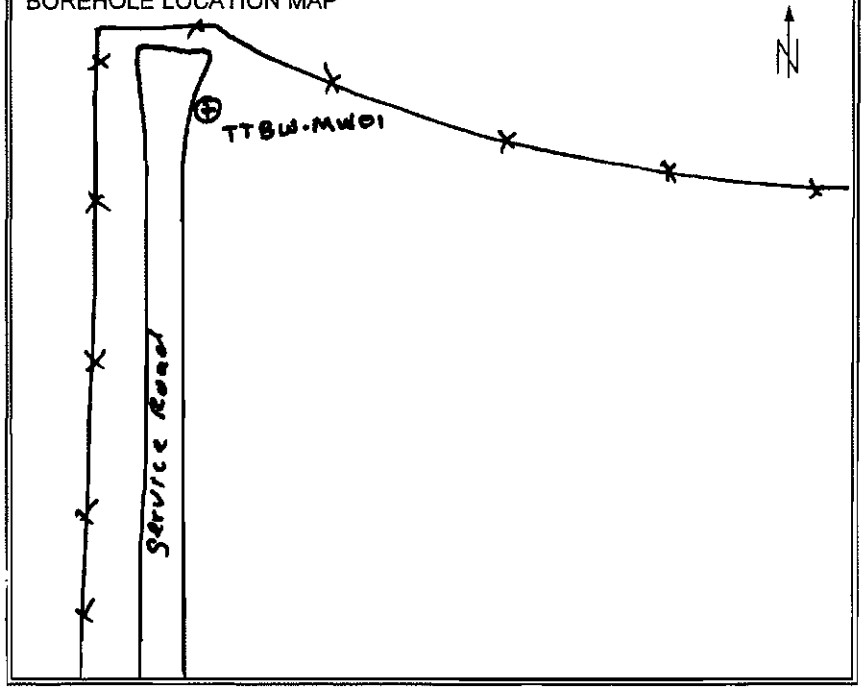
bs - Below Grade Surface
Denotes Water Table

BOREHOLE LOG

Tt

Boring ID: ———	
Monitoring Well ID: TTBW-MW01	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill & Install
Client: Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Marl MS Rhino	
Sampler Type: direct push w/ sleeve liner	
Borehole Diameter (inches): 8.0"	to: 19.0 feet bgs
Overdrilled Diameter (inches): ———	to: ——— feet bgs
Drill Start Date: 3-12-08	Drill Start Time: 1410
Drill Finish Date: 3-12-08	Drill Finish Time: 1427
Total Borehole Depth (feet bgs): 19.0	
Soil Boring Backfill Date: ———	Soil Boring Backfill Time: ———
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 5.5	Date: 3-12-08 Time: 1415
Depth to Other Water-Bearing Zones (feet bgs): ———	
Depth to Water After Drilling (feet bgs): ———	
Well Completion Date: 3-12-08	Well Completion Time: 1430
Screen Interval (feet bgs): 3.0-18.0	Total Well Depth (feet bgs): 18.5
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs): ~~4.30~~ 6.0	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation:
CTO:
BORING ID:

DATE: 3-12-08
LOGGED BY: J Vaughn

MW ID: TTBW-MW01

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1410								SM	0.0 - ~~5.0~~ 5.5. silty sand (SM), olive brown (2.5Y 4/3), very soft, low plasticity, dry to moist, subrounded fine to coarse qtz + feldspar + vole. lithics.		10	50	20	20
								2.0' sch 40 PVC								
									5.5	SM	5.5 - 12.0. silty sand, olive brown (2.5YR 4/3), very soft, low plasticity, wet, subrounded fine to med qtz, biot., felds.		5	50	20	25
		1415														
								0.010 slot PVC sch 40 screen								
		1417								SW	12.0 - 13.0. sand (SW), brown (10YR 5/3), very ~~soft~~ loose, low plasticity, wet, subround fine, felds, biot.			75	20	5
										SC	13.0 - 14.0. ~~silty sand, olive brown~~ silty/clayey sand, v. soft, med plasticity, wet, subround.				75	25
										SM	14.0 - 16.0, silty sand, olive brown (2.5YR 4/3). v. soft, low plasticity, wet, subround fine to coarse qtz, biot., felds.		5	50	20	25
		1420								CL	16.0 - 19.0, clay, light olive gray (5Y 6/2), very stiff, low plasticity, moist.					100
		1427						End cap			TD at 19.0					

dark olive gray brown (2.5Y 4/2)

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW01
PROJECT: NAS Fallon
SITE: Base wide
BOREHOLE NO.: NA
WELL PERMIT NO.: N
TOC TO BOTTOM OF WELL: ~~15.5~~ 20.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-12-08 TIME: 1410
WELL INSTALLATION BEGAN:
DATE: 3-12-08 TIME: 1420
WELL INSTALLATION FINISHED:
DATE: 3-12-08 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: Jason Reff
LICENSE: M2320
DRILL RIG: Marl MS Rhino
DRILLING METHOD:
- ☑ HOLLOW STEM AUGER
- ☐ AIR ROTARY
- ☐ OTHER:

DIAMETER OF AUGERS
ID: ~~8.0"~~ 4 1/4" OD: ~~4 1/4~~ 8.0" N

WELL CASING

- ☑ SCHEDULE 40 PVC
- ☐ OTHER:

PRODUCT: Riser pipe
MFG. BY: Bert Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 5.0'

WELL SCREEN

- ☑ SCHEDULE 40 PVC
- ☐ OTHER:

PRODUCT: Screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

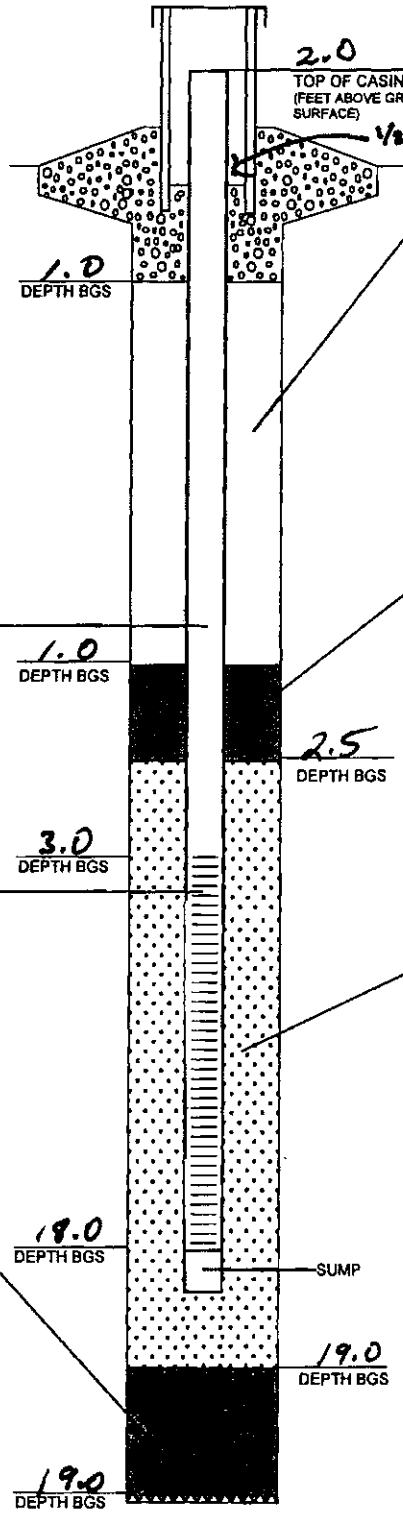
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- ☐ BENTONITE CHIPS, SIZE:
- ☐ BENTONITE PELLETS, SIZE: N
- ☐ SLURRY:
- ☐ FORMATION COLLAPSE:
- ☐ OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- ☐ POURED ☐ TREMIE
- ☐ OTHER:

SURFACE COMPLETION

- ☐ FLUSH MOUNT
- ☑ ABOVE GROUND WITH BUMPER POST (2)
- ☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- ☐ GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT: N
  - BENTONITE:
  - WATER:
- ☐ PREPARED MIX
  - PRODUCT:
  - MFG. BY:

METHOD INSTALLED:
- ☐ POURED ☐ TREMIE
- ☑ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: 1/2 bag (50 lb bags)
- ☐ PELLETS, SIZE:
- ☑ CHIPS, SIZE: 3/8 (coarse)
- ☐ OTHER:

PRODUCT: Hole plug chips
MFG. BY: Baroid
METHOD INSTALLED:
- ☑ POURED ☐ TREMIE
- ☐ OTHER:

AMOUNT OF WATER USED: 4.5 gal

FILTER PACK

- ☐ PREPACKED FILTER

VOLUME CALCULATED: 21.5 ft³
AMOUNT USED: 7 (8 sacks (100 lb/sack))
- ☑ SAND, SIZE: #2/16

PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
- ☑ POURED ☐ TREMIE
- ☐ OTHER:

WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- ☐ YES
- ☑ NO; instal inside of augers

CENTRALIZER DEPTHS:

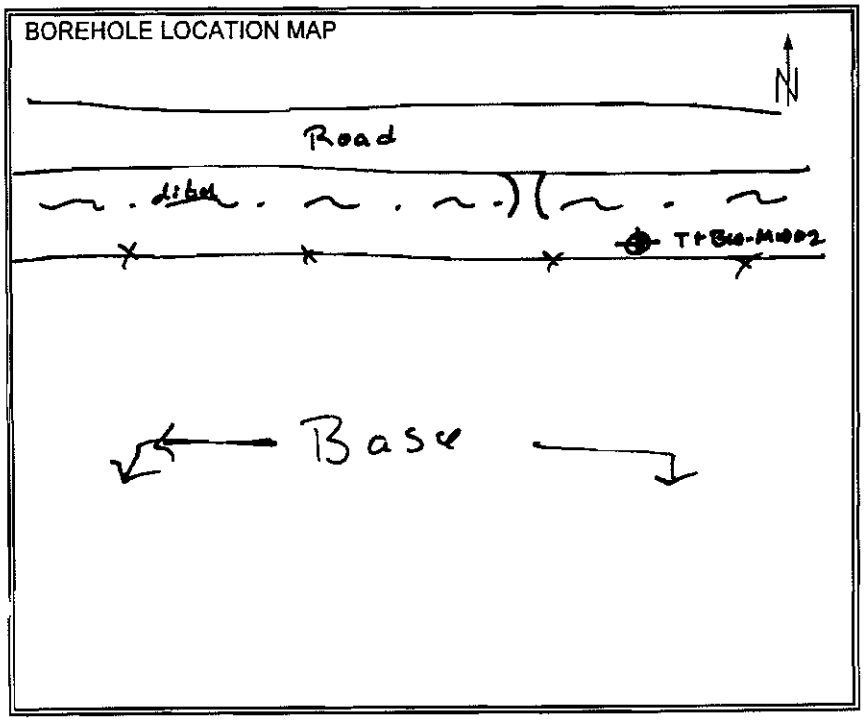
LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Tt

Boring ID: ~~TT-BW-~~	
Monitoring Well ID: TTBW-MW02	
Project Number: 4302.300	Project Name: NAS Fallon
Client: Navy	
Site: Baseside	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mark MS Rhino	
Sampler Type: direct push	
Borehole Diameter (inches): 8.0	to: 19.0 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-17-08	Drill Start Time: 1422
Drill Finish Date: 3-17-08	Drill Finish Time: ~~1534~~ 1438
Total Borehole Depth (feet bgs): 19.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6.8	Date: 3-18-08 Time: 1428
Depth to Other Water-Bearing Zones (feet bgs):	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-18-08	Well Completion Time: 1537
Screen Interval (feet bgs): 3.0-18.0	Total Well Depth (feet bgs): 18.3
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 3-17-08
LOGGED BY Jordan Vaughn

MW ID: TTBW-MW02

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1422								SP	0.0 - ~~6.0~~ 5.5, sand, olivebrown(2.5Y 4/3), medium dense, non-plastic, moist, sub angular qtz, feldsp, volc. Lithics.				90	10
									1							
									2							
									3							
									4							
		1426							5							
									6							
										CL	~~6.0~~ 5.5 - 6.8, clay, greenish gray (GLEY 5/1), stiff, plastic, moist					100
									6.8	SP	6.8 - 7.8 ~~clayey sand~~ sand, olive gray (5Y 5/2), loose, low plasticity, wet, subangular qtz, felds, biot.				90	10 ~~20~~
		1428							8	CL	7.8 - 8.5, clay, olive (5Y 5/3), stiff, plastic, wet.					100
									9	SP	8.5 - 9.5, sand, olive gray (5Y 5/2), loose, lowplasticity, wet, subangular qtz, felds, biot.				90	10
									10	CL	9.5 - 17.0, clay, olive gray (5Y 5/2), stiff, plastic, moist.					100
									11							
		1431							12							
									13							
									14							
									15							
		~~1435~~							16							
									17	SC	17.0-17.5, clayey sand, olive gray (5Y 5/2) loose, plastic, wet, subangular qtz, felsp, biot.				75	25
									18	CL	17.5 - 19.0. Clay, olive gray (5Y 5/2) stiff, plastic, moist.					100
		1438							19							
									20							

148335 13.30 ft N 25905 43.84 ft E

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW02
PROJECT: NAS Fallon
SITE: Base wide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-17-08 TIME: 1422
WELL INSTALLATION BEGAN:
DATE: 3-17-08 TIME: 1452
WELL INSTALLATION FINISHED:
DATE: 3-17-08 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MS Rhino
DRILLING METHOD.
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4 1/4" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bert Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 5.0

WELL SCREEN

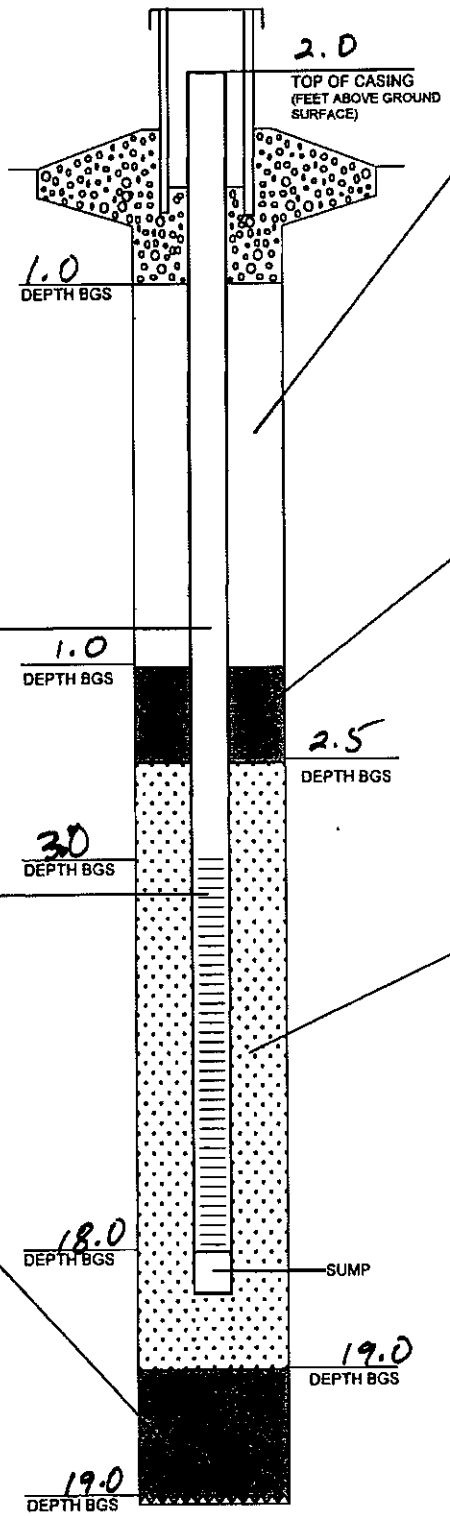
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST (2)
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0
AMOUNT USED: 1/2 x 50lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Bentonite chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 21.5 ft3
AMOUNT USED: 6 x 100lb sacks
☑ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 19.19
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO; installed in auger
CENTRALIZER DEPTHS:

LEGEND

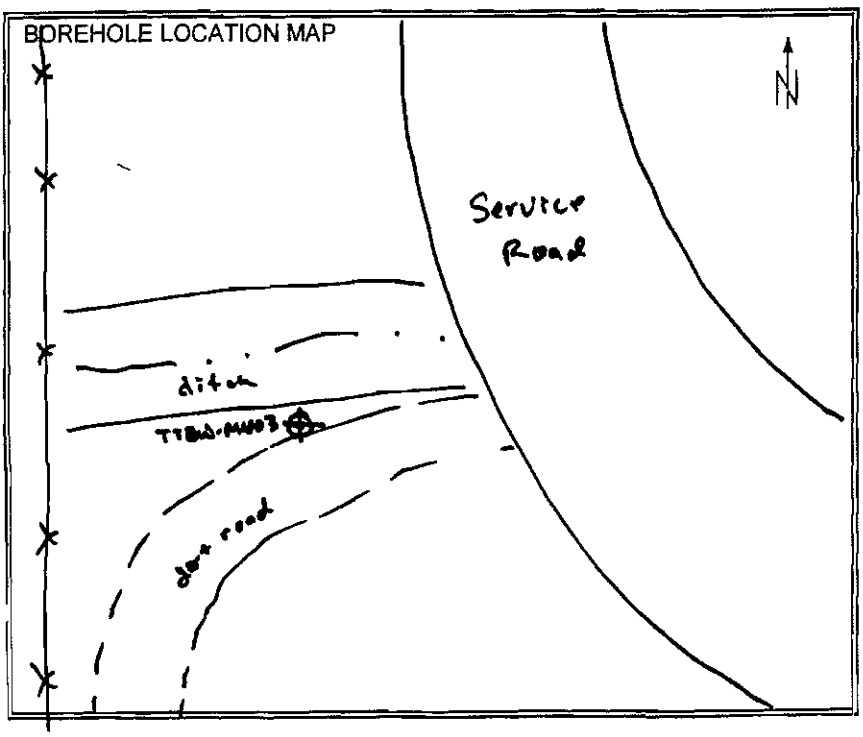
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID: TTBW-MW03	
Monitoring Well ID: —	
Project Number: ~~4302.400~~ 4302.300.04.03	Project Name: NAS Fallon Drill + Install
Client: Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Marl MS Rhino	
Sampler Type: direct push w/ sleeve liner	
Borehole Diameter (inches): 8.0"	to: ~~18.0~~ 18.5 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-14-08	Drill Start Time: 0943
Drill Finish Date: 3-14-08	Drill Finish Time: 1004
Total Borehole Depth (feet bgs): 18.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 5.0	Date: 3-14-08 Time: 0949
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-14-08	Well Completion Time: 11:00
Screen Interval (feet bgs): 3.0 - 18.0	Total Well Depth (feet bgs): 18.5
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID:
MW ID: JTBW-MW03

DATE: 3/14/08
LOGGED BY: Jordan Vaughn
Page | of

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0943								SM	0.0-5.0 siltysand, light olive brown (2.5Y 5/3), loose, Non plastic, Moist, subrounded qtz, flds, biot, volc. lithics			5	75	20
									1							
									2							
									3							
									4							
		0949							5 ▽							
										SW	5.0-6.5 sand, light olive brown (2.5Y 5/3), loose, Non plastic, wet, subrounded qtz, flds, volc lithics, biot.			5	85	10
									6							
									7	SC	6.5-7.5 clayey sand, grayish brown (2.5Y 5/2), loose, Mod plasticity, wet, subrounded qtz, flds.				75	25
		0952							8							
									9							
									10		9.5					
									11	SW SP	11.0-15.0 sand, gray (2.5Y 5/1), loose, Non plastic, wet, subangular qtz, flds, biot, volc lithics. Grain size increases w/ depth		5	85	10	
		0956							12							
									13							
									14							
									15	SW	15.0-18.0, sand, light yellowish brown (2.5Y 6/3), v. loose, Non plastic, wet, subrounded qtz, feldsp, volc. lithics, biot.		35	60	5	
		0959							16							
									17							
		1004							18		TDat 18.0 ft					
									19							
									20							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW03
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3/14/08 TIME: 0943
WELL INSTALLATION BEGAN:
DATE: 3/14/08 TIME: 1011
WELL INSTALLATION FINISHED:
DATE: 3/14/08 TIME: 11:00
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mori M5 Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4 1/4" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bert Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 5.0'

WELL SCREEN

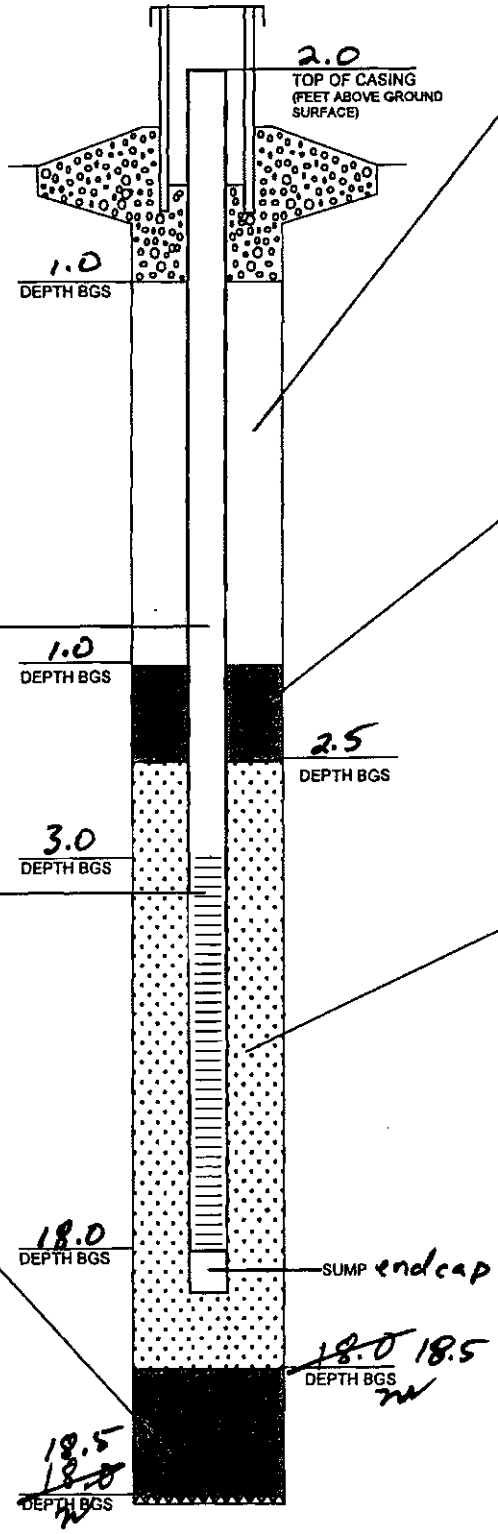
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST (2)
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: ½ x 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Hole plug Bentonite Chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 20.8 ft³
AMOUNT USED: 6 x 100 lb sacks
☑ SAND, SIZE: #2/16
PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 5.0'
(~~BTOC~~ AFTER WELL INSTALLATION) bgs

CENTRALIZERS USED?

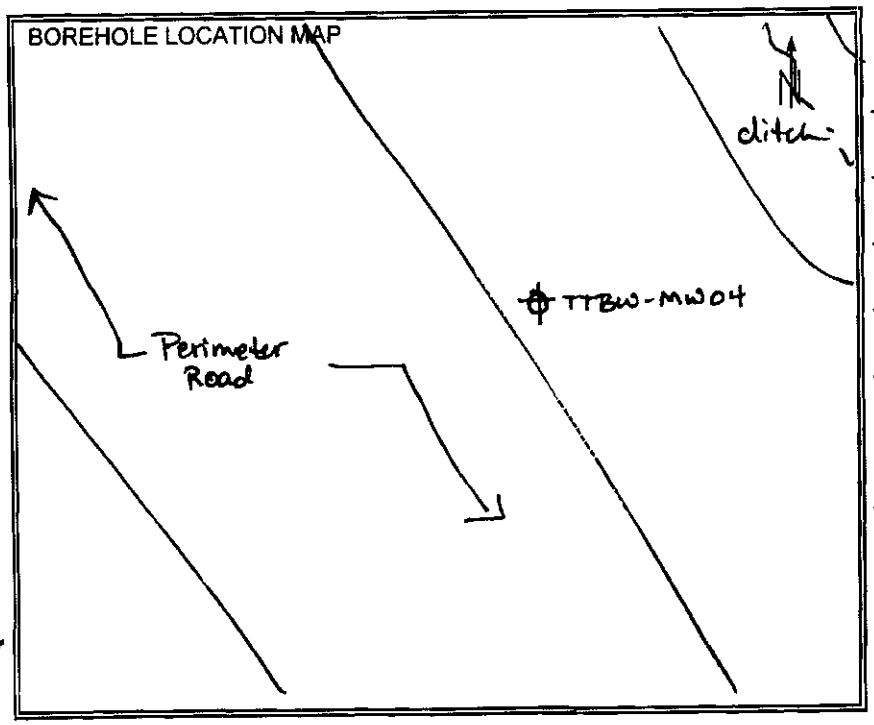
☐ YES ☑ NO: ~~poured to~~ install inside auger
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TTBW - MW04	
Project Number: 4302.30.04.03	Project Name: NAS Fallon Drill + Install
Client: Navy	
Site: basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mark M5 Rhino	
Sampler Type: direct push w/ sleeve liner	
Borehole Diameter (inches): 8.0"	to: 20.0 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-20-08	Drill Start Time: 1044
Drill Finish Date: 3-20-08	Drill Finish Time: 1057
Total Borehole Depth (feet bgs): 20.0	
Soil Boring Backfill Date: — MW installed	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 9.7	Date: 3-19-08 Time: 1053
Depth to Other Water-Bearing Zones (feet bgs):	
Depth to Water After Drilling (feet bgs): 11.7'	
Well Completion Date: 3-19-08	Well Completion Time: 1150
Screen Interval (feet bgs): 14.5 - 19.5	Total Well Depth (feet bgs): 19.8
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs): 11.7'	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: NAS
CTO:
BORING ID:

MW ID: TTBU2MW04

LOGGED BY: Jordan Vaughn

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Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1044								SW	0.0-9.7 sand, brown (10YR 4/3), loose, non-plastic, moist, subrounded qtz, feldsp, volc. lithics.	10	30	40 50	10	10
									1							
									2							
									3							
									4							
		1050							5							
									6							
									7							
		1051							8							
									9							
									9.7 10	SW	9.7-10.7, ~~San~~ sand, brown (10YR 5/3) loose, low plasticity, wet, subrounded qtz, volc. lithics, biotite, feldsp.	5	30	45	10	10
									11	SC	10.7-11.2, clayey sand, light olive brown (2.5Y 5/4), soft, plastic, wet, subangular qtz, volc, biot.			5	65	30
		1053							12	SM	11.2-14.0, silty sand, light olive brown (2.5Y 5/3), soft, low plasticity, wet, sub rounded qtz, feld, biot				65	35
									13							
									14	ML	14.0-15.5, silt, pale olive (5Y 6/3), stiff, low plasticity, moist.				10	90
									15							
		1055							16	CL	15.5-20.0, clay, pale olive (5Y 4/3) stiff, plastic, moist					100
									17							
									18							
									19							
		1057							20		TD at 20.0					

JAD 83 1482847 5.84 ft N
2591180.59 ft E

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW04
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 22.3'

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-20-08 TIME: 1044
WELL INSTALLATION BEGAN:
DATE: 3-20-08 TIME: 1106
WELL INSTALLATION FINISHED:
DATE: 3-20-08 TIME: 1150
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375
LENGTH OF CASING: 7.0'

WELL SCREEN

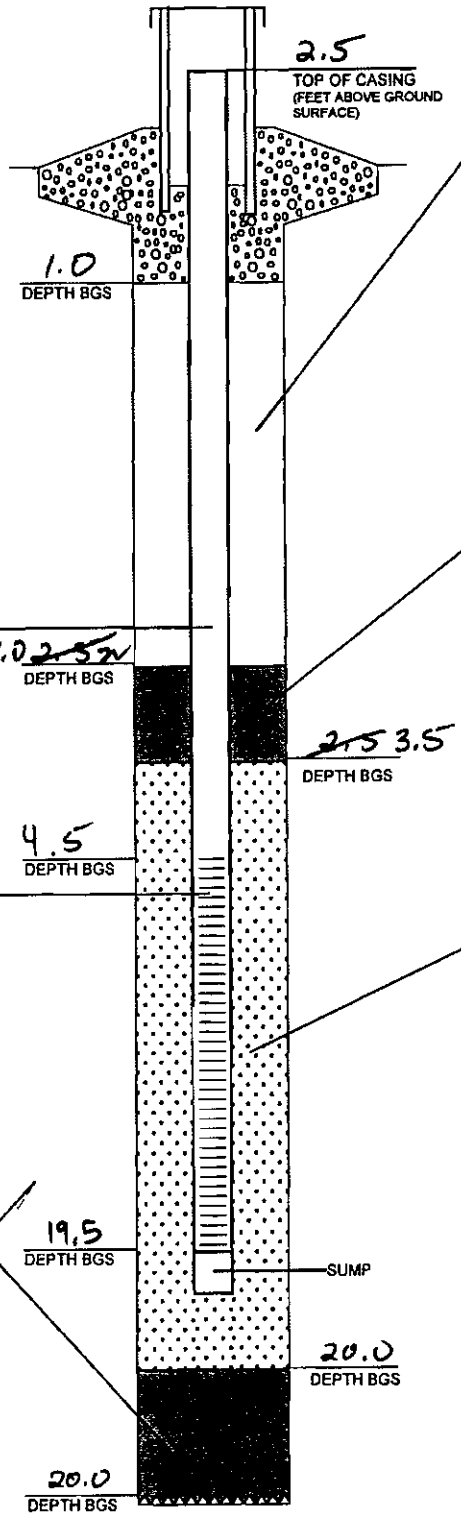
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010"
LENGTH OF SCREEN: 15.0

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST (2)
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 3.3 ft³
AMOUNT USED: ~~X~~ 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Baroid Bentonite chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 6 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 21.5 ft³
AMOUNT USED: 8 x 100 lb sacks
☑ SAND, SIZE: 2/16
PRODUCT:
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 14.19'
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO; installed in augers
CENTRALIZER DEPTHS:

LEGEND

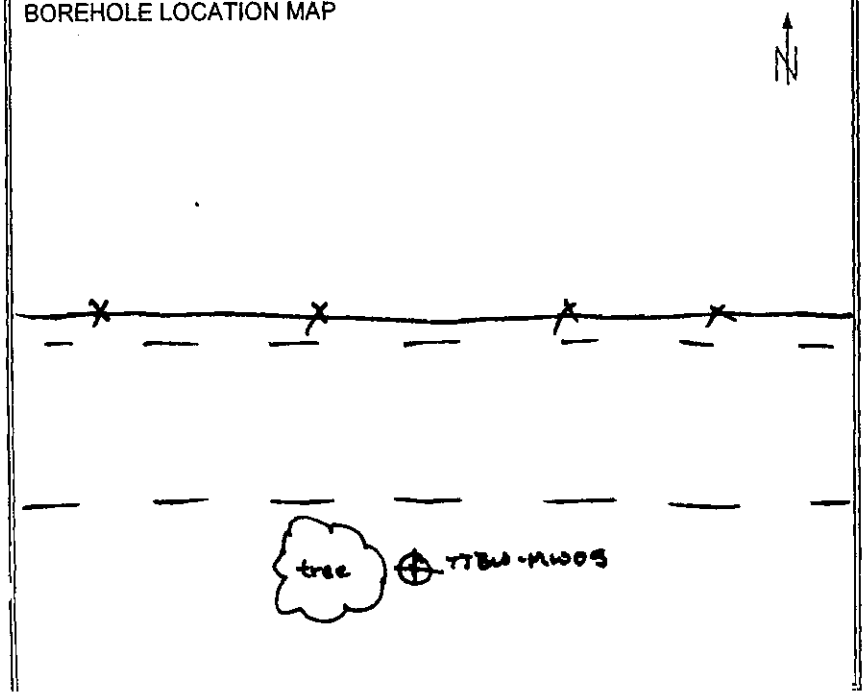
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID: —	
Monitoring Well ID: TTBW-MW05	
Project Number: 4302.30D.04.03	Project Name: NAS Fallon Drill + Install
Client: Navy	
Site: basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mari M5 Rhino	
Sampler Type: direct pushing sleeve liner	
Borehole Diameter (inches): 8.0"	to: 20.0 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-17-08	Drill Start Time: 0753
Drill Finish Date: 3-17-08	Drill Finish Time: 0813
Total Borehole Depth (feet bgs): 20.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 10.5	Date: 3-17-08 Time: 0806
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-17-08	Well Completion Time: 0903
Screen Interval (feet bgs): 4.7-19.7	Total Well Depth (feet bgs): 20.0
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 3-17-08
LOGGED BY: J. Vaughn

MW ID: TTBW-MW05

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0753								SW	0.0 - 7.0 sand, light olive brown (2.5Y 5/3) loose, Non-plastic, moist, subangular qtz, felds,			20	70	10
									1							
									2							
									3							
									4							
		0802							5							
									6							
									7	SP	7.0 - 10.5, sand, light olive brown (2.5Y 5/3) loose, Non-plastic, Moist, subangular qtz, felds, volc. lithics.			80	15	5
		0804							8							
									9							
									10							
									11	SP	10.5 - 11.0, sand, light olive brown (2.5Y 5/3) loose, Non-plastic, wet, subangular qtz, felds, volc.			85	10	5
		0806							12	CL	11.0 - 11.8, clay, light olive brown (2.5Y 5/4) stiff, plastic, Moist.					100
									13	SP	11.8 - 13.0, sand, light olive brown (2.5Y 5/3) loose, Non plastic, wet, subangular qtz, felds, vol.			85	15	
									14	SC	13 - 18.5, clayey sand, light olive brown (2.5Y 5/3), medium dense, ~~mod.~~ plastic, wet, subangular qtz, felds, volc. lithics.					25
									15							
		0810							16							
									17							
									18							
									19	CL	18.5 - 20.0, clay, olive (5Y 5/4), soft, plastic, wet.					100
		0813							20		TD at 20.0'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

ORIG WELL

MONITORING WELL

MONITORING WELL NO.: TTBW-MW05
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: ~~20.5~~ 22.8

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-17-08 TIME: 0753
WELL INSTALLATION BEGAN:
DATE: 3-17-08 TIME: 0821
WELL INSTALLATION FINISHED:
DATE: 3-17-08 TIME: 0905
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bert Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: ~~8.0~~

WELL SCREEN

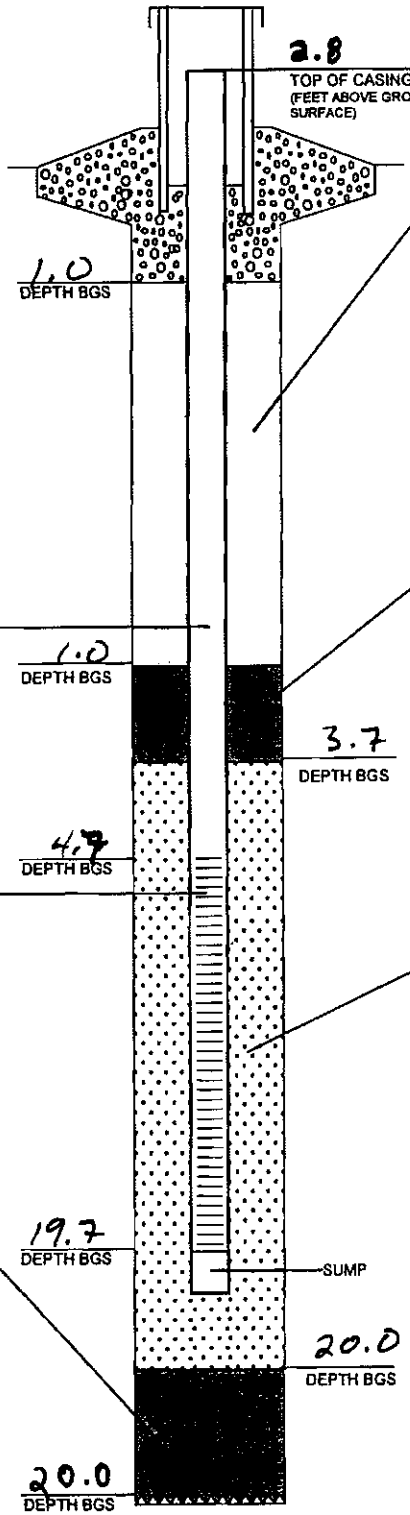
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND ~~WITH BUMPER POST~~
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 3.5 ft³
AMOUNT USED: 1 x 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Holeplug bentonite chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 21.2 ft³
AMOUNT USED: 6½ x 80 lb sacks
☑ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: Conley
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 13.96
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

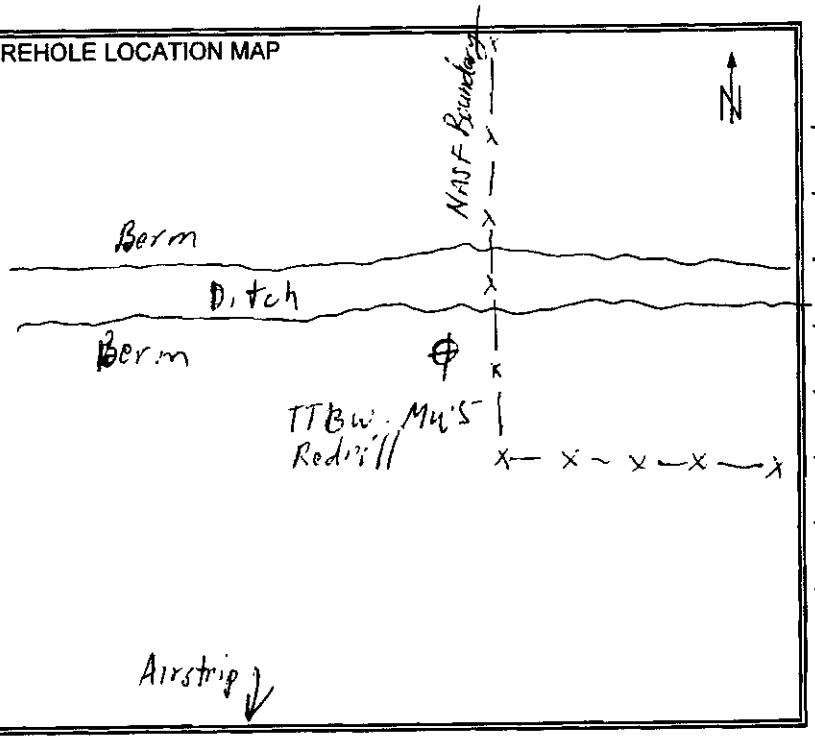
☐ YES ☑ NO: installed in auge
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TTBW-MW05 Redrill	
Project Number: I4302300100	Project Name:
Client: U.S. Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mari MS Rhino / Hollow stem auger	
Sampler Type: Acetate sleeve	
Borehole Diameter (inches): 8	to: 24 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 3-24-08	Drill Start Time: 1207
Drill Finish Date: 3-24-08	Drill Finish Time: 1228
Total Borehole Depth (feet bgs): 24	
Soil Boring Backfill Date:	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 13	Date: 3-24-08 Time: 1222
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 3-24-08	Well Completion Time:
Screen Interval (feet bgs): 13-23	Total Well Depth (feet bgs): 23
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Original well TTBW-MW05 drilled in wrong location - approx 800' east of redrill loc

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 5-24-06
LOGGED BY: R. Knapp

MW ID: TTBW-MW05 redrill

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
Hand Auger										ML	Silt, olive gray (5Y 5/2), loose, dry			10	35	55
									2							
		1207	3							SM	Silty sand, light olive brown (2.5Y 5/4), loose, dry			10	80	10
									4							
		1217	30/36							S	As above					
Acetate sleeves									6	SP	Sand, yellowish brown (10YR 5/4), loose, moist, poorly graded			35	60	5
									8	SP	Sand, poorly graded, light yellowish brown (2.5Y 6/3), loose, moist			15	85	
		1219	40/48						10							
										CL	Clay, very dark grayish brown (2.5Y 4/2), med stiff, damp, sl plastic					100
		1222	48/48						12	SC	~~Sandy clayey~~ Clayey sand, lt olive brown (2.5Y 5/3), med dense, damp			5	70	25
									▽	SP	Sand, dark yellowish brown (10YR 4/4), med dense, wet, poorly graded			10	80	10
									14	SC	Clayey Sand, olive brown (2.5Y 4/3), med dense, wet				70	30
		1224	48/48						16	SP	Sand, poorly graded, olive brown (2.5Y 4/4), loose, wet			15	80	5
									18	CL	Clay, silty, olive (5Y 5/3), soft, micaceous, damp, some brown mottling				5	95

14827631 N
2591772 E

Installation: NAS Fallon
CTO:
BORING ID:

DATE:
LOGGED BY: R. Kiapp

MW ID: TBW-MW05 Redrill

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1228	48/48							SM	Silty sand, olive brown (2.5Y 4/4) med dense, wet			5	60	35
									22	CL	Clay, pale olive (5Y 6/3), very stiff, plastic; damp					100
									24							

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBU-MWC5 Redrill
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 25

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3/24/08 TIME: ~~1440~~ 1247
WELL INSTALLATION BEGAN:
DATE: 3/24/08 TIME: 1240
WELL INSTALLATION FINISHED:
DATE: 3/24/08 TIME: 1330
DRILLING CO.: Gregg
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mail MS Rhino
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4.25 OD: 8"

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Riser pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 5

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: Screen
MFG. BY: Manufac
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15'

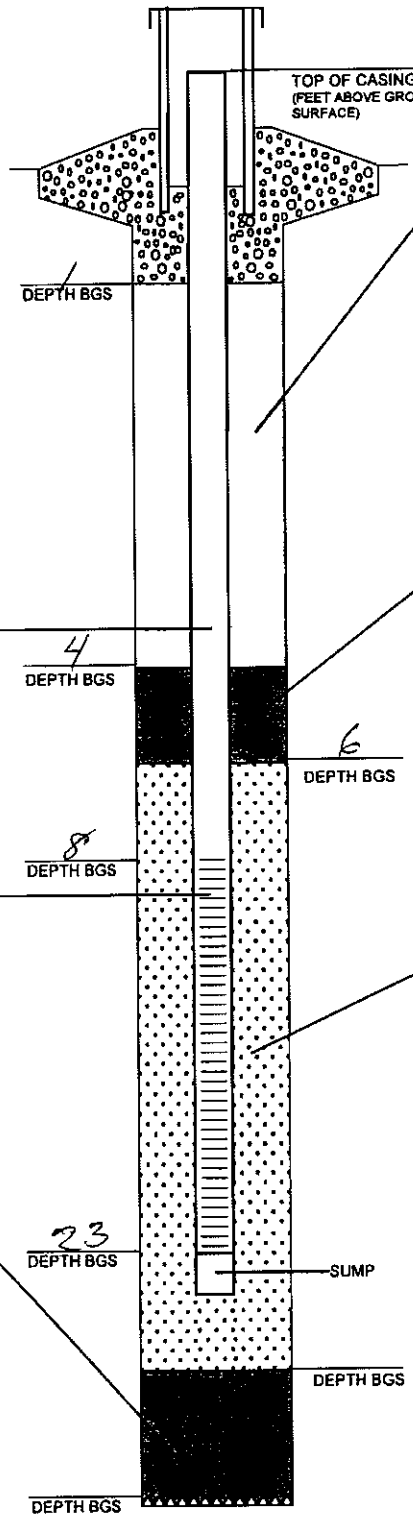
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST
- [x] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [ ] PREPARED MIX
  - PRODUCT:
  - MFG. BY:

METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 50 lb
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: 3/8
- [ ] OTHER:

PRODUCT: Hole Plug
MFG. BY: Baroid
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 6

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED: 2.5 x 100 lb sack
- [x] SAND, SIZE: 2/16

PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

WATER LEVEL: 13
(~~BTOC AFTER WELL INSTALLATION~~)

CENTRALIZERS USED?

- [ ] YES
- [x] NO;

CENTRALIZER DEPTHS:

LEGEND

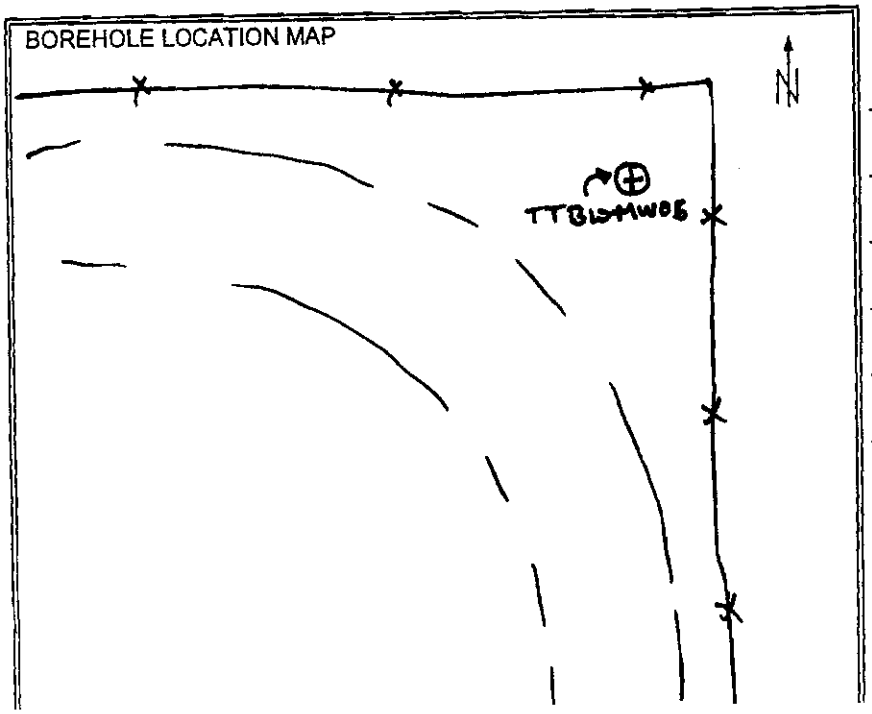
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID:	
Monitoring Well ID: TTBW-MW06	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill + Install
Client: Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Marl MS Rhino	
Sampler Type: direct push w/ sleeve liner	
Borehole Diameter (inches): 8.0"	to: 18.0 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-17-08	Drill Start Time: 0914
Drill Finish Date: 3-17-08	Drill Finish Time: 0936
Total Borehole Depth (feet bgs): 18.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 4.5	Date: 3-17-08 Time: 0918
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-17-08	Well Completion Time: 1020
Screen Interval (feet bgs): 2.3 - 17.3	Total Well Depth (feet bgs): 17.6
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 screen
Static Water Level After Well Installation (feet bgs): 7.52'	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 3-17-08
LOGGED BY: Jordan Vaughn

MW ID: TTBW-MW06

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0914								SP	0.0-4.5 sand, light olive brown (2.5Y 5/4) loose, non-plastic, moist, subangular qtz, felds, volc. lithics.			10	80	10
									1							
									2							
									3							
									4							
		0918							5	SP	4.5-7.0 sand, light olive brown (2.5Y 5/3) loose, non-plastic, wet, subrounded qtz, felds, volc. lithics		20	75	5	
									6							
									7	CL	7.0-9.0 clay, light olive brown (2.5Y 5/3), soft, plastic, wet.				5	95
		0920							8							
									9	SC	9.0-10, clayey sand, light olive brown (2.5Y 5/3) soft, plastic, wet, subrounded qtz, felds				80	40
									10	CL	10.0-13.0 clay, light grayish brown ~~soft~~ medium stiff, plastic, wet.					100
									11							
		0922							12							
									13	SW	13.0-16.5 sand, light olive brown (2.5Y 5/3) loose, non-plastic, wet, subrounded qtz, felds, volc lithics.	20	70	5	5	
									14							
									15							
		0926							16							
									17	CL	16.5-18.0 clay, ~~light~~ olive (5Y 5/3) soft, plastic, wet.					100
		0930							18		TD at 18.0					
									19							
									20							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW06
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-17-08 TIME: 0914
WELL INSTALLATION BEGAN:
DATE: 3-17-08 TIME: 0940
WELL INSTALLATION FINISHED:
DATE: 3-17-08 TIME: 1020
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart Longyear
CASING DIAMETER:
ID: 2.067" OD: ~~2.0~~ 2.375"
LENGTH OF CASING: 5.0

WELL SCREEN

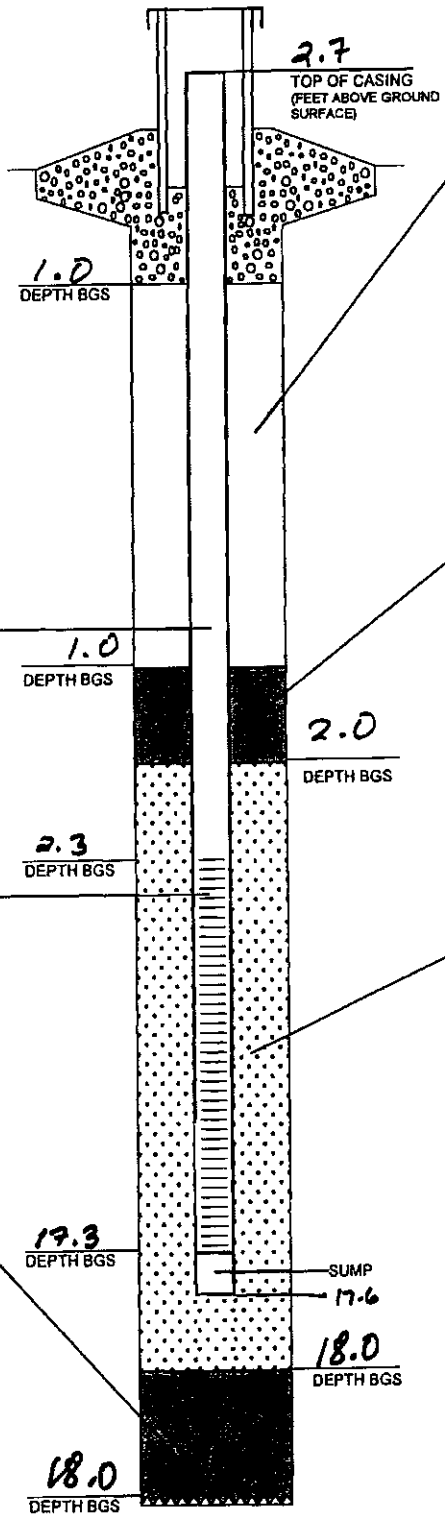
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Memoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 1.3 ft³
AMOUNT USED: ½ × 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Bentonite Chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 3 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 20.8 ft³
AMOUNT USED: 5½ × 100 lb sacks
☑ SAND, SIZE: #2/16
PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 10.22'
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO; installed on auger
CENTRALIZER DEPTHS: 10.22'

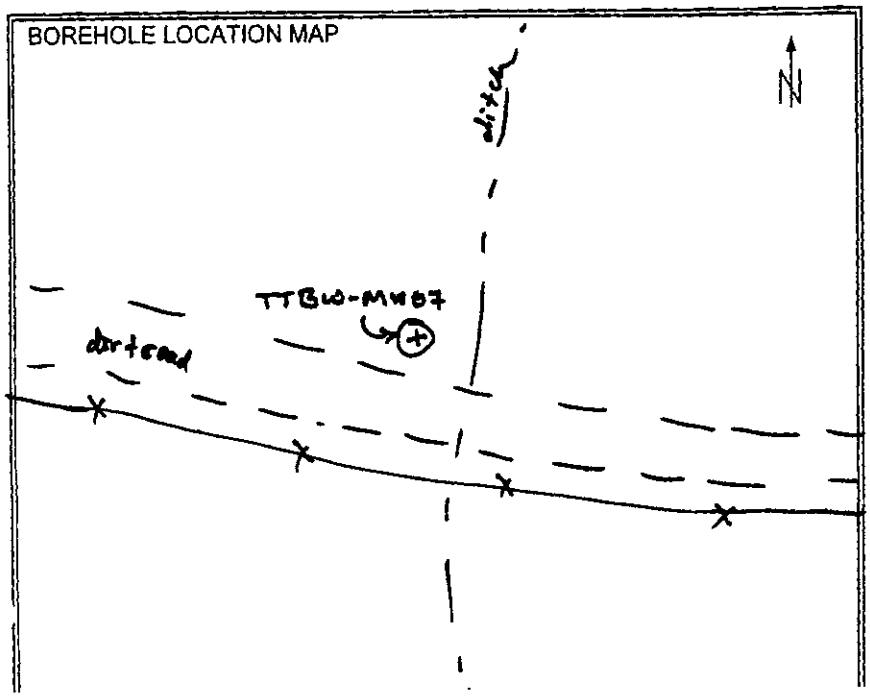
LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Boring ID: —	
Monitoring Well ID: TTBW-MW07	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill + Instal
Client: Navy	
Site: basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Marl MS Rhino	
Sampler Type: direct push w/ sleeve liner	
Borehole Diameter (inches): 8.0"	to: 18.5 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-15-08	Drill Start Time: 0906
Drill Finish Date: 3-15-08	Drill Finish Time: 0929
Total Borehole Depth (feet bgs): 18.5	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 5.0	Date: 3-15-08 Time: 0913
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-15-08	Well Completion Time: 1022
Screen Interval (feet bgs): 3.0 - 18.0	Total Well Depth (feet bgs): 18.5
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs): —	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 3-15-08
LOGGED BY: J. Vaughn

MW ID: TTBW-MW07

Page 1 of 1

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0906								SM	0.0-5.0 silty sand, light olive brown (2.5Y 5/3), ~~very soft~~ very loose, ~~pla~~ high plasticity, moist, subrounded qtz, felds, biot.				75	25
									1							
									2							
									3							
									4							
		0913							5 ▽							
									6	SM	5.0-5.8, silty sand, light olive brown (2.5Y 5/3), ~~very soft~~ loose, ~~high~~ moderate plasticity, wet, subrounded qtz, felds, biot.				70	30
									7	CL	5.8-7.5, clay, dark grayish brown (2.5Y 4/2), medium stiff, plastic, moist,				10	90
		0916							8	SM	7.5-9.0, silty sand, light olive brown (2.5Y 5/3), ~~soft~~ loose, mod. plasticity, wet, subrounded qtz, felds, biot.				70	30
									9	CL	9.0-10.0, clay, dark grayish brown (2.5Y 4/2), mod. stiff, plastic, moist.					100
									10	SM	10.0-11.5, silty sand, light olive brown (2.5Y 5/3), ~~soft~~ loose, mod. plasticity, wet, subrounded qtz, felds, biot.			5	75	20
									11							
		0918							12	SW SP	11.5-15.5, sand, grayish brown (10YR 5/2), ~~soft~~ loose, ~~mod. low~~ non-plasticity, wet, subrounded qtz, felds, volc. lithics, biot.		5	85	5	5
									13							
									14							
									15							
		0924							16	SM	15.5-16.2, silty sand, light olive brown (2.5Y 5/3), ~~soft~~ loose, low plasticity, wet, subrounded qtz, feld, biot.				75	25
									17	SP	16.2-[illegible] sand, grayish brown (10YR 5/2), ~~soft~~ loose, ~~non-pla~~ non-plastic, wet, subrounded qtz, felds, biot, volc. lithics.		5	85	5	5
									18							
		0929							19		TDwt 18.5					
									20							

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TT BW-MW07
PROJECT: NAS Fallon
SITE: Base wide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-15-08 TIME: 0906
WELL INSTALLATION BEGAN:
DATE: 3-15-08 TIME: 0934
WELL INSTALLATION FINISHED:
DATE: 3-15-08 TIME: 1022
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 5.0'

WELL SCREEN

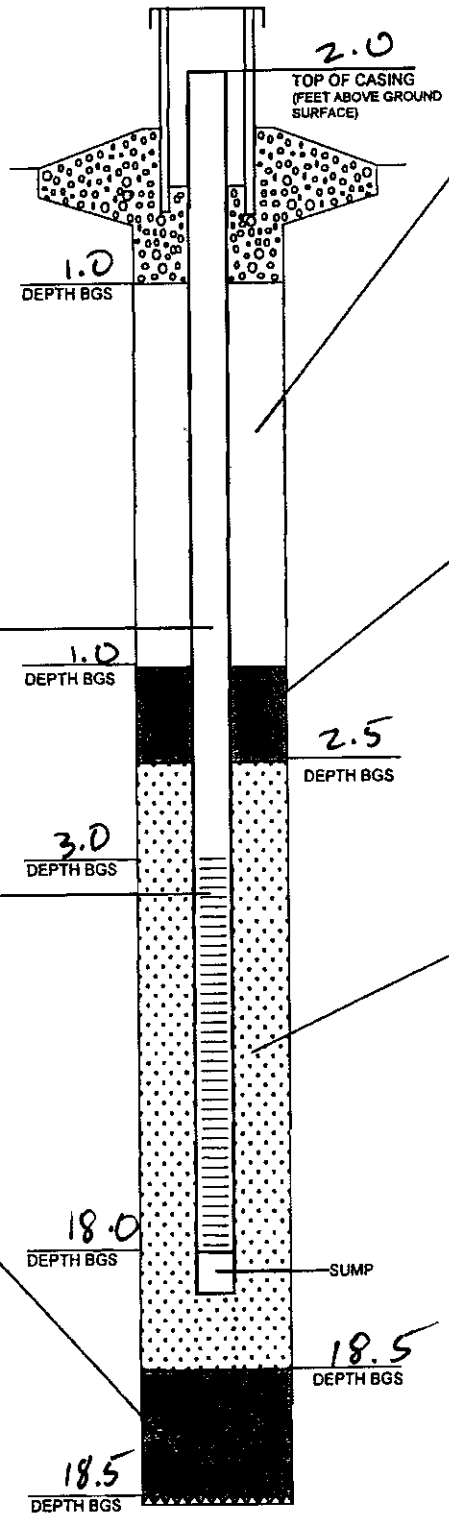
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND ~~WITH BUMPER POST~~
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: 1/2 x 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8 bentonite
☐ OTHER:
PRODUCT: Hole plug bentonite chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 20.8 ft³
AMOUNT USED: 6 x ~~50~~ 16 sacks
☑ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 7.38'
(~~BTOC~~ AFTER WELL INSTALLATION) BTOC

CENTRALIZERS USED?

☐ YES ☑ NO; install inside
CENTRALIZER DEPTHS:

LEGEND

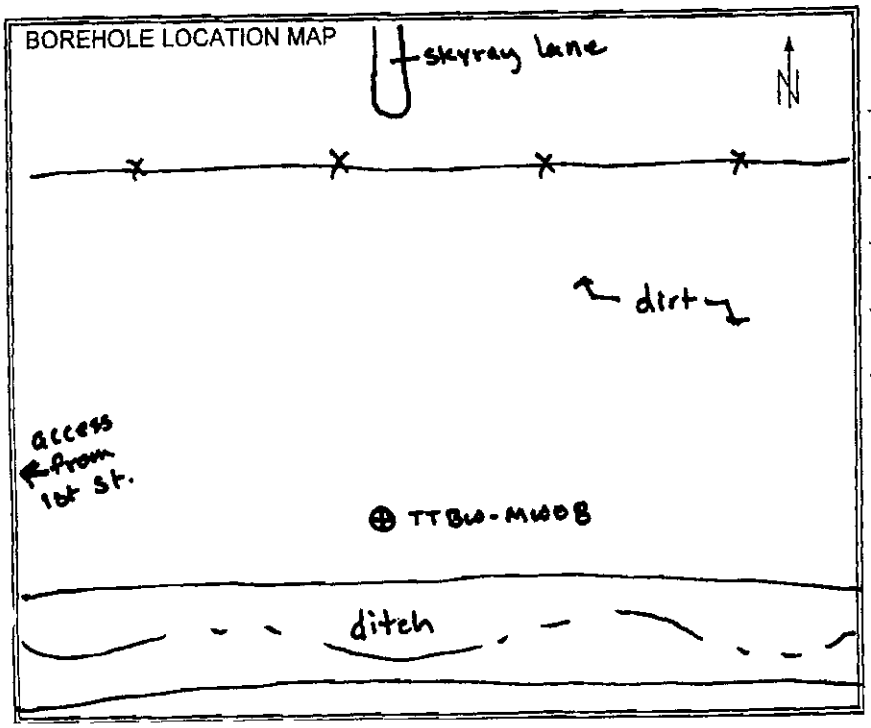
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID:	
Monitoring Well ID: TTBW-MW08	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill + Install
Client: Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Marl MS Rhino	
Sampler Type:	
Borehole Diameter (inches): 8.0	to: 20.0 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-13-08	Drill Start Time: 0908
Drill Finish Date: 3-13-08	Drill Finish Time: 0932
Total Borehole Depth (feet bgs): 20.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): ~~0.0~~ 7.5	Date: 3-13-08 Time: 0919
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-13-08	Well Completion Time: 1043
Screen Interval (feet bgs): 3.0-18.0	Total Well Depth (feet bgs): 18.5
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs): —	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID: MW ID: TTBW-MW08

DATE: 3/13/08
LOGGED BY: J. Vaughn

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0908						2.0		SM	0.0 - 5.0 silty sand, light olive brown (2.5Y 5/3), very loose, non-plastic, moist subangular qtz, feld, volc. lithics			20	60	20
								2" dia Sch 40 pvc	1							
									2							
									3							
									4							
		0915							5	SC	5.0 - 7.5, clayey sand, dark grayish brown (2.5Y 4/2), loose, moderate plasticity, moist, subangular qtz, feld, biot., volc. lithics.			10	60	30
									6							
									7							
		0919							8	SC	7.5 - 10.8. clayey sand, dark grayish brown (2.5Y 4/2), loose, low to mod. plasticity, wet, subrounded qtz, felds, volc lithics, biot.			5	70	25
									9					5		
									10							
									11	CL	10.8 - 11.8. clay, olive brown (2.5Y 4/3), soft, high plasticity, moist,					100
		0920						2" dia Sch 40 pvc 0.010 slot screen	12	SW	11.8 - 14.0 sand, light olive brown (2.5Y 5/3), v. loose, low plasticity, wet, subrounded qtz, felsp, volc lithics, biot.			10	80	10
									13							
									14	SC	14.0 - 15.5 clayey sand, dark grayish brown (2.5Y 4/2), loose, moderate plasticity, subrounded qtz, feld, biot, volc lithics			5	70	25
		0925							15	SW	15.5 - 20.0 sand, light olive brown (2.5Y 5/3), v. loose, non plastic, wet subrounded qtz, felds, biot, volc lithics.			5	85	10
									16							
									17							
									18							
								end cap	19							
		0932							20		TD @ 20.0'					

NAD 27
1481721 1.36 ft N

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW08
PROJECT: NAS Fallon
SITE: Base wide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL:

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-13-08 TIME: 0908
WELL INSTALLATION BEGAN:
DATE: 3-13-08 TIME:
WELL INSTALLATION FINISHED:
DATE: 3-13-08 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: Jason Wolff
LICENSE: M2320
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID 4 1/4" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING:

WELL SCREEN

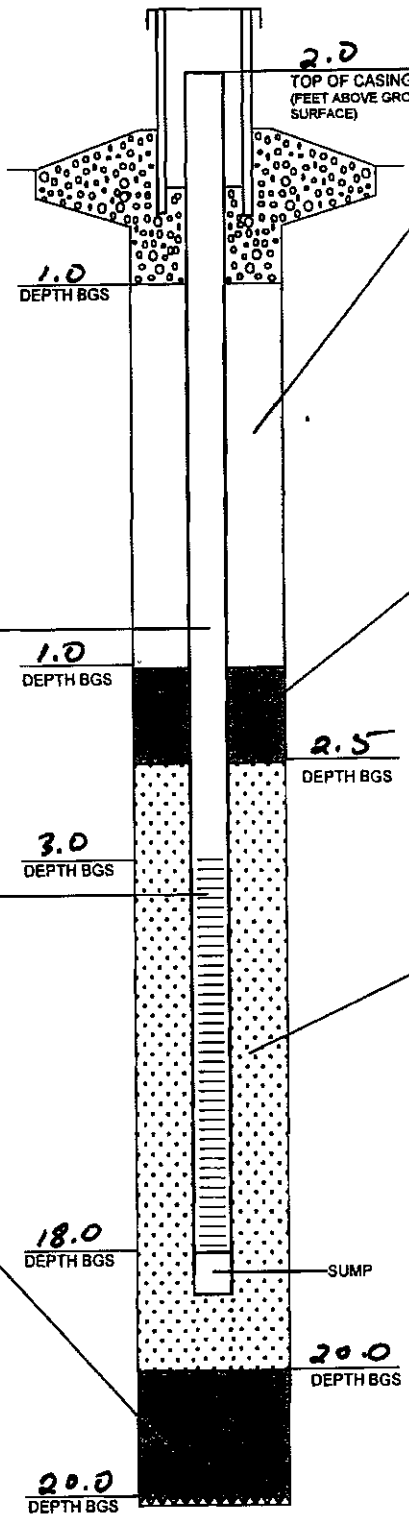
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN:

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST (2)
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: 1/2 x 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Holeplug bentonite chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 22.8 ft³
AMOUNT USED: 6 sacks (100 lb/sack)
☑ SAND, SIZE: #2/16
PRODUCT: Sand
MFG. BY: Lemay
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 7.5
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO; installed in aug
CENTRALIZER DEPTHS:

LEGEND

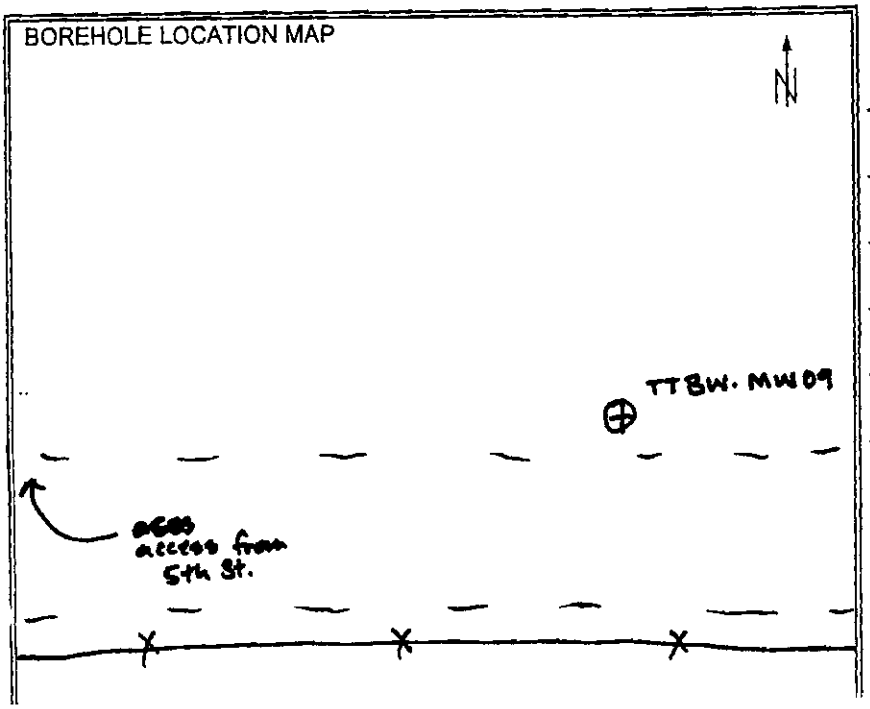
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID: —	
Monitoring Well ID: TTBW-MW09	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill + Install
Client: Navy	
Site: basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mari M5 Rhino	
Sampler Type:	
Borehole Diameter (inches): 8.0"	to: 19.0 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-13-08	Drill Start Time: 0737
Drill Finish Date: 3-13-08	Drill Finish Time: ~~0750~~ 0753
Total Borehole Depth (feet bgs): 19.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6.0	Date: 3-13-08 Time: 0740
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-13-08	Well Completion Time: 0856
Screen Interval (feet bgs): 3.0 - 18.0	Total Well Depth (feet bgs): 18.5
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs): —	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 3/13/08
LOGGED BY: J. Vaughn

MW ID: TTBW-MW09

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0737						30' 2" dia sch 40 PVC	1	SM	0-6.0 silty sand, very dark grayish brown (2.5Y 3/2), very loose, low plasticity, moist, subangular qtz, felds, volc lithics.		5	35	30	30
									2							
									3							
									4							
		0739							5							
									6 ▽	SP SW	6.0-18.0 sand, light olive brown (2.5Y 5/3), v. loose, no plasticity, wet, subrounded qtz, felds, volc. lithics, biot.		10	60	25	5
									7							
		0740						2" dia sch 40 slot PVC screen	8							
									9							
									10							
									11							
		0741							12							
									13							
									14							
		0745							15							
									16							
									17							
		0755							18	SM	18.0-19.0 silty sand, grayish brown (2.5Y 5/2), ~~soft~~ loose, low plasticity, wet.				75	25
		0753						end cap	19		TD at 19.0					
									20							

NAD ~~1983~~ 1927
~~[illegible]~~ 14817280.96ft N

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW09
PROJECT: NAS Fallon Drill + Install
SITE: Base wide
BOREHOLE NO.: TTBW-MW09
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-13-08 TIME: 0737
WELL INSTALLATION BEGAN:
DATE: 3-13-08 TIME: 0757
WELL INSTALLATION FINISHED:
DATE: 3-13-08 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2320
DRILL RIG: Mari MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4 1/4" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 5.0'

WELL SCREEN

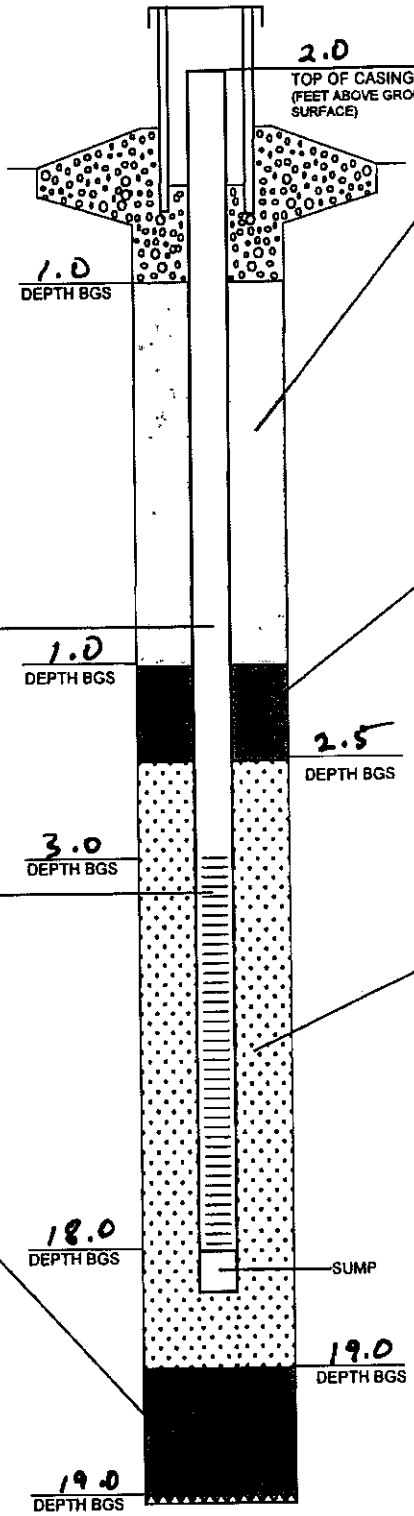
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST (2)
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: 1/2 x 50lb sack
☐ PELLETS, SIZE: 1/2 x 50lb sack
☑ CHIPS, SIZE: 3/8 coarse
☐ OTHER:
PRODUCT: Hole plug chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 21.5 ft³
AMOUNT USED: 5 x 100lb sacks
☑ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 6.0
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO:
CENTRALIZER DEPTHS: install inside augers

LEGEND

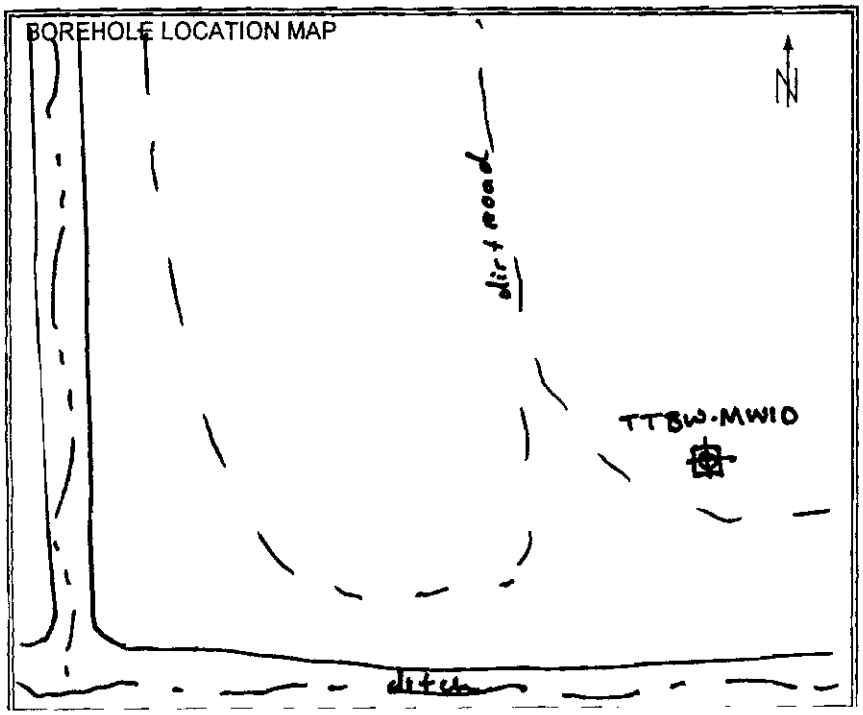
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID: —	
Monitoring Well ID: TTBW-MW10	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill+Install
Client: Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Marl MS Rhino	
Sampler Type: direct push w/ sleeve liners	
Borehole Diameter (inches): 8.0	to: 19.0 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-16-08	Drill Start Time: 1048
Drill Finish Date: 3-16-08	Drill Finish Time: 1106
Total Borehole Depth (feet bgs): 19.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6.5	Date: 3-16-08 Time: 6.5
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-16-08	Well Completion Time: 1155
Screen Interval (feet bgs): 3.0 - 18.0	Total Well Depth (feet bgs): 18.5
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs): 6.5'	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 3-16-07
LOGGED BY: Jordan Vaughn

MW ID: TT BW-MW1D

Page of

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1048								SM	0.0-6.5 silty sand, dark grayish brown (2.5Y 4/2), loose, low plasticity, moist, subangular qtz, felds, volc. lithics.		5	5	60	30
									1							
									2							
									3							
									4							
		1053							5							
									6 ▽							
									7	SM	6.5-10.0, silty sand, light olive brown (2.5Y 5/3), ~~soft~~ loose, w, low plasticity, wet, sub-angular qtz, felds,			10	50	40
		1058							8							
									9							
									10	CL	10.0-11.0, clay, light olive brown (2.5Y 5/3) soft, plastic, wet.				25	75
									11	SM	11.0-16.5, silty sand, light olive brown (2.5Y 5/3), loose, low plasticity, wet, subrounded qtz, felsp, biot,			10	70	20
		1100							12							
									13							
									14							
									15							
		1102							16							
									17	CL	16.5-18.2, clay, olive gray (5Y 5/2), stiff, plastic, moist,					100
									18	SC	18.2-19.0, clayey sand, olive gray (5Y 5/2), ~~soft~~ loose, w, plastic, wet, subangular qtz felds, volc. lithics, biot.			60	20	20
		1106							19							
									20		TD at 19.0'					

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

ORIG WELL, Redrill about 5' to east

MONITORING WELL

MONITORING WELL NO.: TTBW-MW10
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-16-08 TIME: 1048
WELL INSTALLATION BEGAN:
DATE: 3-16-08 TIME: 1108
WELL INSTALLATION FINISHED:
DATE: 3-16-08 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: Neff
LICENSE: M3338
DRILL RIG:
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart Langyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 5.0

WELL SCREEN

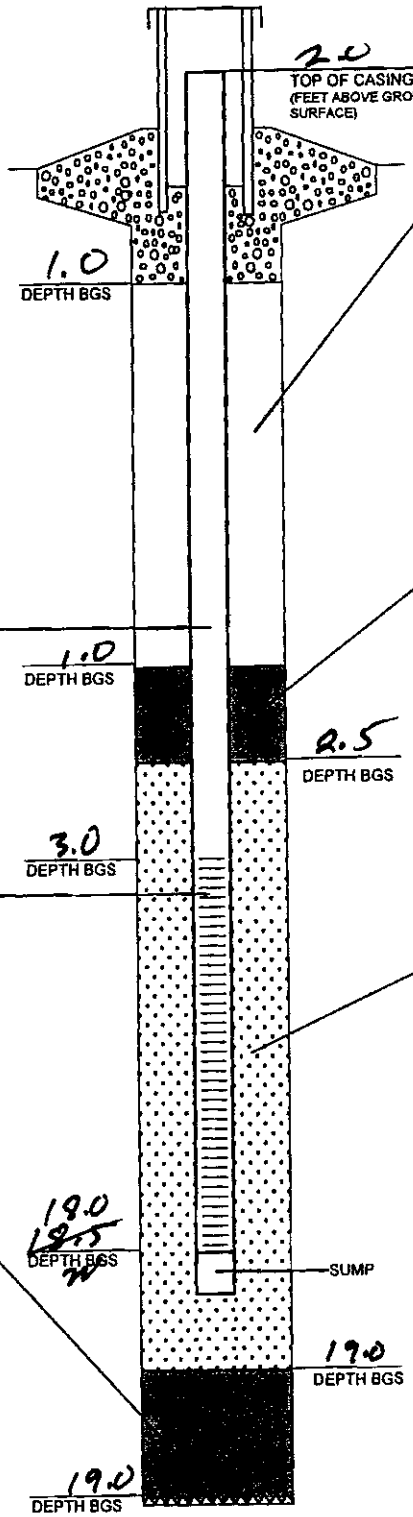
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Mattex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND ~~WITH BUMPER POSTS~~
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: 1/2" 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Bentonite chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 21.5 ft³
AMOUNT USED: 5½" 100 lb sacks
☑ SAND, SIZE: 2/16
PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 8.21'
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO; installed during
CENTRALIZER DEPTHS: construction

LEGEND

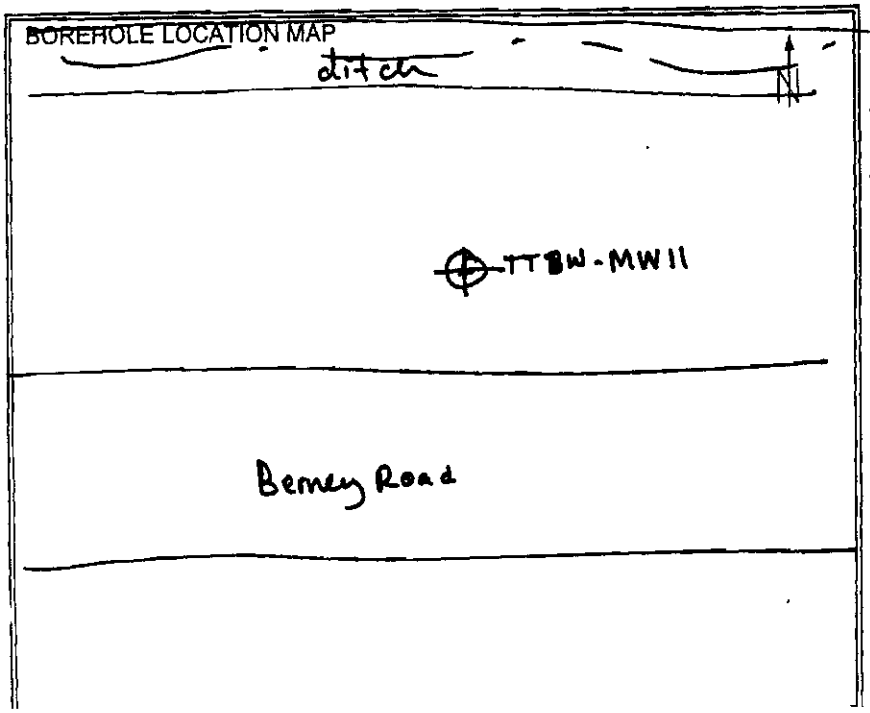
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID: —	
Monitoring Well ID: TTBW-MW11	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill + Install
Client: Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mari MS Rhino	
Sampler Type:	
Borehole Diameter (inches): 8.0"	to: 20.0 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-17-08	Drill Start Time: 1042
Drill Finish Date: 3-17-08	Drill Finish Time: 1100
Total Borehole Depth (feet bgs): 20.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 10.2	Date: 3-17-08 Time: 1054
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-17-08	Well Completion Time: 1151
Screen Interval (feet bgs): 4.5-19.5	Total Well Depth (feet bgs): 19.8
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs): 10.85	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 3-17-08
LOGGED BY: Jordan Vaughn

MW ID: TTBW-MW11

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1042								SW	0.0-5.5, sand, dark yellowish brown (10YR 4/4), ~~loose~~, very loose, non-plastic, moist, sub rounded qtz, felds, volc. lithics.		t	20	70	10
									1							
									2							
									3							
									4							
		1048							5							
									6	SM	5.5-10.2 silty sand, brown (10YR 4/3), loose, low plasticity, moist, subrounded qtz, felds, volc. lithics, biot.			10	65	25
									7							
		1051							8							
									9							
									10 ▽ 10.2	SM	10.2-11.2, silty sand, light olive brown (2.5Y 5/4), loose, plastic, wet, subrounded qtz, felds, biot.				75	25
									11							
		1054							12	CL	11.2-13.0, clay, light olive brown (2.5Y 5/3), soft, plastic, wet.				5	95
									13	SP	13.0-14.5, sand, light olive brown (2.5Y 5/3), loose, low plasticity, wet, subangular qtz, feld, biot, volc. lithics.			80	10	10
									14							
									15	CL	14.5-16.5, clay, light olive brown (2.5Y 5/3), soft, plastic, wet.					100
		1056							16							
									17	SC	16.5-18.0, clayey sand, light olive brown (2.5Y 5/3), loose, plastic, wet. sub rounded qtz, feld, volc. lithics, biot.			5	75	20
									18	SP	18.0-20.0, sand, dark grayish brown (2.5Y 4/2), loose, non plastic, wet, subrounded qtz, felds, volc lithics, biot.			5	95	
									19							
		1100							20							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW11
PROJECT: NAS Fallon
SITE: Basalt
BOREHOLE NO.:
WELL PERMIT NO..
TOC TO BOTTOM OF WELL: 21.8

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-17-08 TIME: 1040
WELL INSTALLATION BEGAN:
DATE: 3-17-08 TIME: 1120
WELL INSTALLATION FINISHED:
DATE: 3-17-08 TIME: 1151
DRILLING CO.: Greeg Drilling
DRILLER: Jason Kreth
LICENSE: M2328
DRILL RIG: Mori MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375
LENGTH OF CASING: 6.5'

WELL SCREEN

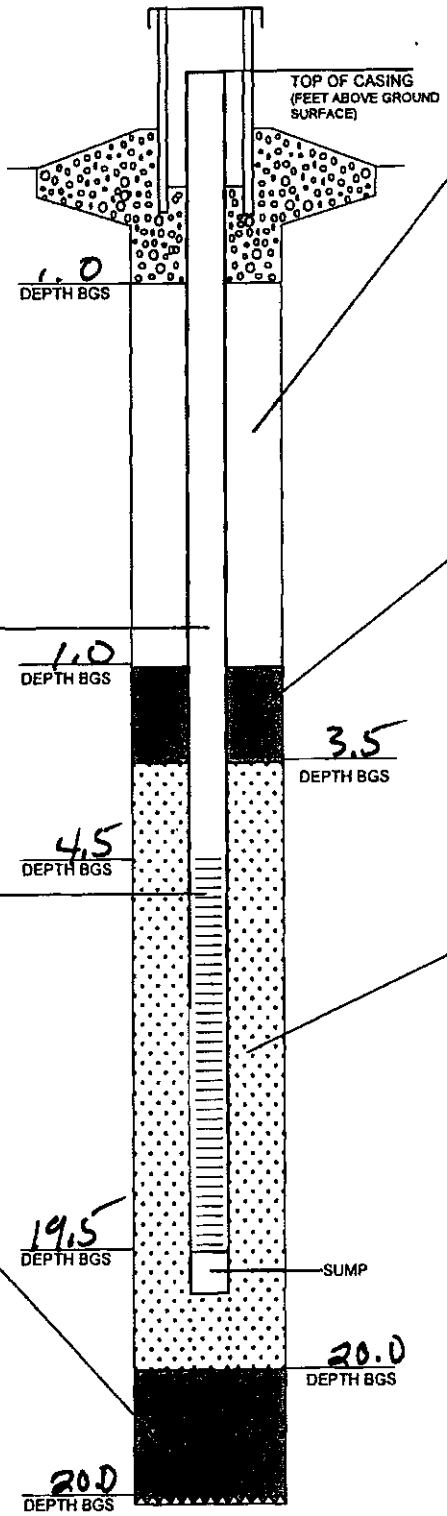
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND ~~WITH BUMPER POST~~
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION.
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO..

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 3.5 ft³
AMOUNT USED: ½ * 50 lb bentonite sacks
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: bentonite chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 21.5 ft³
AMOUNT USED: 6 * 100 lb sacks
☑ SAND, SIZE: #2/16
PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 12.85
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO: installed in auger
CENTRALIZER DEPTHS:

LEGEND

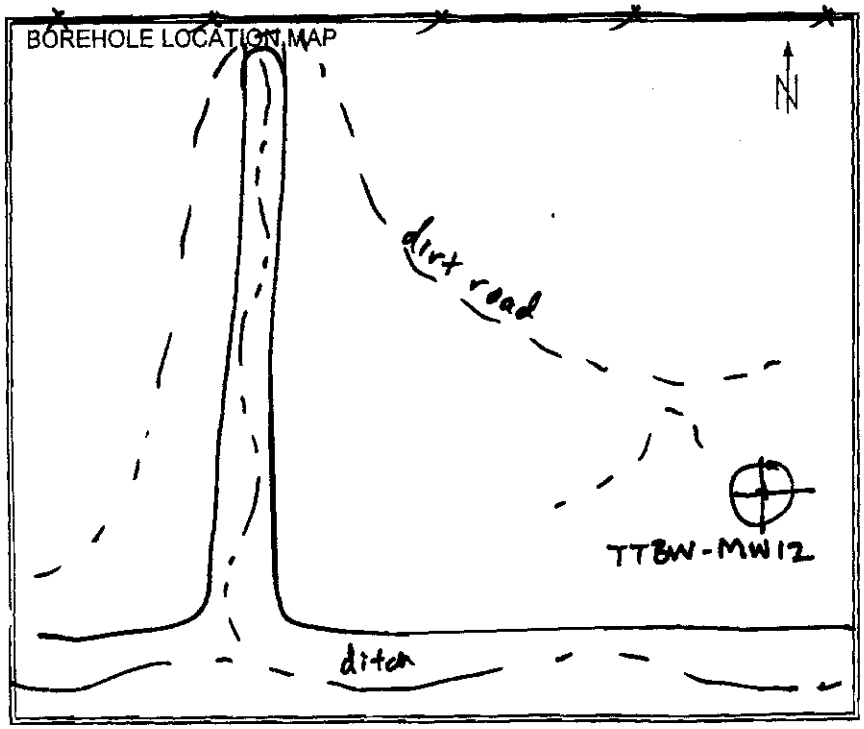
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID: —	
Monitoring Well ID: TTBW-MW12	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill+Install
Client: Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mari M5 Rhino	
Sampler Type: direct push w/ sleeve liner	
Borehole Diameter (inches): 8.0"	to: 18.5 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-16-08	Drill Start Time: 0905
Drill Finish Date: 3-16-08	Drill Finish Time: 0919
Total Borehole Depth (feet bgs): 18.5	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 7.0	Date: 3-16-08 Time: 0912
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-16-08	Well Completion Time: 1023
Screen Interval (feet bgs): 3.0 - 18.0	Total Well Depth (feet bgs): 18.5
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010slot
Static Water Level After Well Installation (feet bgs): 7.53'	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 3-16-08
LOGGED BY: Jordan Vaughn

MW ID: TTBW-MW12

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0905								SM	0.0-5.8, silty sand, olive brown (2.5Y 4/3), loose, Non-plastic, moist, subangular qtz, felds, volc. lithics.		10	20	40	30
									1							
									2							
									3							
									4							
		0910							5							
											5.8-7.0, clay, grayish brown (2.5Y 5/2),				25	75
									6	CL	soft, plastic, moist.					
									7 ▽							
										SC	7.0-14.0 Clayey sand, light olive brown (2.5Y 5/3), ~~soft~~ very loose, plastic, wet. subrounded		10	20	40	30
		0912							8		qtz, felds, volc. lithics, biot.					
									9							
									10							
									11							
		0914							12							
									13							
									14							
										CL	14.0-16.0 ~~Clay Sandy~~ clay, grayish brown (2.5Y 5/2), soft, plastic, wet.				25	75
									15							
		0917							16							
										SC	16.0-17.5 clayey sand, light olive brown (2.5Y 5/3), ~~soft~~ loose, plastic, wet, subangular			10	60	30
									17		qtz, felds, biot.					
									18	CL	~~18.5~~ 17.5-18.5 clay, gra light yellowish brown (2.5Y 6/3), stiff, low plasticity, moist				~~20~~	~~80~~ 100
		0919							19							
											TD at 18.5					
									20							

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW12
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-16-08 TIME: 0905
WELL INSTALLATION BEGAN:
DATE: 3-16-08 TIME: 0922
WELL INSTALLATION FINISHED:
DATE: 3-16-08 TIME: 1023
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Marl MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING: 5.0'

WELL SCREEN

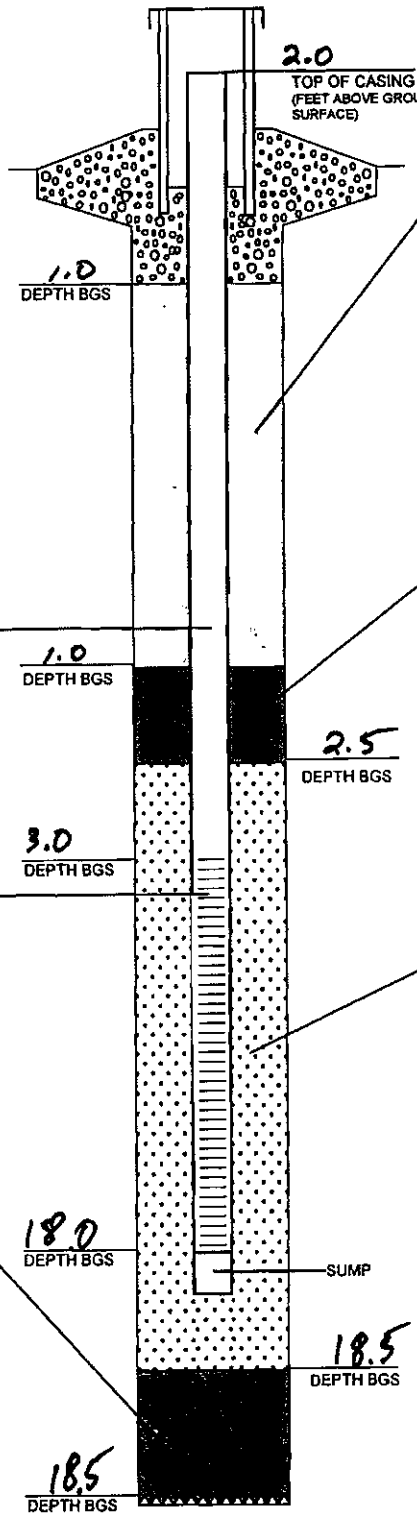
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND ~~WITH BUMPER POST~~
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: ½" 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: bentonite chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 4 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 20.8 ft³
AMOUNT USED: 5½ x 100 lb sack
☑ SAND, SIZE: 2/16
PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 9.53'
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

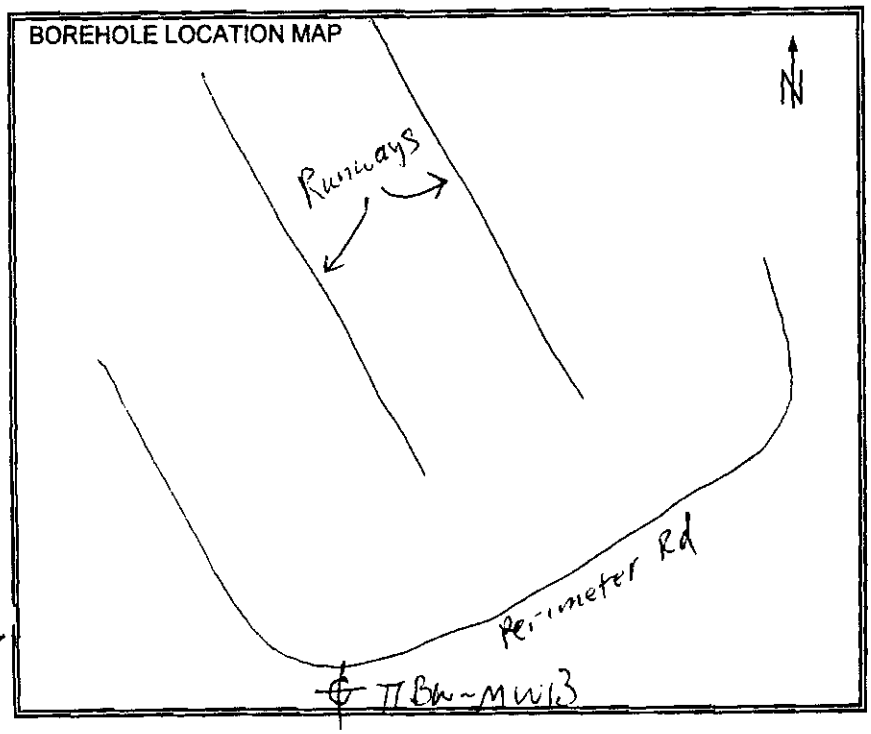
☐ YES ☑ NO: installed in auger
CENTRALIZER DEPTHS: n/a

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TTBW-MW13	
Project Number: I43023001001	Project Name:
Client: US Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: Richard Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mari MS Rhino / Hollow stem auger	
Sampler Type: Acetate sleeve	
Borehole Diameter (inches): 8	to: 20 feet bgs
Overdrilled Diameter (inches): NA	to: feet bgs
Drill Start Date: 3-24-08	Drill Start Time: 1410
Drill Finish Date: 3-24-08	Drill Finish Time: 1423
Total Borehole Depth (feet bgs): 20	
Soil Boring Backfill Date:	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 7	Date: 3/24/08 Time: 1413
Depth to Other Water-Bearing Zones (feet bgs): NA	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 3-24-08	Well Completion Time:
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 3-24-08
LOGGED BY: R. Knapp

MW ID: TTBW-MW13

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
← Hand auger																
		1410							2	CL	Clay, sandy dark brown (10YR 3/3), med dense, sl plastic			15	30	55
									4							
		1413	3/12						6	CL	Clay, dark yellowish brown (10YR 3/4), plastic, med stiff, moist				1	99
										SP	Sand, olive brown (2.5Y 4/3), med dense, wet, poorly graded			5	85	10
		1415	48/48						8							
									10	ML	Silt, clayey, olive gray (5Y 4/2) med stiff, sl plastic, wet				2	98
		1417	48/48						12	SP	Sand, poorly graded, olive brown (2.5Y 4/3), loose, wet			40	55	5
									14							
		1423	48/48						16	SP	Sand, poorly graded, olive brown (2.5Y 4/3), med dense, wet			5	95	
									18							
										CL	Clay, olive (5Y 5/3), very stiff sl plastic, moist					100

1481595.3 N
2595156.5

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-4W13
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-24-08 TIME: 1410
WELL INSTALLATION BEGAN:
DATE: 3-24-08 TIME: 1445
WELL INSTALLATION FINISHED:
DATE: 3-24-08 TIME: 1540
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mail MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4.25 OD: 8

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Riser Pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.375
LENGTH OF CASING: 5

WELL SCREEN

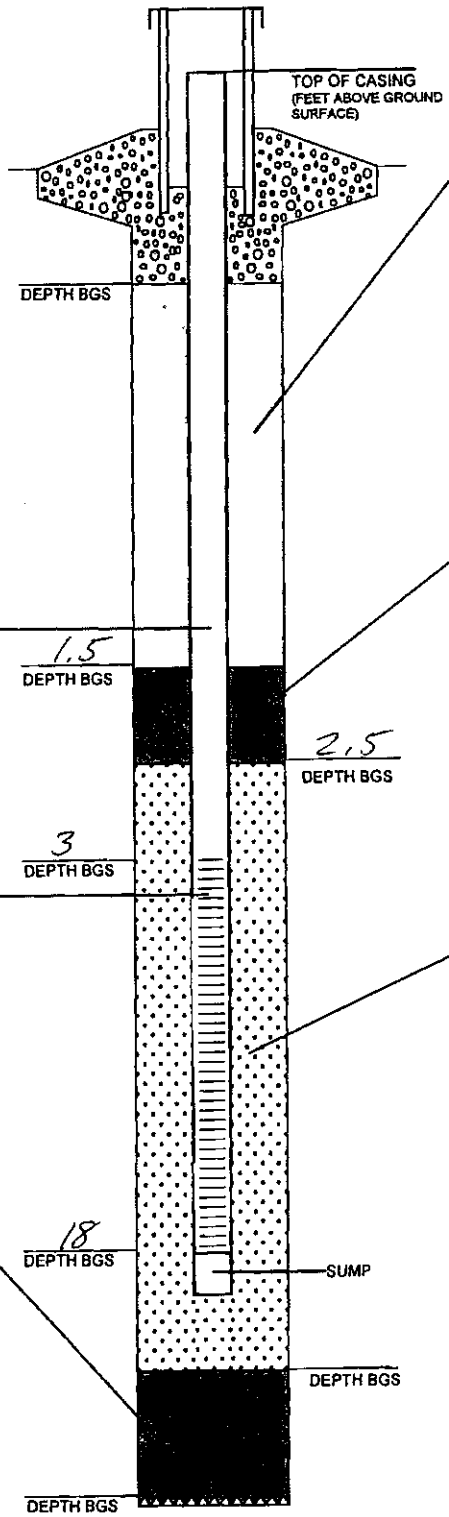
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Hole plug bentonite chip
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 3

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 600 lb
☑ SAND, SIZE: #2/16
PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 7
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

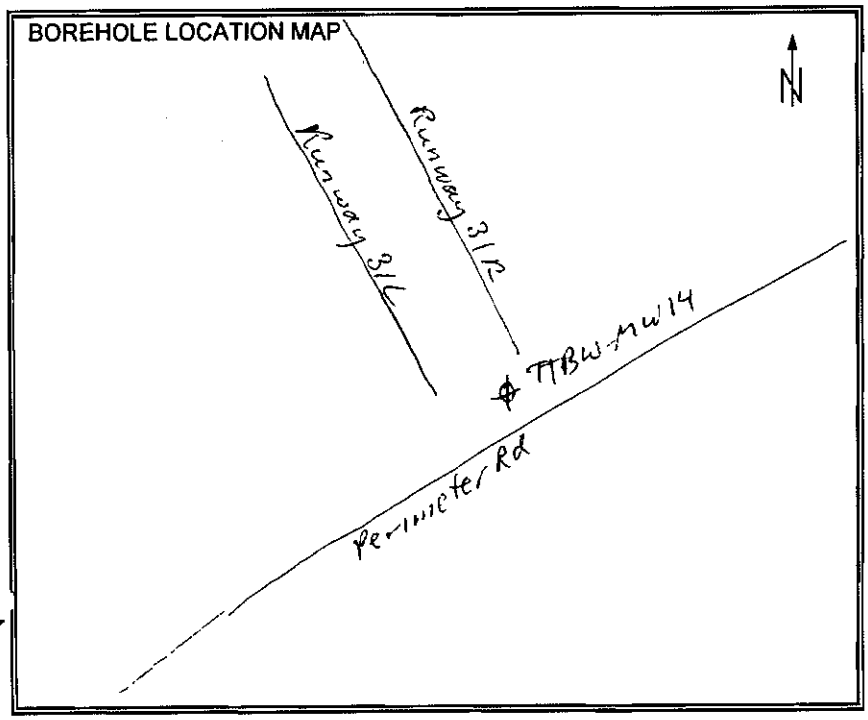
☐ YES ☑ NO;
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:	
Monitoring Well ID: TTBW-MW14	
Project Number: I4302300	Project Name:
Client: US Navy	
Site: Hyde Battlewide	
Borehole Location (Township, Range, Section):	
Logged By: R. Knapp	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mari MST Rhino	
Sampler Type: Acetate sleeves	
Borehole Diameter (inches): 8	to: 19 feet bgs
Overdrilled Diameter (inches): N/A	to: feet bgs
Drill Start Date: 3-26-08	Drill Start Time: 0953
Drill Finish Date: 3-26-08	Drill Finish Time: 1009
Total Borehole Depth (feet bgs): 19	
Soil Boring Backfill Date:	Soil Boring Backfill Time:
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 7	Date: / Time:
Depth to Other Water-Bearing Zones (feet bgs):	
Depth to Water After Drilling (feet bgs):	
Well Completion Date: 3-26-08	Well Completion Time: 1150
Screen Interval (feet bgs): 3-18	Total Well Depth (feet bgs): 18
Well Diameter (inches): 2	Well Casing Material: PVC
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: N.A.S Fallon
CTO:
BORING ID:

DATE: 5-26-08
LOGGED BY: R. Knapp

MW ID: TTBW-MW14

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
Hand auger																
									2	SC	Clayey sand, very dark grey (10 brown (2.5Y 3/2), loose, moist			20	60	20
									4							
		0953	36/36							SC	As above					
									6	SP	Sand, poorly graded, olive brown (2.5Y 4/3), med dense, wet @ 7			15	80	5
Acetate sleeves									8	SP	As above					
		0959	48/48													
									10	SP	Sand, poorly graded, olive brown (2.5Y 4/4), loose, wet		1	69	30	
										CL	Clay, sandy, soft, sl plastic moist				15	85
		1001	0/48						12		No recovery 12-16					
									14							
		1009							16	SW	Sand, well graded, olive brown (2.5Y 4/3), loose, wet		5	70	25	
									18	CL	Clay, olive (2.5Y 5/3), plastic, very stiff					100

14817312 N
2596906 E

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW14
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 12.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-26-08 TIME: 0953
WELL INSTALLATION BEGAN:
DATE: 3-26-08 TIME: 1015
WELL INSTALLATION FINISHED:
DATE: 3-26-08 TIME: 1140
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mark MST
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4 1/4 OD: 8

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Riser pipe
MFG. BY: Boart Longyear
CASING DIAMETER:
ID: 2.067 OD: 2.77
LENGTH OF CASING: 5

WELL SCREEN

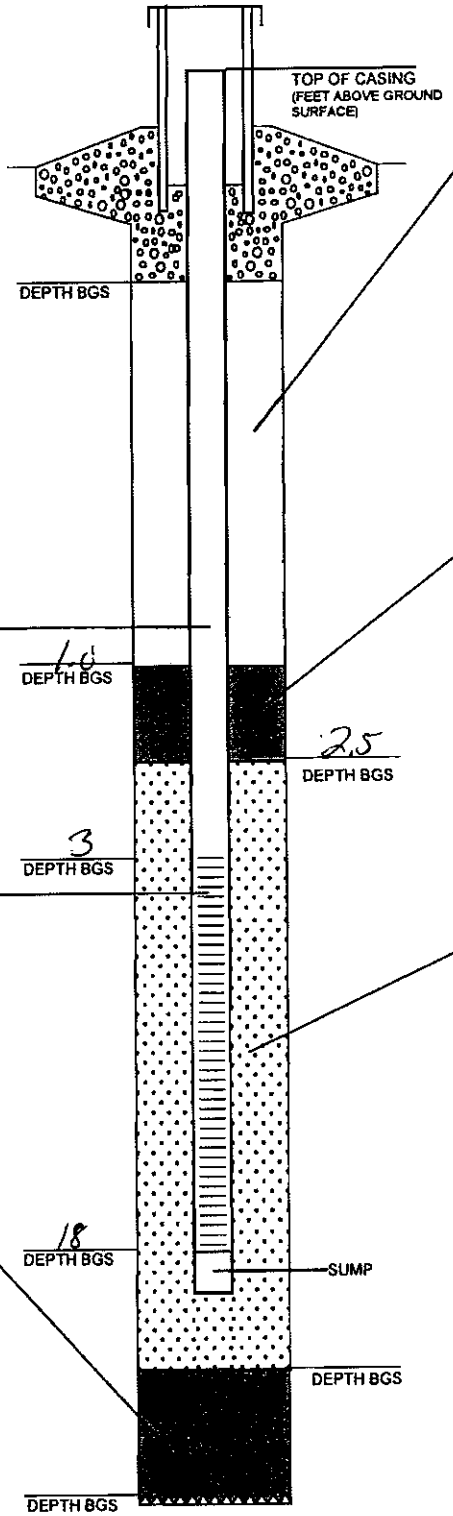
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: Screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067 OD: 2.375
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☑ FLUSH MOUNT
☐ ABOVE GROUND WITH BUMPER POST
☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: 25 lb
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Bentonite chips
MFG. BY:
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED:
AMOUNT USED: 600 lb
☑ SAND, SIZE: 2/16
PRODUCT: Sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL:
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

☐ YES ☑ NO;
CENTRALIZER DEPTHS:

LEGEND

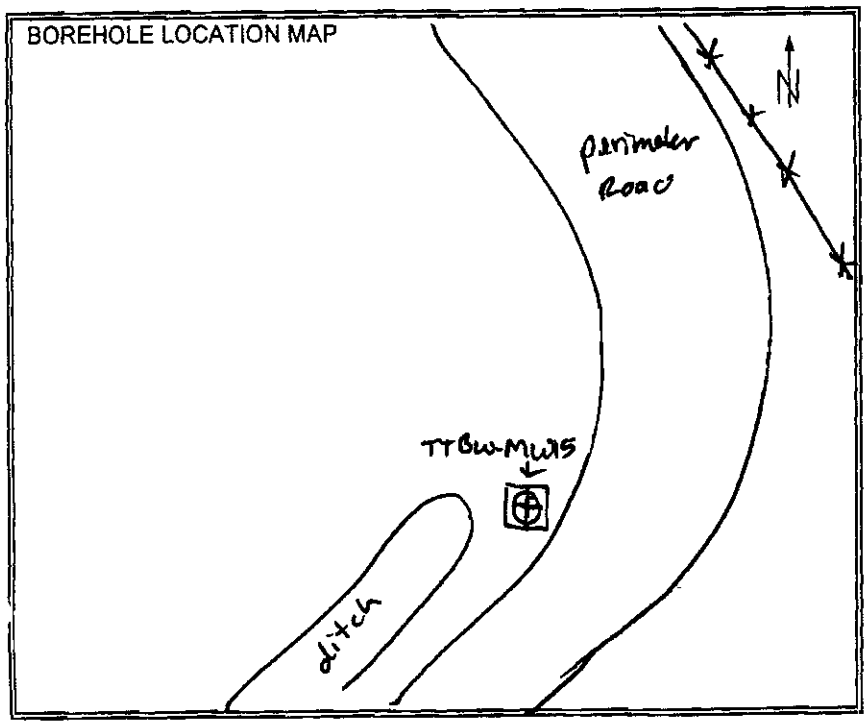
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID: —	
Monitoring Well ID: TTBW-MW15	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill + Install
Client: Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Marl MS Rhino	
Sampler Type: direct push, sleeve liner	
Borehole Diameter (inches): 8.0"	to: 20.0 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-20-08	Drill Start Time: 1408
Drill Finish Date: 3-20-08	Drill Finish Time: 1427
Total Borehole Depth (feet bgs): 20.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 7.5	Date: 3-20-08 Time: 1414
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-20-08	Well Completion Time: 1525
Screen Interval (feet bgs): 3.0 – 18.0	Total Well Depth (feet bgs): 15.0
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: PVC, 0.010 slot screen
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 3-20-08
LOGGED BY: J. Vaughn

MW ID: TTBW-MW15

Page of

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1408								SM	0.0 - 2.0, silty sand, olive brown (2.5Y 4/3), medium dense, non-plastic, moist, subangular qtz, volc. lithics, felds.	15				25
									1							
									2	SC	2.0-6.2, Clayey sand, grayish brown (2.5Y 5/2), hard, low plasticity, sub rounded qtz, brot, volc. lithics, felds	~~10~~ 10	~~20~~ 20	~~30~~ 30	10	30 30
		1412							3							
									4							
									5							
									6	CL	6.2-7.5, clay, olive brown, medium stiff, plastic, moist.				5	95
									7							
		1414							8	SP	7.5-8.5, sand, olive brown (2.5Y 4/3), soft, low plasticity, wet, rounded qtz, felds, brot.			5	90	5
									9	CL	8.5-10.0, Clay, light olive brown (2.5Y 5/4), soft, plastic, moist.				5	95
									10	SP	10.0 - 14.0, sand, light olive brown (2.5Y 5/4), loose, non-plastic, wet, sub-rounded qtz, volc. lithics, brot, felds.			85	10	5
		1417							11							
									12							
									13							
									14	ML	14.0-15.0, silt, light olive brown (2.5Y 5/4), soft, plastic, wet.				20	80
									15	CL	15.0 - 20.0, clay, dark grayish brown (2.5Y 4/2), med. stiff, ~~no~~ plastic, moist				5	95
		1420							16							
									17							
									18							
									19							
		1427							20		TD at 20.0 ft					

1183 1481876442 ft N 2595419.93 ft E

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW15
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-20-08 TIME: 1408
WELL INSTALLATION BEGAN:
DATE: 3-20-08 TIME: ~~1427~~ 1438
WELL INSTALLATION FINISHED:
DATE: 3-20 TIME: 1525
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mari M5 Rhino
DRILLING METHOD:
- [x] HOLLOW STEM AUGER
- [ ] AIR ROTARY
- [ ] OTHER:

DIAMETER OF AUGERS:
ID: 4 1/4" OD: 8.0"

WELL CASING

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: riser pipe
MFG. BY: Bart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375
LENGTH OF CASING: 5.0'

WELL SCREEN

- [x] SCHEDULE 40 PVC
- [ ] OTHER:

PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: ~~4~~ 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0

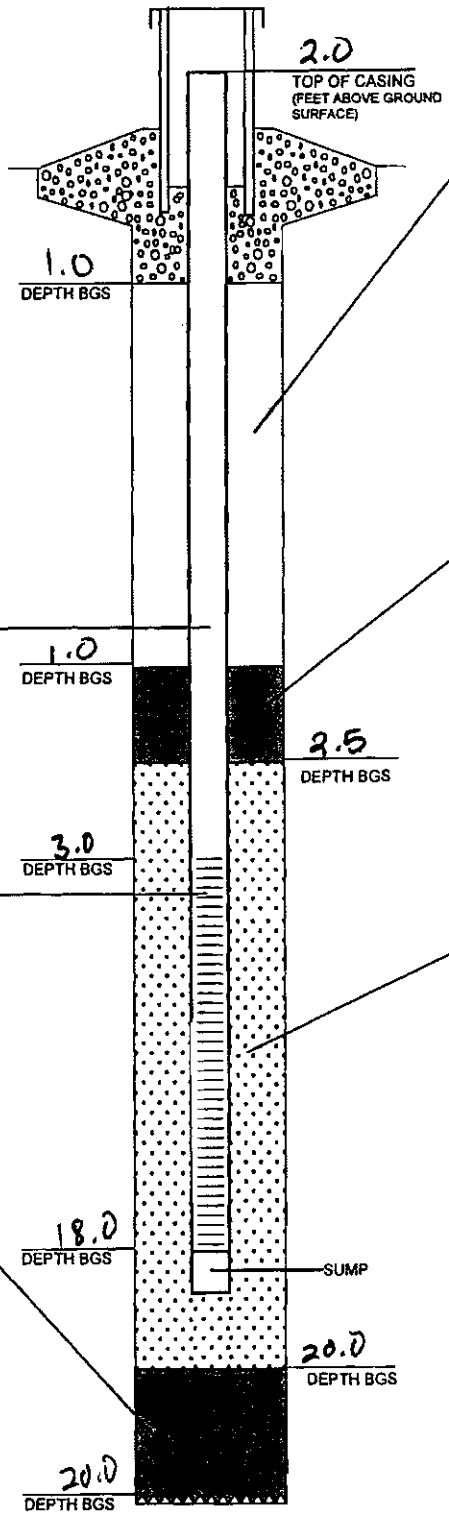
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
- [ ] BENTONITE CHIPS, SIZE:
- [ ] BENTONITE PELLETS, SIZE:
- [ ] SLURRY:
- [ ] FORMATION COLLAPSE:
- [ ] OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

SURFACE COMPLETION

- [ ] FLUSH MOUNT
- [x] ABOVE GROUND WITH BUMPER POST (2)
- [x] CONCRETE
- [ ] ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
- [ ] GROUT FORMULA (PERCENTAGES)
  - PORTLAND CEMENT:
  - BENTONITE:
  - WATER:
- [ ] PREPARED MIX
  - PRODUCT:
  - MFG. BY:

METHOD INSTALLED:
- [ ] POURED
- [ ] TREMIE
- [ ] OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.0 ft³
AMOUNT USED: 1/2 x 50 lb sack
- [ ] PELLETS, SIZE:
- [x] CHIPS, SIZE: 3/8
- [ ] OTHER:

PRODUCT: Bentonite Chips
MFG. BY: Baroid
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

AMOUNT OF WATER USED: 4 gal

FILTER PACK

- [ ] PREPACKED FILTER

VOLUME CALCULATED: 22.8 ft³
AMOUNT USED: 6 x 100 lb sacks
- [x] SAND, SIZE: 2/16

PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
- [x] POURED
- [ ] TREMIE
- [ ] OTHER:

WATER LEVEL: 11.06
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- [ ] YES
- [x] NO; inside augers

CENTRALIZER DEPTHS:

LEGEND

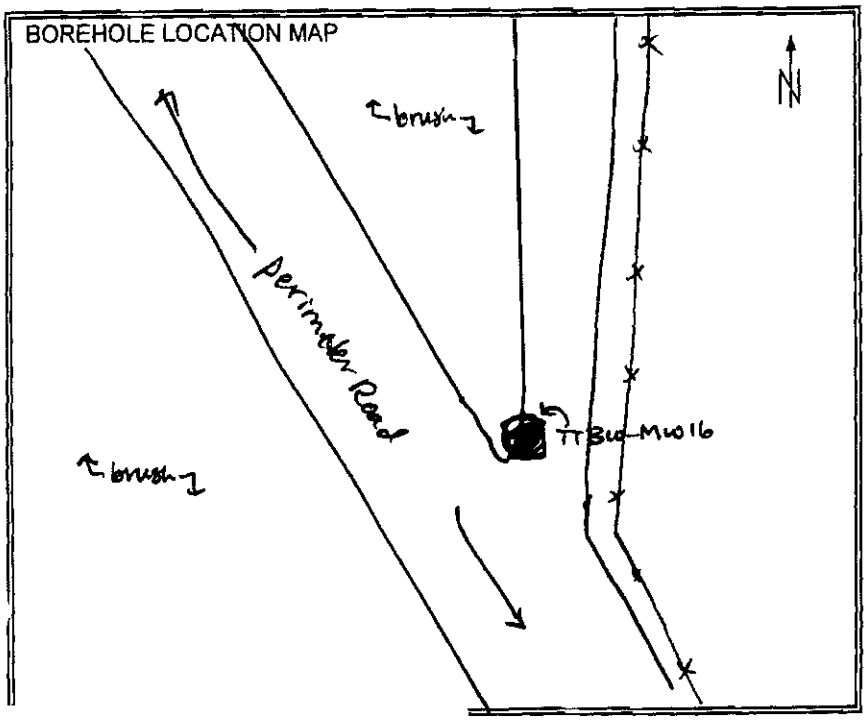
BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

BOREHOLE LOG

Tt

Boring ID:	
Monitoring Well ID: ~~TTBW-MW17~~ TTBW-MW16 ~	
Project Number: 4320.300.04.~~03~~03	Project Name: NAS Fallon Drill+Install
Client: Navy	
Site: Basewide	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaughn	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Mart M5 Rhino	
Sampler Type: direct push, sleeve liner	
Borehole Diameter (inches): 8.0"	to: 20.0 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: ~~3-19-08~~ 3-20-08	Drill Start Time: 1239
Drill Finish Date: 3-20-08	Drill Finish Time: 1255
Total Borehole Depth (feet bgs): 20.0	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 6.0	Date: 3-20-08 Time: 1244
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-20-08	Well Completion Time: 1354
Screen Interval (feet bgs): 3.5-18.5	Total Well Depth (feet bgs): 18.8
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs):	

BOREHOLE LOCATION MAP



NOTES/REMARKS

BOREHOLE LOG

Installation: NAS Fallon
CTO:
BORING ID:

DATE: ~~3-19-08~~ 3-20-08
LOGGED BY: Jordan Vaughn

MW ID: ~~TTBN MW17~~ TTBU-MW16

Page of

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		1239								SM	0.0-5.5, silty sand, brown (10YR 5/3), loose, non-plastic, moist, sub rounded qtz, felds, volc lithics		10	40	25	25
									1							
									2							
									3							
									4							
		1242							5							
										ML	5.5-6.0, silt, olive brown (2.5Y 4/3), medium stiff, plastic, moist.				10	90
									6 ▽							
										ML	6.0-7.5, silt, olive brown (2.5Y 4/3) soft, plastic, ~~to~~ wet.				10	90
									7							
		1244							8	CL	7.5-9.5, clay, olive brown (2.5Y 4/3), stiff, plastic, moist.					
									9							
									10	SM	9.5-10.8, silty sand, light olive brown (2.5Y 5/3), loose, non-plastic, wet		5	10	60	25
									11	CL	10.8-12.2, clay, olive (5Y 5/3), medium stiff, plastic, moist.				10	90
		1247							12	SW	12.2- sand, olive brown (2.5Y 4/3), loose, non-plastic, wet, sub rounded qtz, felds, volc. lithics, bot.		5	15	75	5
									13							
									14							
									15							
		1250							16							
									17							
									18							
									19							
		1255							20		TD at 20.0'					

1482016 9.02 ft N 2597657.35 ft E. US St. Plane '83

MONITORING WELL COMPLETION RECORD

TETRA TECH EM INC

MONITORING WELL

MONITORING WELL NO.: TTBW-MW16
PROJECT: NAS Fallon
SITE: Basewide
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 20.3'

DRILLING INFORMATION

DRILLING BEGAN:
DATE: 3-20-08 TIME: 1239
WELL INSTALLATION BEGAN:
DATE: 3-20-08 TIME: 1305
WELL INSTALLATION FINISHED:
DATE: 3-20-08 TIME:
DRILLING CO.: Gregg Drilling
DRILLER: Jason Neff
LICENSE: M2328
DRILL RIG: Mori MS Rhino
DRILLING METHOD:
☑ HOLLOW STEM AUGER
☐ AIR ROTARY
☐ OTHER:
DIAMETER OF AUGERS:
ID: 4¼" OD: 8.0"

WELL CASING

☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: riser pipe
MFG. BY: Bart Longyear
CASING DIAMETER:
ID: 2.067" OD: 2.375"
LENGTH OF CASING:

WELL SCREEN

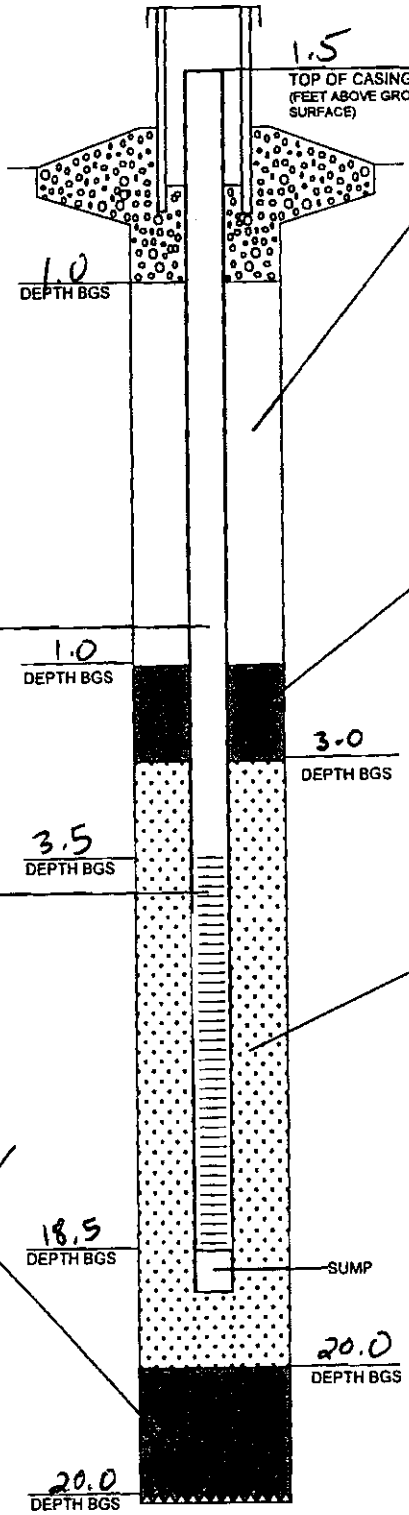
☑ SCHEDULE 40 PVC
☐ OTHER:
PRODUCT: screen
MFG. BY: Monoflex
CASING DIAMETER:
ID: 2.067" OD: 2.375"
SLOT SIZE: 0.010
LENGTH OF SCREEN: 15.0'

BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED:
☐ BENTONITE CHIPS, SIZE:
☐ BENTONITE PELLETS, SIZE:
☐ SLURRY:
☐ FORMATION COLLAPSE:
☐ OTHER:
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

SURFACE COMPLETION

☐ FLUSH MOUNT
☑ ABOVE GROUND WITH BUMPER POST (2)
☑ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED:
☐ GROUT FORMULA (PERCENTAGES)
PORTLAND CEMENT:
BENTONITE:
WATER:
☐ PREPARED MIX
PRODUCT:
MFG. BY:
METHOD INSTALLED:
☐ POURED ☐ TREMIE
☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED: 2.6 ft³
AMOUNT USED: ½ x 50 lb sack
☐ PELLETS, SIZE:
☑ CHIPS, SIZE: 3/8
☐ OTHER:
PRODUCT: Holeplug bentonite chips
MFG. BY: Baroid
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
AMOUNT OF WATER USED: 5 gal

FILTER PACK

☐ PREPACKED FILTER
VOLUME CALCULATED: 22.1 ft³
AMOUNT USED: 7 x [redacted] lb sack
☑ SAND, SIZE:
PRODUCT: sand
MFG. BY: Cemex
METHOD INSTALLED:
☑ POURED ☐ TREMIE
☐ OTHER:
WATER LEVEL: 8.33 ft
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

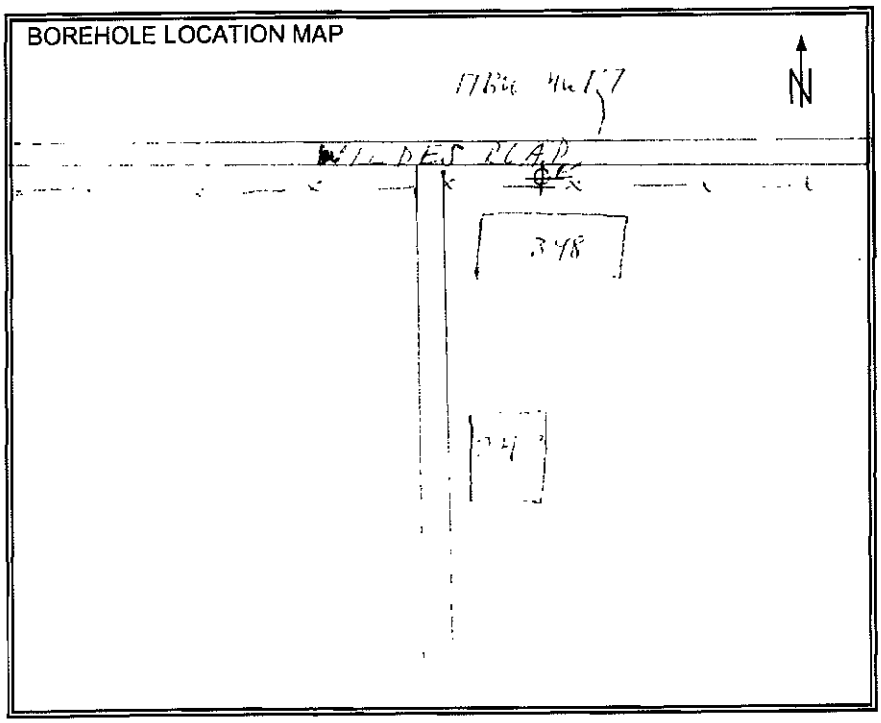
☐ YES ☑ NO; Installed in auger.
CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

Boring ID:			
Monitoring Well ID: TTBW-MW17			
Project Number: 1C3D I 4.3C2 3CC11C1	Project Name: CI Addendum		
Client: US Navy			
Site: Background			
Borehole Location (Township, Range, Section): T18N R29E Sec 10 SE¼ of NE¼			
Logged By: Richard Knapp			
Reviewed By:	Review Date:		
Drilling Contractor: Gregg Drilling			
Drill Rig Type/Method: Mail MST/HSA			
Sampler Type: Macrocore			
Borehole Diameter (inches): 4	to: 16	feet bgs	
Overdrilled Diameter (inches): 8	to: 13	feet bgs	
Drill Start Date: 10-18-08	Drill Start Time: 0858		
Drill Finish Date: 10-18-08	Drill Finish Time: 0914		
Total Borehole Depth (feet bgs): 16			
Soil Boring Backfill Date: NA	Soil Boring Backfill Time:		
Ground Surface Reference Elevation (feet msl):			
Depth to 1st Saturated Zone (feet bgs): 6.5	Date: 10-18-08	Time: 0902	
Depth to Other Water-Bearing Zones (feet bgs):			
Depth to Water After Drilling (feet bgs):			
Well Completion Date: 10-18-08	Well Completion Time: 1100		
Screen Interval (feet bgs): 3-13	Total Well Depth (feet bgs): 13		
Well Diameter (inches): 2	Well Casing Material: PVC		
Static Water Level After Well Installation (feet bgs): 5.3			

BOREHOLE LOCATION MAP



NOTES/REMARKS

Installation: NAS Fallon
CTO:
BORING ID:

DATE: 10/12/03
LOGGED BY: L. Kinney

MW ID: TTBU-MW17

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction Info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		900	16/16							SP	Sand, olive brown (2.5Y 4/4), wet, dense, dry				95	5
									12	ML	Silt, sandy, dark olive brown (2.5Y 3/3), moist, dry				15	85
Monitor Well		970	18/18				13									
							12		5	SP	Sand, yellowish brown (10YR 5/8), med dense, wet at 6.5			20	35	5
		1068	42/48				1.1									
							58			SM	Sand, silty, light olive brown (2.5Y 5/3), wet, dense			5	65	30
		1114	48/48						-1	CL	Clay, greyish brown (2.5Y 5/2), slightly plastic, moist				1	99

MONITORING WELL COMPLETION RECORD

TETRATECH EM INC

MONITORING WELL

MONITORING WELL NO.: [illegible]
PROJECT: [illegible]
SITE: [illegible]
BOREHOLE NO.:
WELL PERMIT NO.:
TOC TO BOTTOM OF WELL: 13.5

DRILLING INFORMATION

DRILLING BEGAN:
DATE: [illegible] TIME: [illegible]
WELL INSTALLATION BEGAN:
DATE: [illegible] TIME: [illegible]
WELL INSTALLATION FINISHED:
DATE: [illegible] TIME: [illegible]
DRILLING CO.: [illegible]
DRILLER: [illegible]
LICENSE: [illegible]
DRILL RIG: [illegible]
DRILLING METHOD:
- ☒ HOLLOW STEM AUGER
- ☐ AIR ROTARY
- ☐ OTHER:

DIAMETER OF AUGERS:
ID: 7 OD: 8

WELL CASING

- ☒ SCHEDULE 40 PVC
- ☐ OTHER:

PRODUCT: [illegible]
MFG. BY: [illegible]
CASING DIAMETER:
ID: 2.061 OD: 2.375
LENGTH OF CASING: 5.5

WELL SCREEN

- ☒ SCHEDULE 40 PVC
- ☐ OTHER:

PRODUCT: [illegible]
MFG. BY: [illegible]
CASING DIAMETER:
ID: 2.061 OD: 2.375
SLOT SIZE: [illegible]
LENGTH OF SCREEN: 10

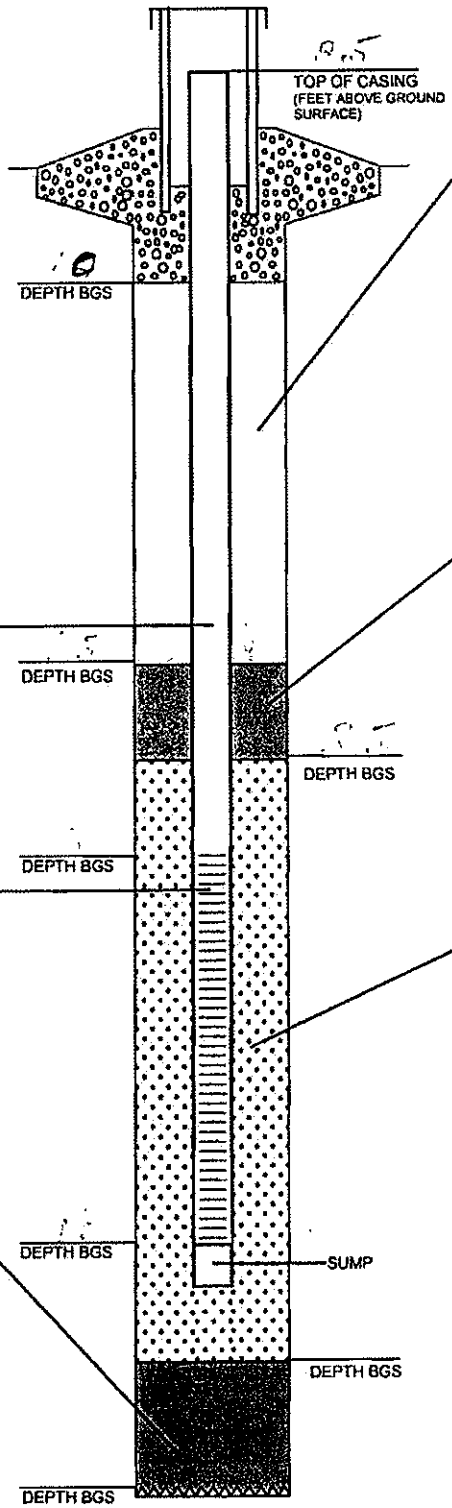
BOREHOLE BACKFILL

AMOUNT CALCULATED:
AMOUNT USED: 1.4
- ☐ BENTONITE CHIPS, SIZE:
- ☐ BENTONITE PELLETS, SIZE:
- ☐ SLURRY:
- ☒ FORMATION COLLAPSE: 12-16
- ☐ OTHER:

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- ☐ POURED ☐ TREMIE
- ☐ OTHER:

SURFACE COMPLETION

- ☐ FLUSH MOUNT
- ☒ ABOVE GROUND WITH BUMPER POST
- ☐ CONCRETE ☐ ASPHALT



SURVEY INFORMATION

TOC ELEVATION:
GROUND SURFACE ELEVATION:
NORTHING:
EASTING:
DATE SURVEYED:
SURVEY CO.:

ANNULAR SEAL

VOLUME CALCULATED:
AMOUNT USED: [illegible]
- ☒ GROUT FORMULA (PERCENTAGES)

PORTLAND CEMENT: [illegible]
BENTONITE: [illegible]
WATER: [illegible]
- ☐ PREPARED MIX

PRODUCT:
MFG. BY:
METHOD INSTALLED:
- ☒ POURED ☐ TREMIE
- ☐ OTHER:

BENTONITE SEAL

VOLUME CALCULATED:
AMOUNT USED: [illegible]
- ☐ PELLETS, SIZE:
- ☒ CHIPS, SIZE: [illegible]
- ☐ OTHER:

PRODUCT: [illegible]
MFG. BY: [illegible]
METHOD INSTALLED:
- ☒ POURED ☐ TREMIE
- ☐ OTHER:

AMOUNT OF WATER USED: [illegible]

FILTER PACK

- ☐ PREPACKED FILTER

VOLUME CALCULATED:
AMOUNT USED: [illegible]
- ☒ SAND, SIZE: 2/16

PRODUCT: [illegible]
MFG. BY: [illegible]
METHOD INSTALLED:
- ☐ POURED ☒ TREMIE
- ☐ OTHER:

WATER LEVEL: 7.5 + 2.5 = 10'
(BTOC AFTER WELL INSTALLATION)

CENTRALIZERS USED?

- ☐ YES ☒ NO:

CENTRALIZER DEPTHS:

LEGEND

BGS = BELOW GROUND SURFACE
BTOC = BELOW TOP OF CASING
N/A = NOT APPLICABLE
NR = NOT RECORDED
TOC = TOP OF CASING

APPENDIX C-2
WELLS RECOMMENDED TO BE PLUGGED

Site 1

Lithologic logs were not available for the following monitoring wells located at Site 1 during report development:

Well ID	Installation Date
MW-72 Y	3/13/1996
P1-MW-01	5/14/2002
P1-MW-02	5/14/2002
P1-MW-03	5/14/2002
P1-MW-04	5/14/2002
P1-MW-05	5/14/2002
P1-MW-06	5/13/2002
P1-MW-07	5/13/2002
P1-MW-08	5/13/2002
P2-MW-01	5/15/2002
P2-MW-02	5/15/2002
P2-MW-03	5/15/2002
P2-MW-04	5/15/2002
P2-MW-05	5/14/2002
P2-MW-06	5/14/2002
P2-MW-07	5/15/2002
P2-MW-08	5/16/2002
P2-MW-09	5/15/2002

Notes & Comments:

Wells BAT-1-B, BAT-1-D, BAT-1-E/14C, BAT-1-F, BAT-1-G-L, BAT-1-G-M, BAT-1-G-U, BAT-1-J, and BAT-1-K are of the construction shown on either of the next two pages, Figure G-1 or G-2. Specific well details are listed in the table (G.1-1) that immediately follows the above figures.

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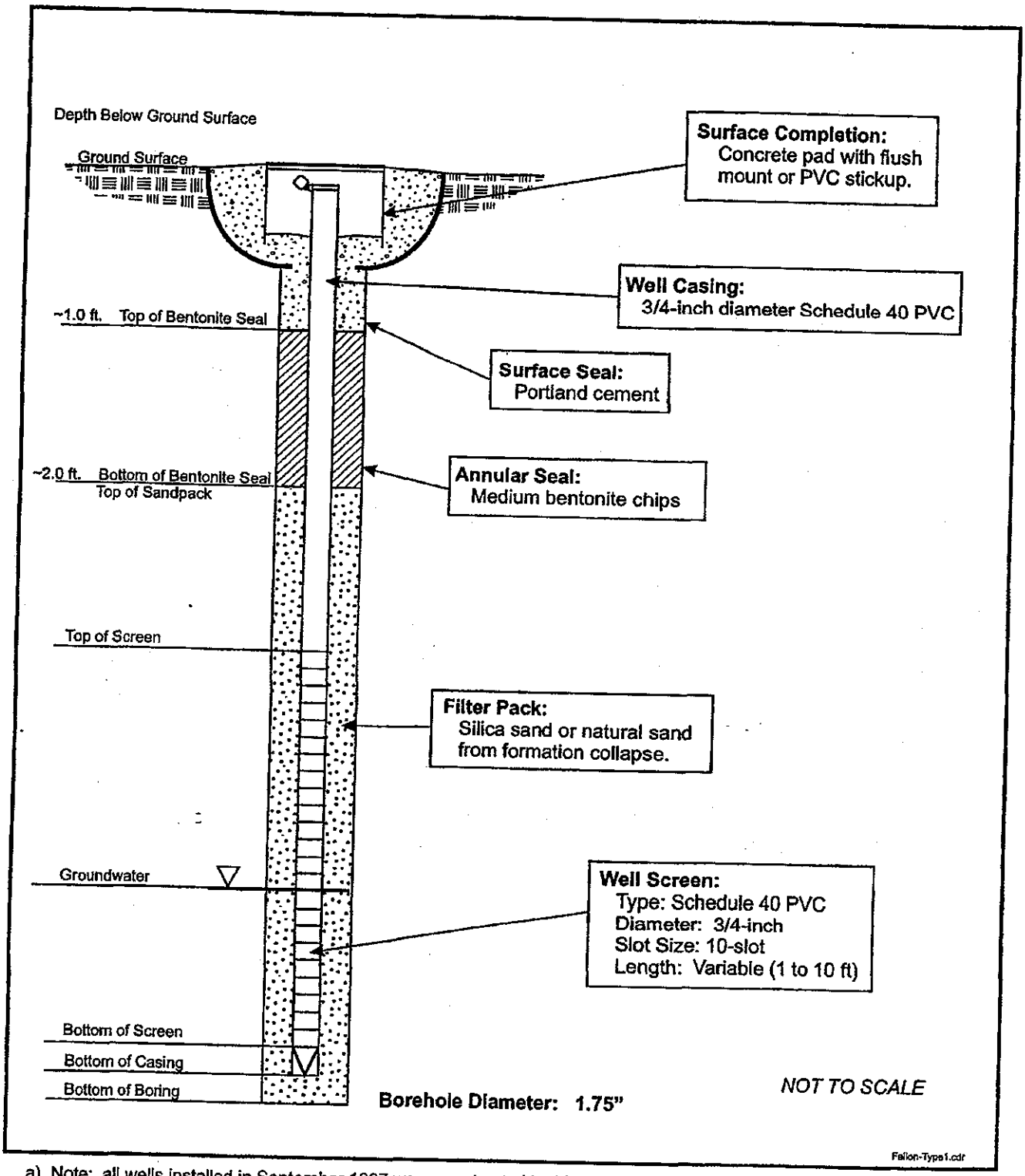
Figure G-1

WELL COMPLETION DIAGRAM SILICA/NATURAL SAND PACK[a]



a) Note: all wells installed in September 1997 were constructed in this manner.

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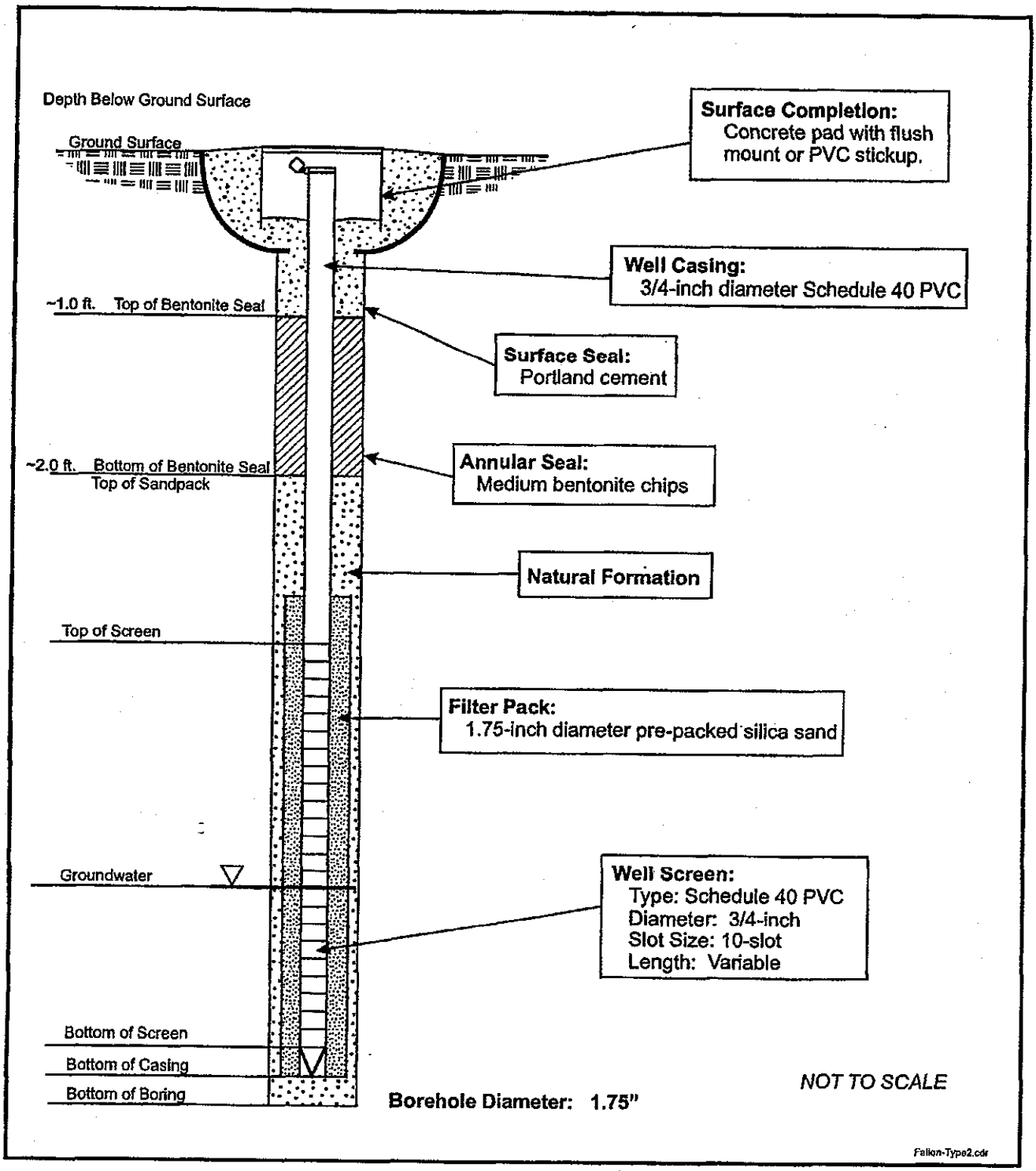
Figure G-2

WELL COMPLETION DIAGRAM PRE-PACKED SCREEN[a]



a) Note: all wells installed after September 1997 were constructed in this manner.

ornl OAK RIDGE NATIONAL LABORATORY

Well Summary Information

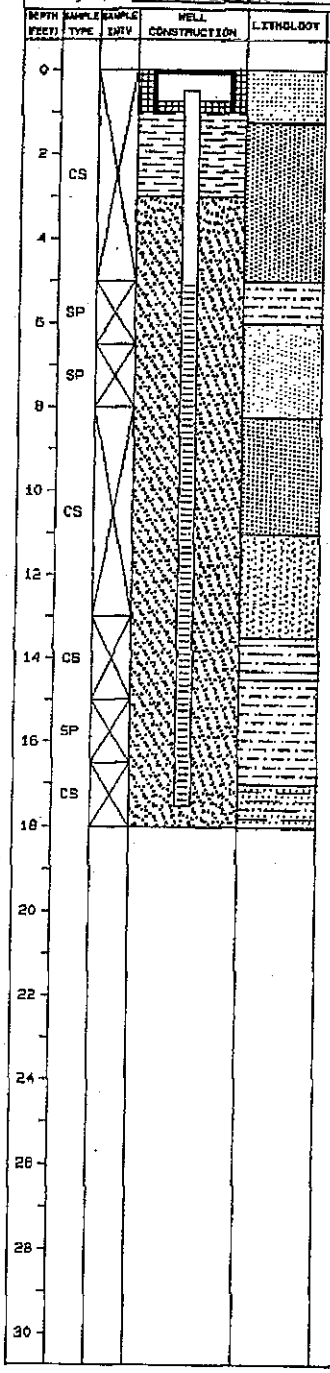
Prepared By: S.R. Sturm Date: 11/21/91 Page: 1 OF 1

Hole No.: PW02 Casing Elevation: 3925.25' Ground Elevation: 3925.86'

Total Depth: 18' No. of Compl.: 1 Rig Type: CME-75 Location: Site 14

Auger Size: 10" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

SP SAND: very dark grayish brown (10YR3/2), silty, vfU-fU, subangular, predominantly clear quartz, dry.

SP SAND: yellowish brown (10YR5/4), fL-fU, angular to subangular, dry.

SM SILTY SAND: grayish brown (10YR5/2), vfU, some clay, abundant roots, micaceous, damp.

SP SAND: grayish brown (10YR5/2), fU, subangular, some silt, predominantly clear quartz, 5% mafic minerals, some biotite.

SP SAND: color as above, fU-mU, subangular, predominantly clear quartz, becoming coarse, saturated

SW SAND: grayish brown (10YR5/2), fU-vcL, subangular, predominantly clear quartz, saturated.

CS SANDY CLAY: light yellowish brown (10YR6/4), fL, abundant Fe oxide staining, blocky, stiff, few open pores <1mm.

SM SANDY SILT: vfL-fL, subangular, abundant mica with black patchy Fe oxides.

SC SILTY CLAY: olive (5Y5/4), abundant mica, stiff.

CONCRETE 0-1'
BENTONITE PELLETS (3/8") 1.0'-3.0'
FRAC SAND (#2) 3.0'-18'
SLOTTED 5" PVC SCREEN (0.010") 5'-17'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: S.R. Sturm Date: 12/4/91 Page: 1 OF 1

Hole No.: PZ1-3 Casing Elevation: 3924.29 Ground Elevation: 3924.23

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 1

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				SP SAND: pale brown, fine grained.
4	GB				SM SILTY SAND: very fine grained.
6					
8	GB				
10	GB				SW SAND: light gray, subanguler, micaceous.
12					
14	GB				SW SAND: as above, well graded.
16	GB				Frac sand (8/20), 1'-15'. Native sand 15'-18'. PVC (.010"), 1.5" screen, 5'-15'.
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

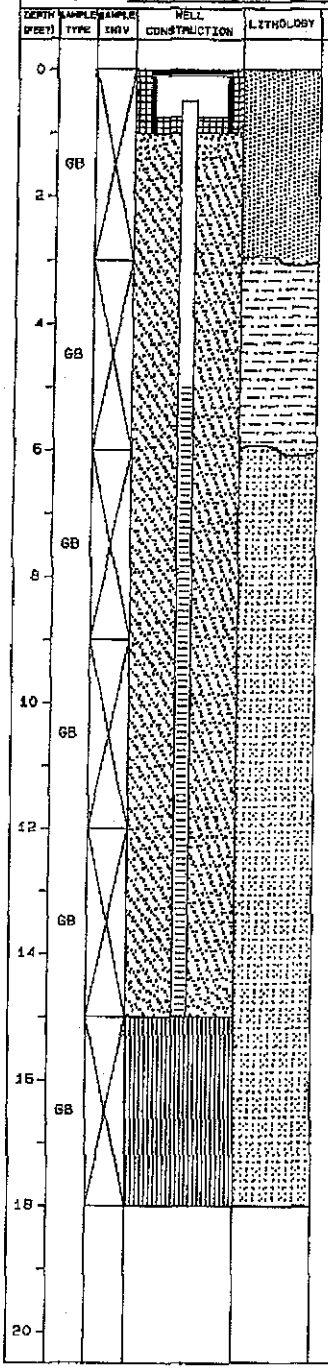
Prepared By: S.R. Sturm Date: 12/5/91 Page: 1 OF 1

Hole No.: PZ1-4 Casing Elevation: 3925.51 Ground Elevation: 3925.41

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 1

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91



DESCRIPTION

SP SAND: pale brown, fine grained.

SM SILTY SAND: very fine grained.

SW SAND: light gray, subanguler, micaceous.

SW SAND: as above, well graded.

Frac sand (8/20), 1'-15'.
Native sand 15'-18'.
PVC (.010"), 1.5" screen, 5'-15'.

ornl OAK RIDGE NATIONAL LABORATORY

Well Summary Information

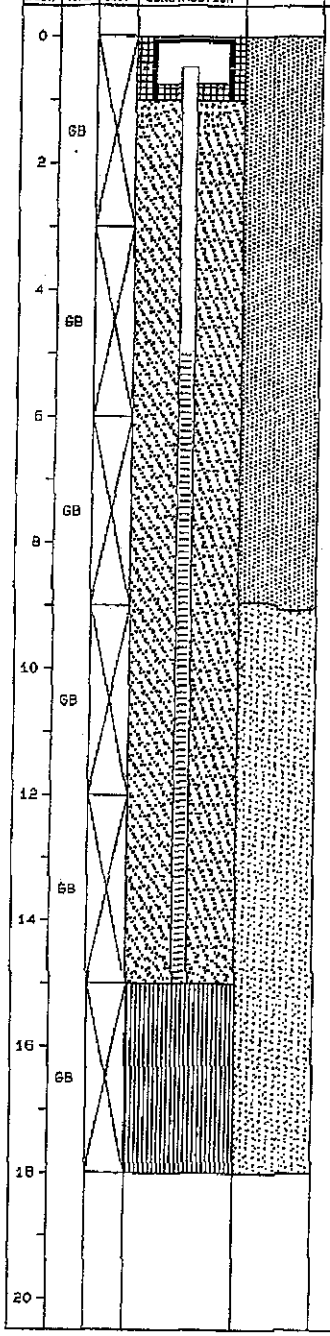
Prepared By: S.A. Sturm Date: 12/5/91 Page: 1 OF 1

Hole No.: PZ1-5 Casing Elevation: 3925.94 Ground Elevation: 3925.82

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 1

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91



DESCRIPTION

SP SAND: pale brown, eolian, fine grained.

SP SAND: light gray, micaceous, very fine grained.

SP SAND: as above.

SW SAND: light gray, very fine to medium grained.

SW SAND: as above.

SW SAND: light gray, fine to coarse grained, some pebbles to 2 mm, channel sand.

Frac sand (8/20), 1'-15'.
Native sand 15'-18'.
PVC (.010"), 1.5" screen, 5'-15'.

ornl OAK RIDGE NATIONAL LABORATORY

Well Summary Information

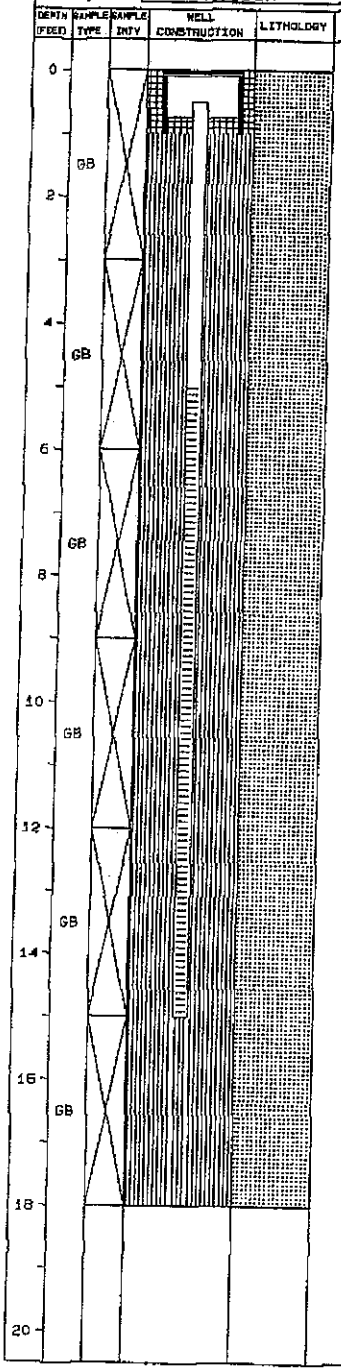
Prepared By: S.R. Sturm Date: 12/5/91 Page: 1 OF 1

Hole No.: PZ1-7 Casing Elevation: 3925.00 Ground Elevation: 3924.91

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 1

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91



DESCRIPTION
SP SAND: pale brown, fine to medium grained.
SP SAND: as above.
SP SAND: altered to dark gray.
SP SAND: fine to medium grained.
SP SAND: as above.
SP SAND: light gray, becoming more coarse. HNU, 90 ppm in hole.
Native sand 1'-18'. PVC (.010"), 1.5" screen, 5'-15'. Sample bailed.

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Well Summary Information

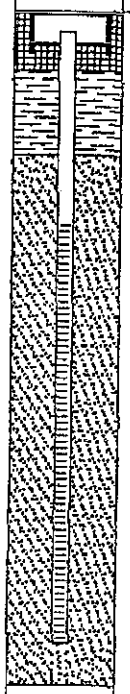
Prepared By: R.M. Schlosser Date: 11/18/91 Page: 1 OF 1

Hole No.: MW51U Casing Elevation: 3927.84' Ground Elevation: 3927.86'

Total Depth: 16.0' No. of Compl.: 1 Rig Type: CME-75 Location: Site 1

Auger Size: 7 5/8" O.D. Sample Type: NONE

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91

DEPTH FEET	SAMPLE TYPE	SAMPLE INV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					NO SAMPLES TAKEN, SEE MW51L FOR LITHOLOGY
4					AUGER TO 16'
6					
8					
10					CONCRETE 0'-1.4' SLOTTED 2" PVC SCREEN (0.010") 5'-15' BENTONITE PELLETS (3/8") 1.4'-3.4' FRAC SAND (#2) 3.4'-16'
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

UST-R Site 1 (395)

Lithologic logs and/or Monitoring Well Completion Reports were not available for the following monitoring wells located at UST-R Site 1 (395) during report development:

Well ID		Installation Date
395A	Y	12/8/1994
395D	Y	12/7/1994
395E	Y	3/26/1996

Sites 2/4

Lithologic logs were not available for the following monitoring wells located at the Hot Pit during report development:

Well ID	Installation Date
EW-24	4/28/1988
EW-27	4/29/1988
EW-28	4/29/1988
RW-1	7/15/1993
RW-2	7/14/1993
RW-3	6/8/1993
RW-5A	11/9/1993

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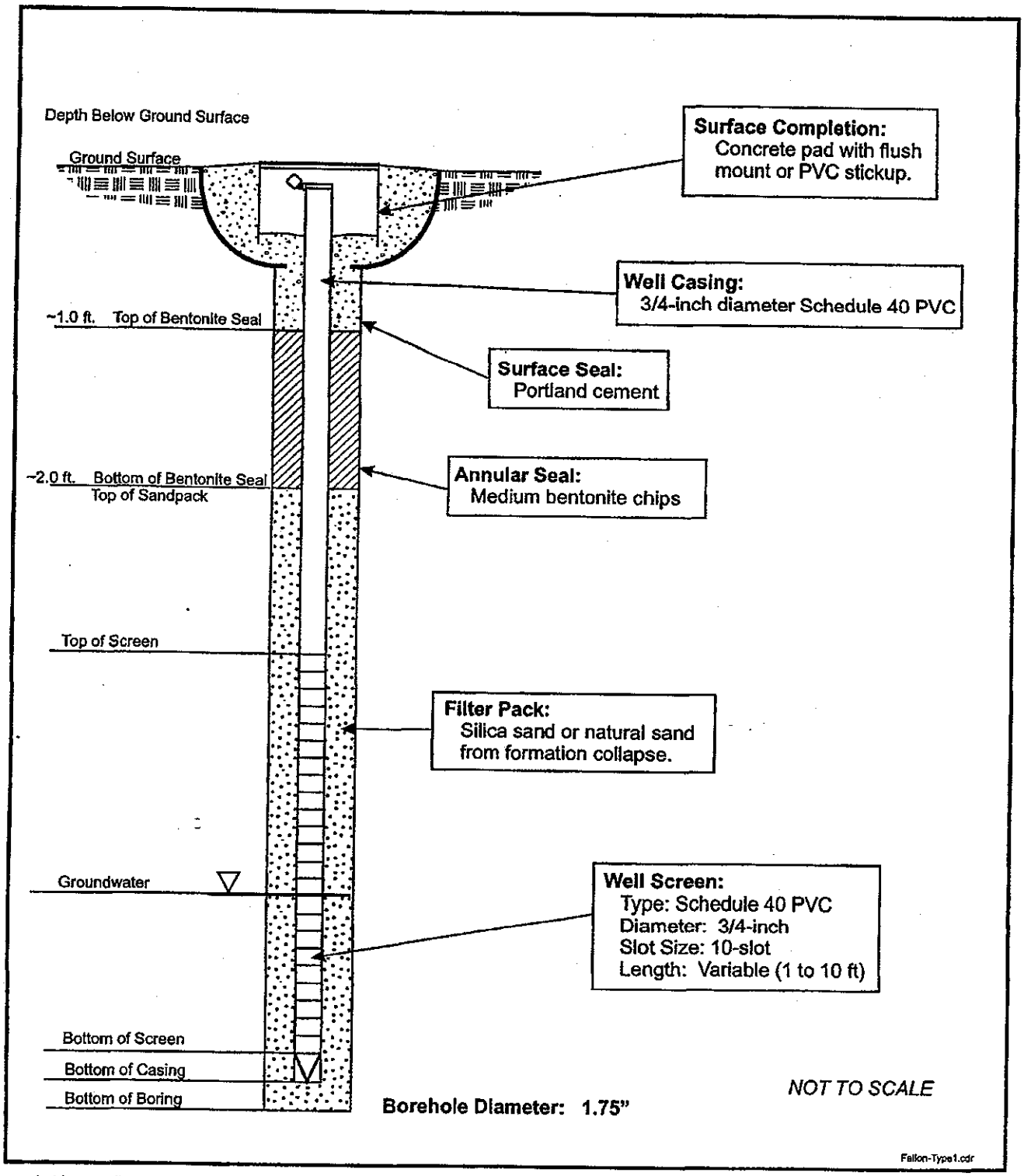
Figure G-1

WELL COMPLETION DIAGRAM SILICA/NATURAL SAND PACK[a]



a) Note: all wells installed in September 1997 were constructed in this manner.

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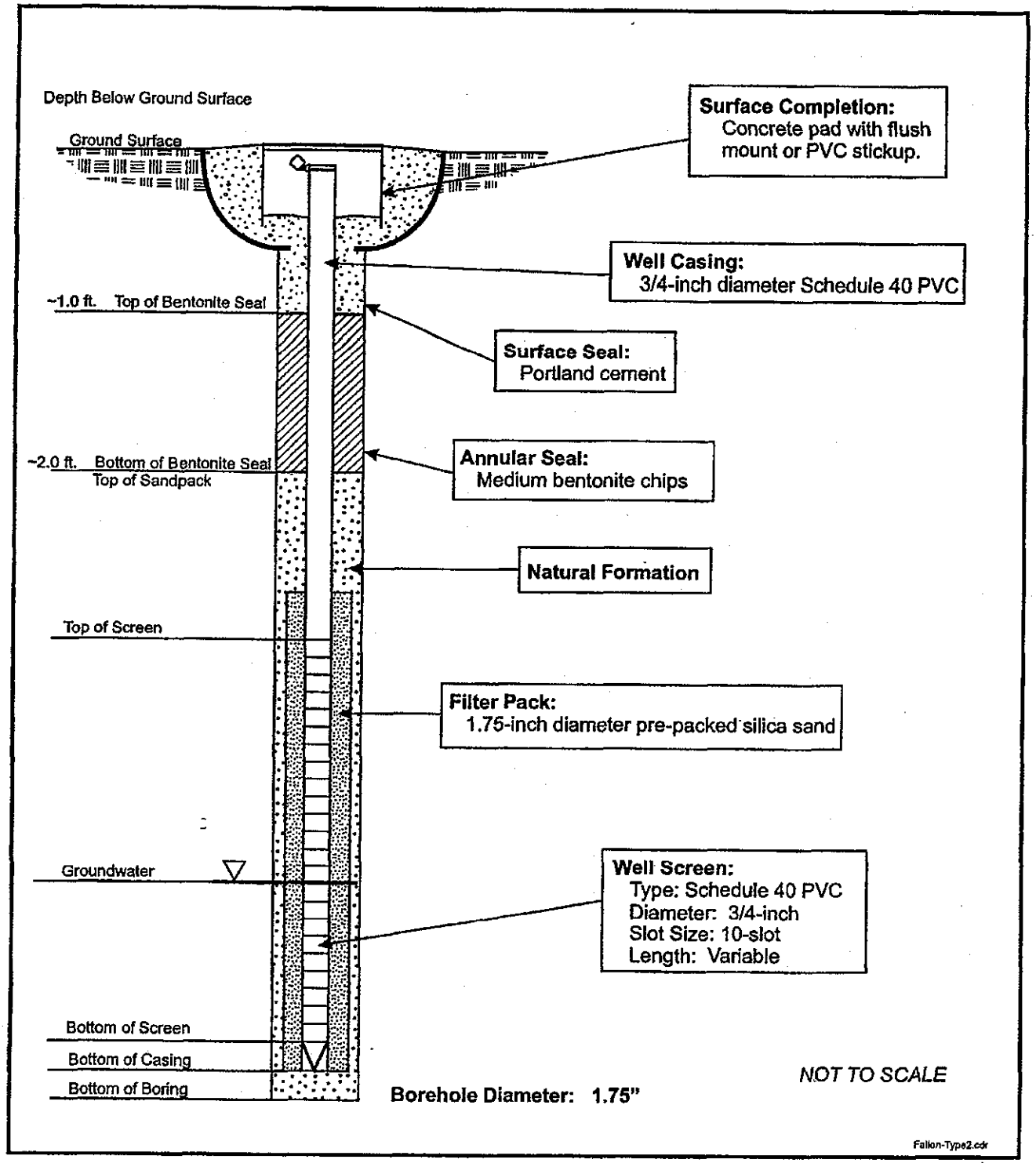
Figure G-2

WELL COMPLETION DIAGRAM PRE-PACKED SCREEN[a]



a) Note: all wells installed after September 1997 were constructed in this manner.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

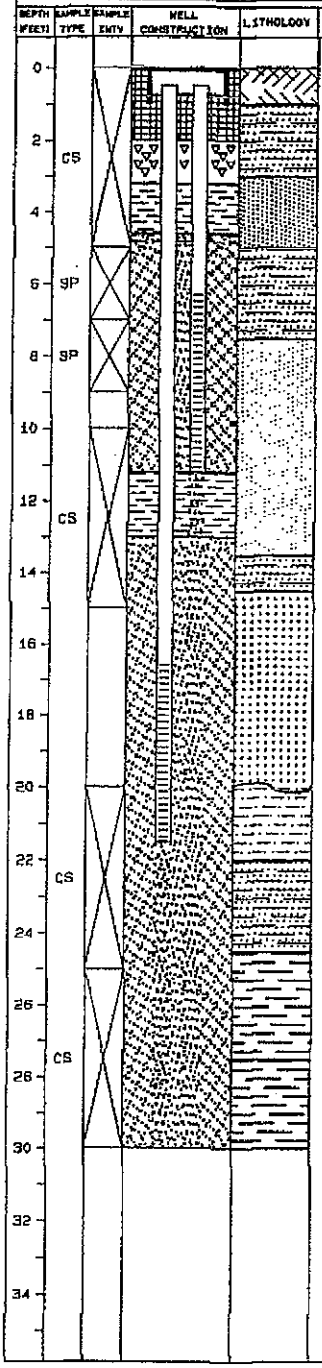
Prepared By: Bob Schlosser Date: 6/18/90 Page: 1 OF 1

Hole No.: MW03 Casing Elev.: UBL-3933.13' Ground Elev.: 3933.29' Location: Transportation Yard

Total Depth: 30.0' Number of Completions: 2 Rig Type: Schramm T-685

Auger Size: 8" Sample Type: 3.5"x5'Continuous 2.5"x2' "Calif. method" SS

Project: NAS Fallon Data Verified By: Date:



DESCRIPTION

FILL: gravel, 8-15mm, with sand.

CL CLAYEY SILT: dark brown (10YR3/3), micaceous with root hairs, some dark yeldwish brown mottling (10YR3/3), grading to

SP SAND: brown (10YR5/3), fine to medium grained (fL-mL), subangular to subrounded, loosly consolidated, micaceous, wet at 7.0'

CL CLAYEY SILT: sandy in part, grading to

SP SAND: brown (10YR5/3) fine grained (vfU-fL), subangular to angular with some rounded, silty in part.

SP SAND: as above, mottled occasionally grayish brown (10YR5/3), some root hairs, abundant limonite staining

SP SAND: color as above, becoming medium grained

CL CLAYEY SILT: slightly plastic, moist

SW SAND: pale brown (10YR6/3), medium to coarse grained (mL-cU), saturated, subrounded to rounded, well graded with abundant accessory minerals

SAND HEAVED IN HOLE TO 17, FILLED AUGERS WITH WATER AND AUGERED TO 20.0'

SP SAND: dark grayish brown (10YR4/2), silty in part.

MARKER BED CARSON RIVER-LAHONTAN LAKE.

CL CLAYEY SILT: yellowish brown mottled brownish yellow, dry, tight, with interbedded very fine grained sand, varved, some light grey mottling

CL CLAY: light grey (5Y7/1) mottled yellowish brown (10YR5/4), micaceous, dry, tight, light brown is less silty than yellowish brown, some fine sand in partings occasionally.

CL CLAY: greenish gray (5GY6/1), hackly fractured, blocky from 27.5'-29.0', 1-2 mm varves, reworked mudcracks, lower unit has abundant root hairs some evaporites very thinly bedded 2-3 cm apart, oolites (?)

SLOTTED PVC CASING (.010") 6.2'-11.2 and at 16.5'-21.5'
FRAC SAND (8/12), 4.6'-11.2' and 24.0'-30.0'
BENTONITE PELLETS (1/4") 3.2'-4.6', 11.2'-13.0'

ornl OAK RIDGE NATIONAL LABORATORY

Well Summary Information

Prepared By: Bob Schlosser Date: 6/22/90 Page: 1 OF 1

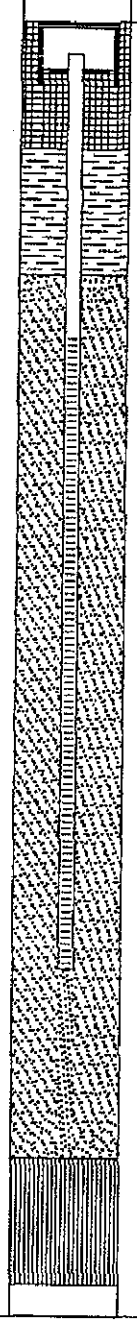
Hole No.: MW06U Casing Elevation: 3935.75' Ground Elevation: 3935.58'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 2

Auger Size: 8" O.D. Sample Type: None

Project: NAS Fallon Data Verified By: David Smuin Date: 6/23/90

DEPTH (FEET)	SAMPLE TYPE	SAMPLE ENTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					HOLE NOT LOGGED. SEE MW06L
4					CONCRETE SURFACE SEAL. 0'-2'
6					AUGER TO 20.0' SET CASING 15.0'
8					
10					
12					SLOTTED SCREEN (0.010") 5.0'-15.0' FRAC SAND (8/12) 4.0'-18.0' BENTONITE PELLETS (1/4") 2.0'-4.0'. HYDRATED WITH POTABLE WATER (2 GALLONS)
14					
16					
18					
20					



ornl OAK RIDGE NATIONAL LABORATORY

Well Summary Information

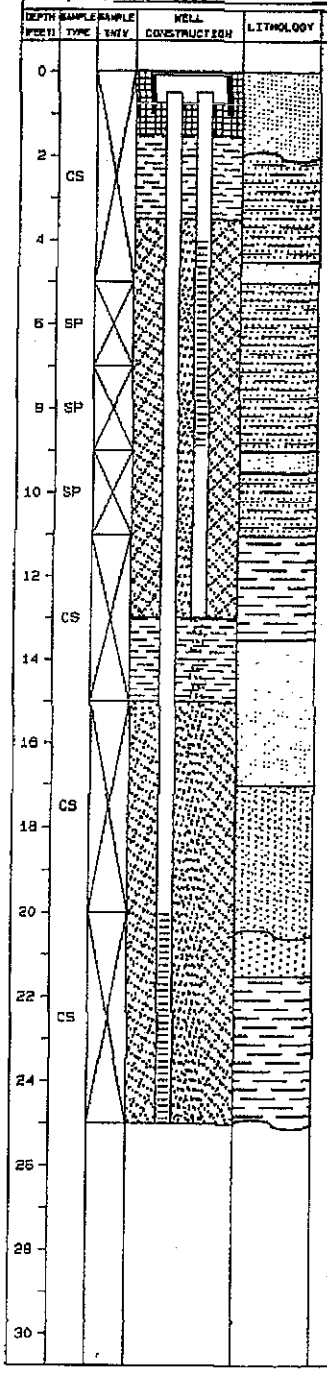
Prepared By: Bob Schlosser Date: 6/23/90 Page: 1 OF 1

Hole No.: MW08 Casing Elev.: U-3937.74 L-3937.68 Ground Elev.: 3937.89 Location: Site 2

Total Depth: 25.0' Number of Completions: 2 Rig Type: Schramm T-685

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 8/24/90



DESCRIPTION

SP SAND: pale brown (10YR6/3), subangular to sub-rounded, arkosic in part, loosely consolidated

CL CLAYEY SILT: with abundant very fine sand, roots and other organics, small isolated pockets of fine grained sand 5-8 mm thick

SP SAND: as above

CL CLAYEY SILT: dark grayish brown (10YR3/2), some organics, moist

SP SAND: fine grained as above with clay

CL CLAYEY SILT: dark brown (10YR4/3), micaceous, abundant root hairs

CL CLAY: dark brown (10YR3/3), very tight, plastic, abundant limonite staining and black organics

SP SAND: fine grained (fU), very micaceous, mostly clear quartz, subrounded to rounded, loosely consolidated, becoming mL downward

SW SAND: dark brown (10YR5/3) fine to medium grained (fU-mU), micaceous, abundant dark accessory minerals, some scattered 1-2 mm pebbles

SW SAND: as above, becoming mU-cU, well graded

CL CLAYEY SILT: olive (5Y5/4), micaceous, silty in part to very silty. From 23.0'-24.0', very fine grained sand with heavy limonite staining CARSON RIVER-LAHONTON LAKE MARKER BED>

SLOTTED PVC SCREEN (0.010"), 20.0'-25.0', 4.0'-9.0'
FRAC SAND (8/12), 13.0'-25.0', 3.5'-9.0'
BENTONITE PELLETS (1/4"), 11.0'-13.0', 1.5'-3.5'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

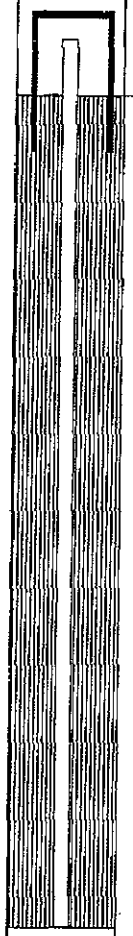
Prepared By: R.M. Schlosser Date: 9/25/89 Page: 1 OF 1

Hole No.: PZ2-4 Casing Elevation: 3940.11 Ground Elevation: 3939.21

Total Depth: 15' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 2

Auger Size: 4" Sample Type: None

Project: NAS Fallon Data Verified By: D.R. Smyin Date: 12/17/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					NO SAMPLES TAKEN, NO LITHOLOGY DESCRIBED. Native sand, Surface-15'. PVC (1.0"), +1'-15', Open ended piezometer.
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M. Schlosser Date: 9/25/89 Page: 1 OF 1

Hole No.: PZ2-5 Casing Elevation: 3938.51 Ground Elevation: 3937.52

Total Depth: 15' No. of Compl.: 1 Rig Type: ORNL V2GRT Location: Site 2

Auger Size: 4" Sample Type: None

Project: NAS Fallon Data Verified By: D.A. Smuin Date: 12/17/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					NO SAMPLES TAKEN, NO LITHOLOGY DESCRIBED. Native sand, Surface-15'. PVC (1.0"), +1'-15', Open ended piezometer.
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M. Schlosser Date: 9/25/89 Page: 1 OF 1

Hole No.: PZ2-6 Casing Elevation: 3940.80 Ground Elevation: 3939.42

Total Depth: 15' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 2

Auger Size: 4" Sample Type: None

Project: NAS Fallon Data Verified By: D.R. Smyth Date: 12/17/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					NO SAMPLES TAKEN, NO LITHOLOGY DESCRIBED. Native sand, Surface-15'. PVC (1.0"), +1'-15', Open ended piezometer.
2					
4					
6					
8					
10					
12					
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M. Schlosser Date: 9/25/89 Page: 1 OF 1

Hole No.: PZ2-7 Casing Elevation: 3939.91 Ground Elevation: 3938.03

Total Depth: 15' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 2

Auger Size: 4" Sample Type: None

Project: NAS Fallon Data Verified By: D.R. Smuin Date: 12/17/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					
4					
6					
8					
10					NO SAMPLES TAKEN, NO LITHOLOGY DESCRIBED.
12					Native sand, Surface-15'. PVC (1.0"), +1'-15', Open ended piezometer.
14					
16					
18					
20					

Site 3

Lithologic logs were not available for the following monitoring wells located at Site 3 during report development:

Well ID	Installation Date
MW-95	3/28/1996

Notes & Comments:

Wells BAT-3-A-L, BAT-3-A-U, BAT-3-B-L, BAT-3-B-U, BAT-3-C-L, BAT-3-C-U, and BAT-3-D are of the construction shown on either of the next two pages, Figure G-1 or G-2. Specific well details are listed in the table (G.1-1) that immediately follows the above figures.

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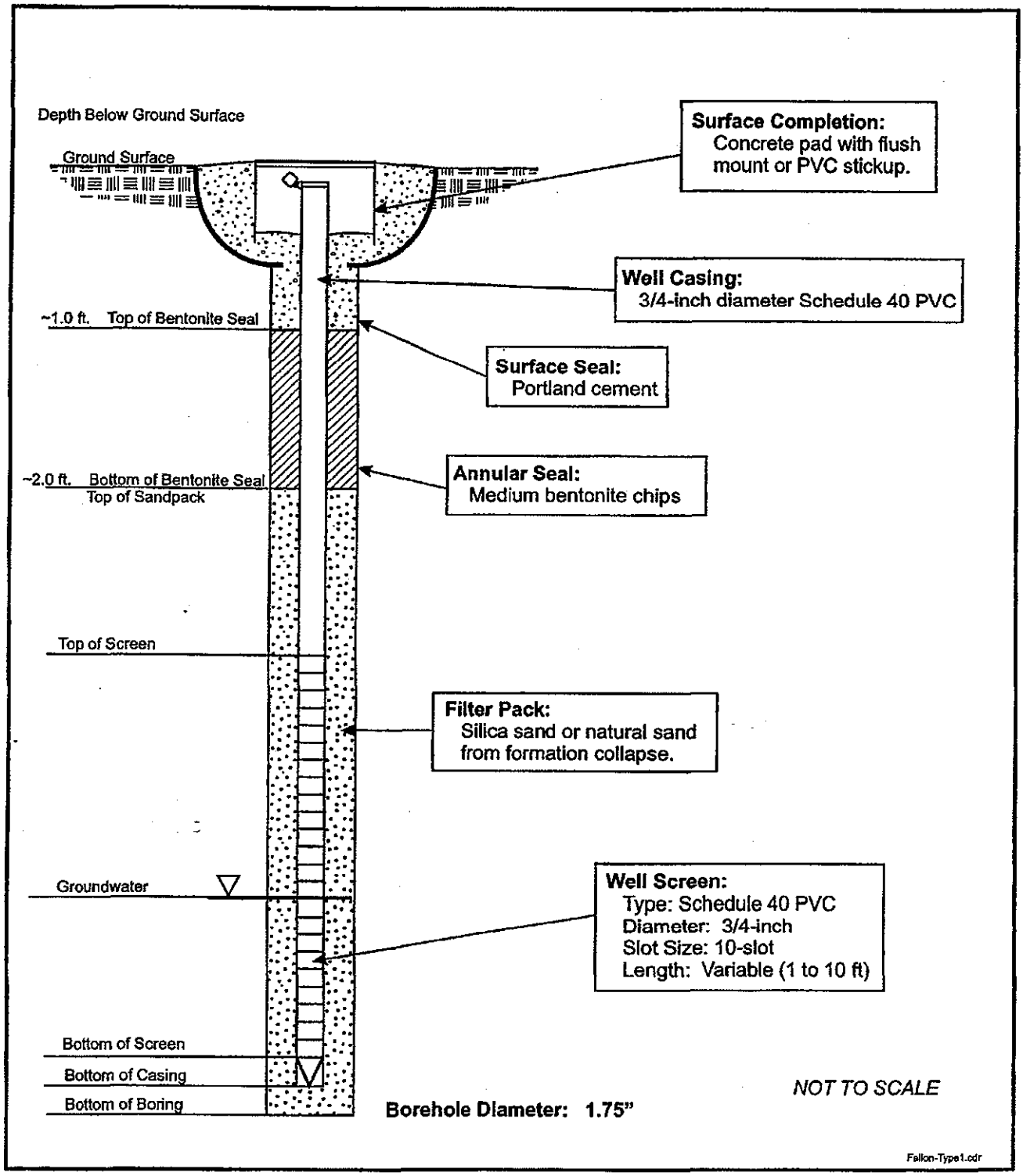
Figure G-1

WELL COMPLETION DIAGRAM SILICA/NATURAL SAND PACK[a]



a) Note: all wells installed in September 1997 were constructed in this manner.

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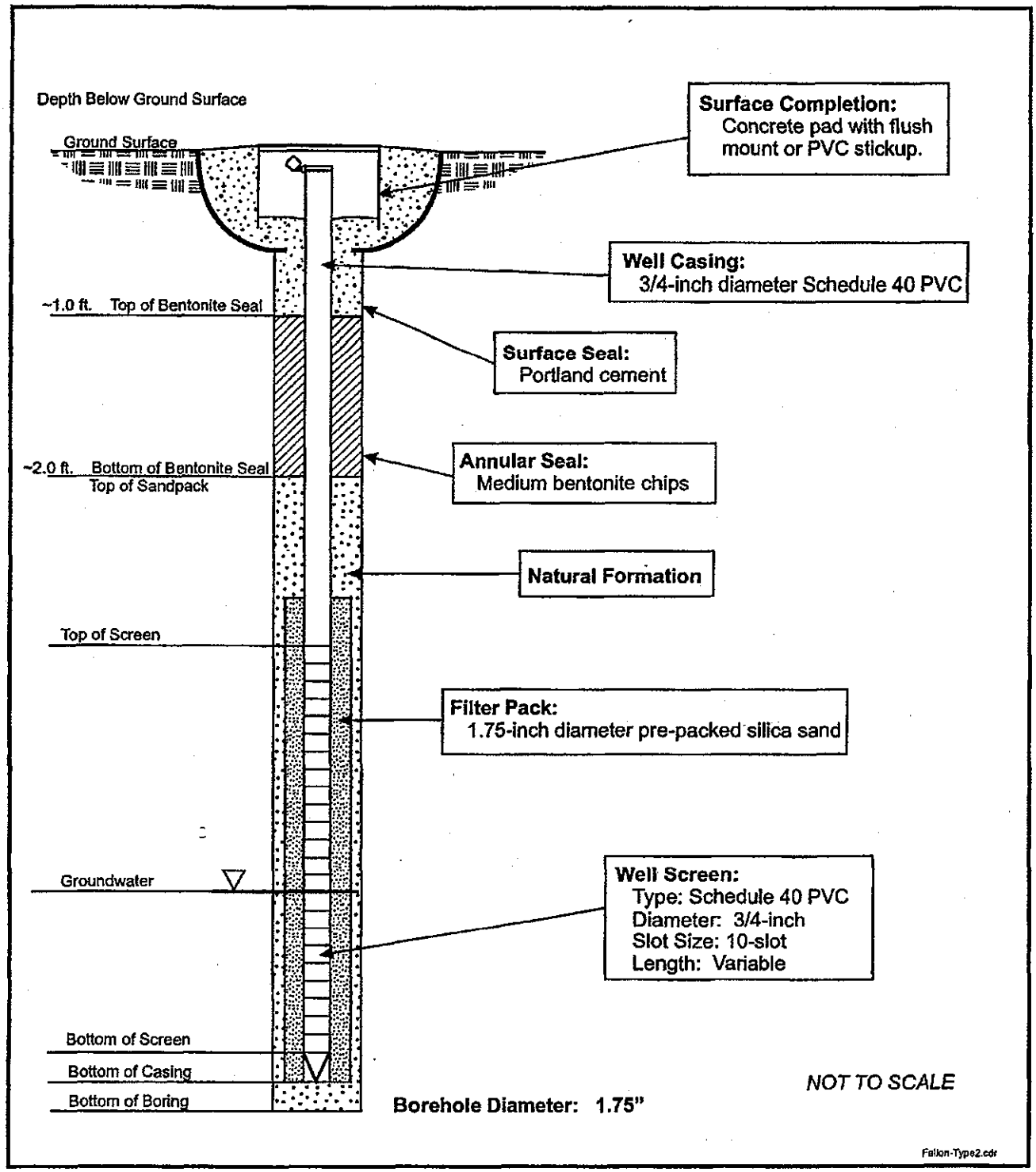
Figure G-2

WELL COMPLETION DIAGRAM PRE-PACKED SCREEN[a]



a) Note: all wells installed after September 1997 were constructed in this manner.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

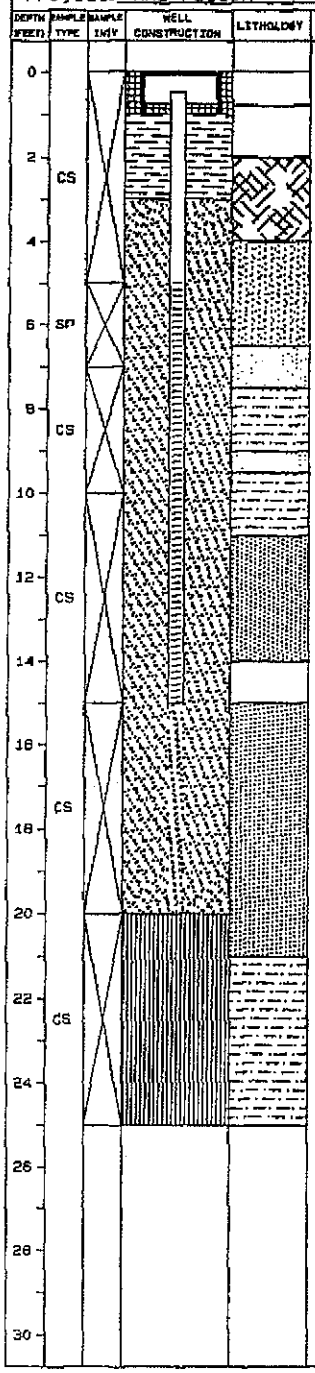
Prepared By: Bob Schlosser Date: 3/13/91 Page: 1 OF 1

Hole No.: MW30 Casing Elevation: 3933.10' Ground Elevation: 3933.33'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 3

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smyth Date: 3/22/91



DESCRIPTION

CONCRETE

NO SAMPLE, DRILLED 2' UNDER CONCRETE

FILL: gravel and sand

SW SAND: dark brown (10YR3/3), fL-vcU, subanglar to subround, micaceous, dark accessory minerals

SP SAND: dark gray (5Y4/1), vfU, very poorly graded, predominantly subrounded, very calcareous

SM SANDY SILT: medium brown, stiff

SP SAND: as above, HNU=2.3 ppm

SM SILTY SAND: very dark gray (7.5YRN3/), vfL

LOST 14'-15'

SP SAND: brown (10YR5/3), fL

SP SAND: as above, very calcareous, micaceous

SP SAND: as above, thin 1 mm dark organic banding, slightly calcareous in part

SM SANDY SILT: olive yellow (2.5Y6/6), sand vfU, grading to SILTY CLAY, strong Fe stained sand at 24.0'. MARKER BED

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20), 3'-20'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'
NATIVE FILL 20'-25'

Well Summary Information

ornl DAK RIDGE NATIONAL LABORATORY

Prepared By: W.H. Burke Date: 3/14/91 Page: 1 OF 1

Hole No.: MW41L Casing Elevation: 3931.71' Ground Elevation: 3932.13'

Total Depth: 26.5' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 3

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					FILL: gravel and sand
2	CS				SP SAND: dark yellowish brown (10YR4/4), fL, subangular to subround, micaceous, some feldspar, basalt
4					
6	SP				SM SILTY SAND: grayish brown (10YR5/2)), vfL SP SAND: yellowish brown (10YR5/4), cL-mUc subangular to rounded, micaceous, wet
8	SP				
10					AUGER 9'-10' SM SILTY SAND: grayish brown (10YR5/2), vfU
12	CS				
14					SP SAND: brown (10YR5/3), mU-mL, subangular to subrounded, silty in part
16					
18	CS				
20					SM SILTY SAND: grayish brown (10YR5/2), vfU SP SAND: color as above, vfU-fL, silty in part, becoming coarser with depth
22	CS				
24					SM SILTY SAND: light brownish gray (2.5Y6/2), vfU, subangular to subround, some Fe stained clay stringers
26					NO SAMPLE 25'-26.5' NEAT CEMENTE 0'-14.5' BENTONITE PELLETS (3/8") 14.5'-17.5' FRAC SAND (8/20), 17.5'-26.5' SLOTTED 2" PVC SCREEN (0.010") 20.5'-25.5'
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

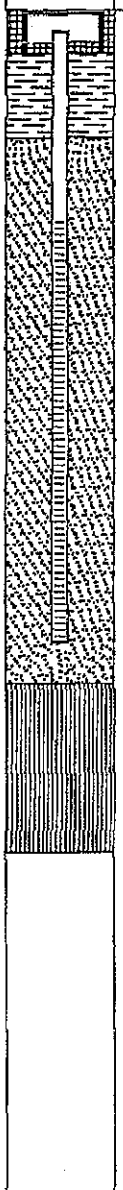
Prepared By: Bob Schlosser Date: 3/15/91 Page: 1 OF 1

Hole No.: MW41U Casing Elevation: 3931.83' Ground Elevation: 3932.13'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 3

Auger Size: 8" O.D. Sample Type: NONE

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					NO SAMPLES TAKEN. SEE MW41L FOR LITHOLOGY
4					AUGER TO 20'
6					
8					
10					CONCRETE 0'-1' SLOTTED 2" PVC SCREEN (0.010") 5'-15' BENTONITE PELLETS (3/8") 1'-3' FRAC SAND (8/20) 3'-16' NATIVE FILL 16'-20'
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Site 6

Lithologic logs were not available for the following monitoring wells located at Site 6 during report development:

Well ID	Installation Date
GTI-6-1A	5/31/1995
MW-46 NA	3/17/1991

Notes & Comments:

Well BAT-6-B, BAT-6-C, BAT-6-D, BAT-6-E, BAT-6-F, BAT-6-G, and BAT-6-I is of the construction shown on either of the next two pages, Figure G-1 or G-2. Specific well details are listed in the table (G.1-1) that immediately follows the above figures.

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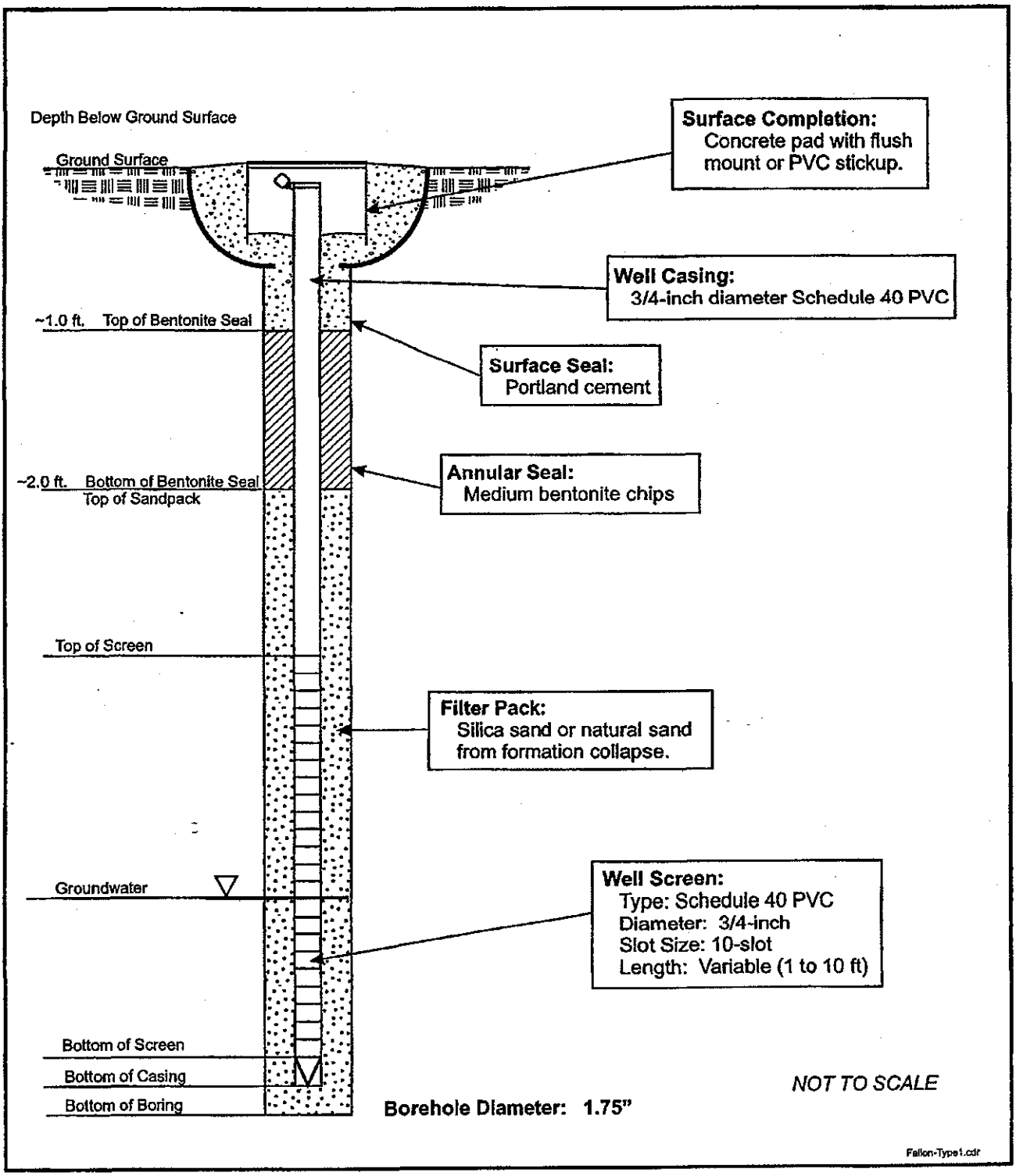
Figure G-1

WELL COMPLETION DIAGRAM SILICA/NATURAL SAND PACK[a]

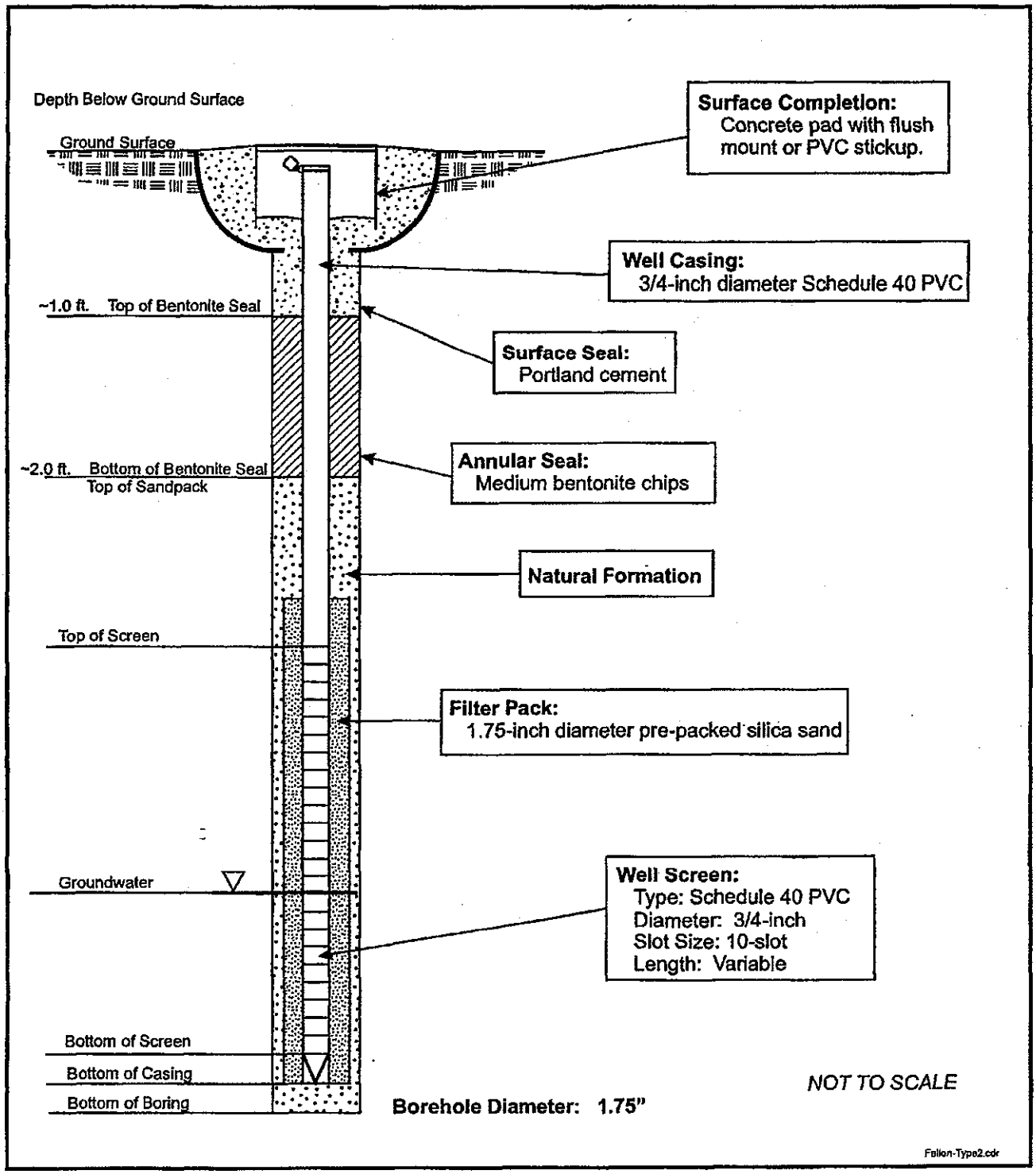


a) Note: all wells installed in September 1997 were constructed in this manner.

Battelle
. . . Putting Technology To Work

Figure G-2

WELL COMPLETION DIAGRAM PRE-PACKED SCREEN[a]



a) Note: all wells installed after September 1997 were constructed in this manner.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

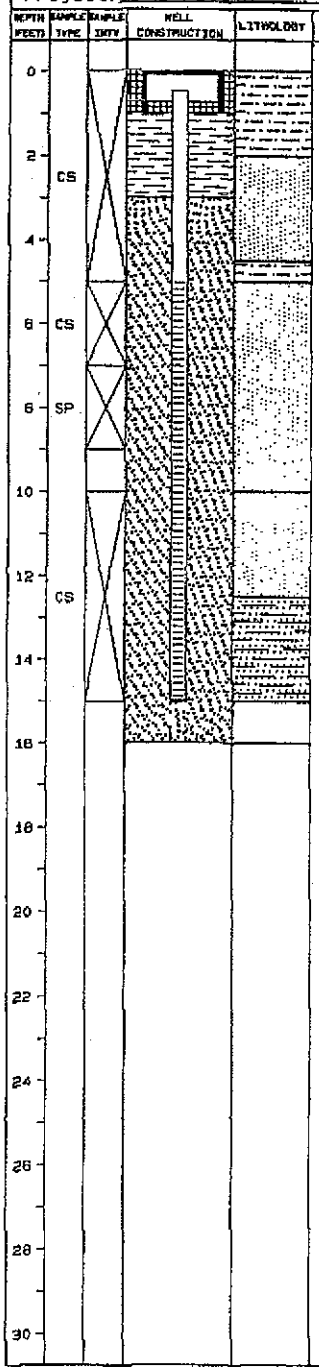
Prepared By: Bob Schlosser Date: 3/17/91 Page: 1 OF 1

Hole No.: MW47 Casing Elevation: 3925.72' Ground Elevation: 3925.90'

Total Depth: 16.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Group II Sites

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91



DESCRIPTION

SM SANDY SILT: brown (10YR4/3), abundant root hairs and vesicles, some Fe staining

SP SAND: yellowish brown (10YR5/4), vfL-fU, subangular to subround, silty in part, abundant dark accessory minerals, arkosic

SM SILTY SAND: color as above, some dark organics

SP SAND: grayish brown (10YR5/2), vfL-fU, becoming coarser with depth

AUGER 9'-10'

SP SAND: olive gray, silty in part, increasing silt content with depth, strong Fe staining 11' & 12'

CS CLAYEY SILT: olive, becoming less silty with depth, becoming blocky and dry at 15'

AUGER TO 16' TO SET WELL

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20) 3'-16'
SLOTTED 2" PVC SCREEN (0.010") 5'-15'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: S.R. Sturm Date: 11/22/91 Page: 1 OF 1

Hole No.: MW57 Casing Elevation: 3927.94' Ground Elevation: 3928.05'

Total Depth: 13' No. of Compl.: 1 Rig Type: CME-75 Location: Site 6

Augor Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: david Smuin Date: 12/1/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
	CS				SM SILTY SAND: brown (10YR4/3), vfL-fL, moderately graded, subangular, abraded, eolian.
2					
	SP				SP SAND: brown (10YR5/3), fL-mL, subangular to rounded, predominantly clear quartz, <5% mafics very few fines.
4					
	SP				SP SAND: brown (10YR5/3), vfU, angular to subangular, very poor grading, saturated, predominantly clear quartz, 10%-15% mafics.
6					
	CS				CS SILTY CLAY: olive (5Y5/3), stiff, laminar bedding, limonite stained sand beds at 8.2' and at 8.4', MARKER BED.
8					
10					
	CS				CS SILTY CLAY: as above, becoming fatter with depth blocky structure, dry.
12					
14					CONCRETE 0-.2' BENTONITE PELLETS (3/8") 0.2'-1.0' FRAC SAND (#2), 1.0'-13' SLOTTED 2" PVC SCREEN (0.010") 2'-7'
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

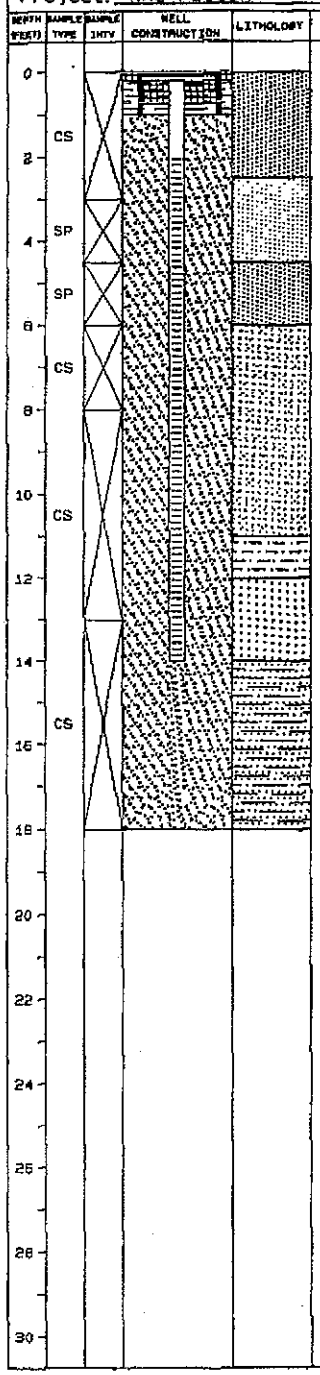
Prepared By: S.R. Sturm Date: 11/22/91 Page: 1 OF 1

Hole No.: PW03 Casing Elevation: 3926.85' Ground Elevation: 3926.73'

Total Depth: 18' No. of Compl.: 1 Rig Type: CME-75 Location: Site 6

Auger Size: 10" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

SP SAND: brown (10YR5/3), fL-mL, subangular, little or no fines, damp.

SP SAND: brown (10YR5/3), vfL-fL, subangular, silty very micaceous.

SP SAND: color as above, fU-mL, predominantly clear quartz, <5% mafics.

SW SAND: brown (10YR5/3), fU-vcU, subangular, no fines, predominantly clear quartz, <5% accessory minerals, pebbles 2-5mm, vfL sandstone casts.

SW SAND: as above, pebbles to 10mm.

SM SILTY SAND: brown (10YR5/3), vfL, poor grading, laminated bedding <1mm thick, common Fe black oxides.

SW SAND: as above.

CS SILTY CLAY: (5Y5/4) to (5Y4/2), olive to olive gray, very homogeneous, very stiff, predominanty laminar bedding, very thin, with scattered discontinuous parallel zones, 2-5mm thick laminae with abundant flat colied gastropod shells that are 1mm thick and 2-3mm wide, smooth shell, no visible suture lines.

CONCRETE 0-.2'
BENTONITE PELLETS (3/8") .2'-1.0'
FRAC SAND (#2), 1.0'-18'
SLOTTED 5" PVC SCREEN (0.010") 2'-14'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: B.M Schlosser Date: 04/3/91 Page: 1 OF 1

Hole No.: PZ05-1 Casing Elevation: 3926.64 Ground Elevation: 3925.31

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 6

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				SP SAND: brown, silty in part.
4	GB				
6					
8	GB				SC SILTY SAND: brown, becoming cleaner with depth Frac sand (8/20), 0'-12'. PVC (.010) 1.5" screen, 7'-8', 2" PVC surface casing cemented in place.
10	GB				
12					
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M.Schlosser Date: 04/3/91 Page: 1 OF 1

Hole No.: PZ6-2 Casing Elevation: 3926.46 Ground Elevation: 3924.84

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 6

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date:

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				SP SAND: brown, Very fine grained.
4	GB				
6					SP SAND: as above, wet.
8	GB				
10	GB				SP SAND: as above. Frac sand (8/20), 0'-12'. PVC (.010") 1.5" screen, 6.5'-7.5', 2" PVC surface casing cemented in place.
12					
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M.Schlosser Date: 04/3/91 Page: 1 OF 1

Hole No.: PZ6-3 Casing Elevation: 3926.46 Ground Elevation: 3924.84

Total Depth: 9.0' No. of Compl.: 1 Rig Type: ORNL U2CAT Location: Site 6

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				SP SAND: brown, medium grained.
4	GB				SP SAND: as above, wet.
6					
8	GB				SW SAND: brownish gray, medium to coarse grained. Frac sand (8/20), 0'-9'. PVC (.010") 1.5" screen, 7'-8', 2" PVC surface casing cemented in place.
10					
12					
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

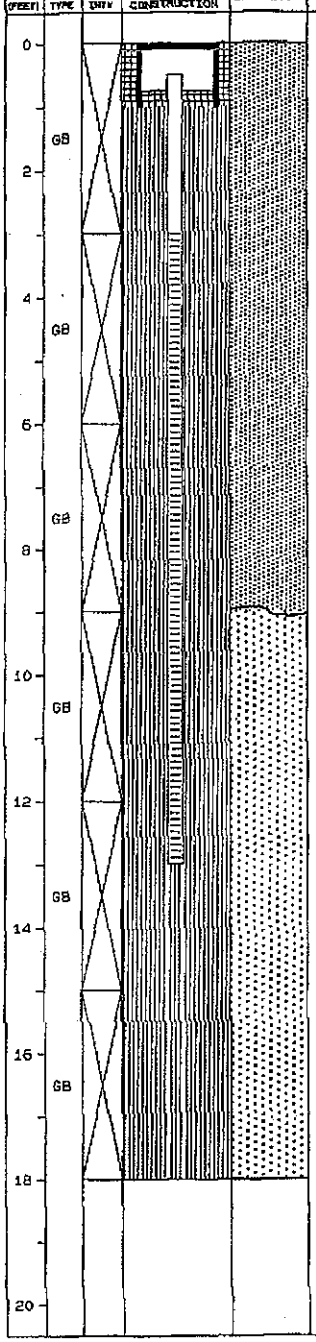
Prepared By: S.A. Sturm Date: 12/6/91 Page: 1 OF 1

Hole No.: PZ6-4 Casing Elevation: 3926.86 Ground Elevation: 3926.71

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CAT Location: Site 6

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91



DESCRIPTION
SP SAND: pale brown, fine to medium grained.
SP SAND: some silt.
SP SAND: as above.
SW SAND: light gray, fine to very coarse grained.
SW SAND: as above, with pebbles 2-6mm.
SW SAND: as above, channel sand. Native sand 1'-18'. PVC (.010"), 1.5" screen, 3'-13'.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

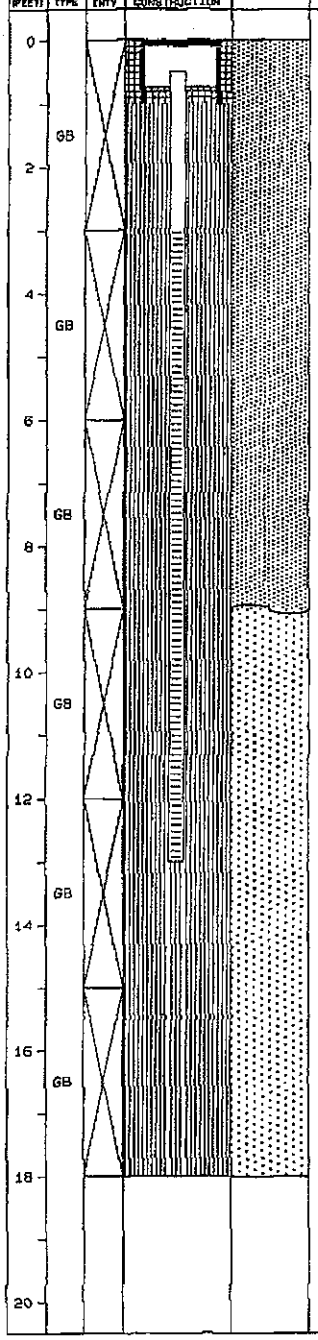
Prepared By: S.A. Sturm Date: 12/6/91 Page: 1 OF 1

Hole No.: PZ6-5 Casing Elevation: 3927.06 Ground Elevation: 3926.94

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 6

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91



DESCRIPTION
SP SAND: pale brown, fine to medium grained.
SP SAND: as above.
SP SAND: as above.
SW SAND: light gray, fine to very coarse grained.
SW SAND: as above, with pebbles 2-6mm.
SW SAND: as above, channel sand. Native sand 1'-18'. PVC (.010"), 1.5" screen, 3'-13'.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

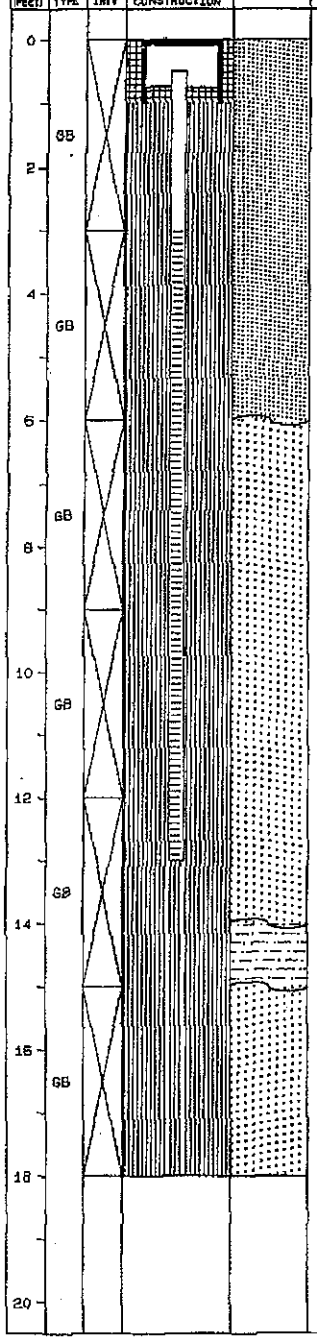
Prepared By: S.A. Sturm Date: 12/6/91 Page: 1 OF 1

Hole No.: PZ6-6 Casing Elevation: 3926.84 Ground Elevation: 3926.76

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 6

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91



DESCRIPTION
SP SAND: pale brown, fine to medium grained.
SP SAND: as above, some silt.
SW SAND: light gray, fine to coarse grained.
SW SAND: fine to very coarse grained, pebbles to 20 mm.
SM SANDY SILT: olive, dense, dry.
SW SAND: fine to very coarse grained, pebbles to 20 mm, some Sandy silt at 17.5'. Native sand 1'-18'. PVC (.010"), 1.5" screen, 3'-13'.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: S.R. Sturm Date: 12/6/91 Page: 1 OF 1

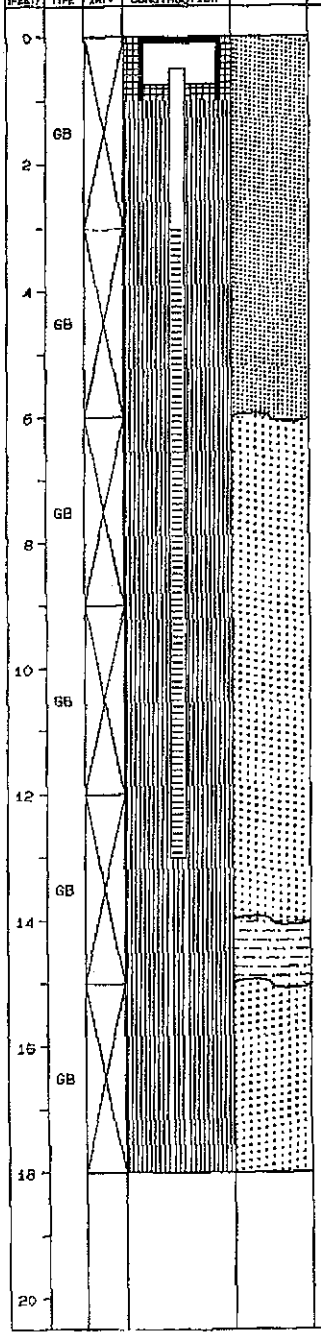
Hole No.: PZ6-7 Casing Elevation: 3927.12 Ground Elevation: 3927.10

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 6

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				SP SAND: pale brown, fine to medium grained.
4	GB				SP SAND: as above, some silt.
6	GB				
8					SW SAND: light gray, fine to coarse grained.
10	GB				SW SAND: fine to very coarse grained, pebbles to 20 mm.
12	GB				
14					SM SANDY SILT: olive, dense, dry.
16	GB				SW SAND: fine to very coarse grained, pebbles to 20 mm, some Sandy silt at 17.5'.
18					Native sand 1'-18'. PVC (.010"), 1.5" screen, 3'-13'.
20					



Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M. Schlosser Date: 12/6/91 Page: 1 OF 1

Hole No.: PZ6-10 Casing Elevation: 3928.81 Ground Elevation: 3928.83

Total Depth: 15.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 6

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 12/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV.	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				SP SAND: medium to dark brown, fine to mediume grained, becoming silty with depth.
4	GB				
6					
8	GB				
10	GB				
12					CL SILTY CLAY: olive brown. Free Phase in Hole, no sample taken.
14	GB				Frac sand (8/20), 1'-13'. Native sand 13'-15' PVC (.010") screen, 2.5'-12.5'.
16					
18					
20					

Site 14

Lithologic logs were not available for the following monitoring wells located at Site 14 during report development:

Well ID	Installation Date
GTI-14-3A	5/31/1995
PZ-14-7	12/4/1991
MW-76	3/13/1996

Notes & Comments:

Well BAT-14-A-L, BAT-14-A-U, BAT-14-B, BAT-14-C6, BAT-14-D, BAT-14-D2, BAT-14-D4,BAT-14-D5, BAT-14-E, BAT-14-E5, BAT-14-G-L, BAT-14-G-U, BAT-14-H is of the construction shown on either of the next two pages, Figure G-1 or G-2. Specific well details are listed in the table (G.1-1) that immediately follows the above figures.

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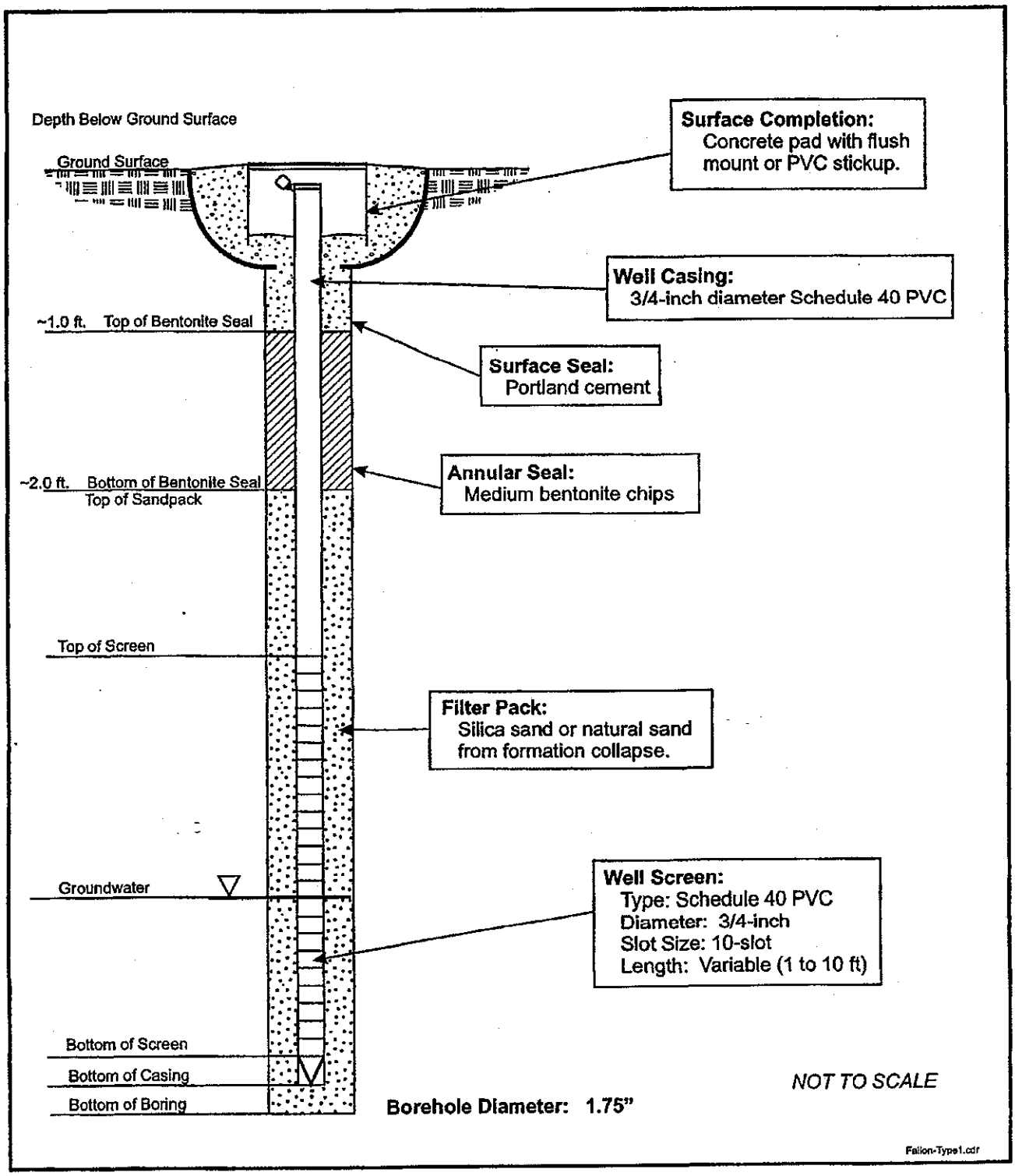
Figure G-1

WELL COMPLETION DIAGRAM SILICA/NATURAL SAND PACK[a]

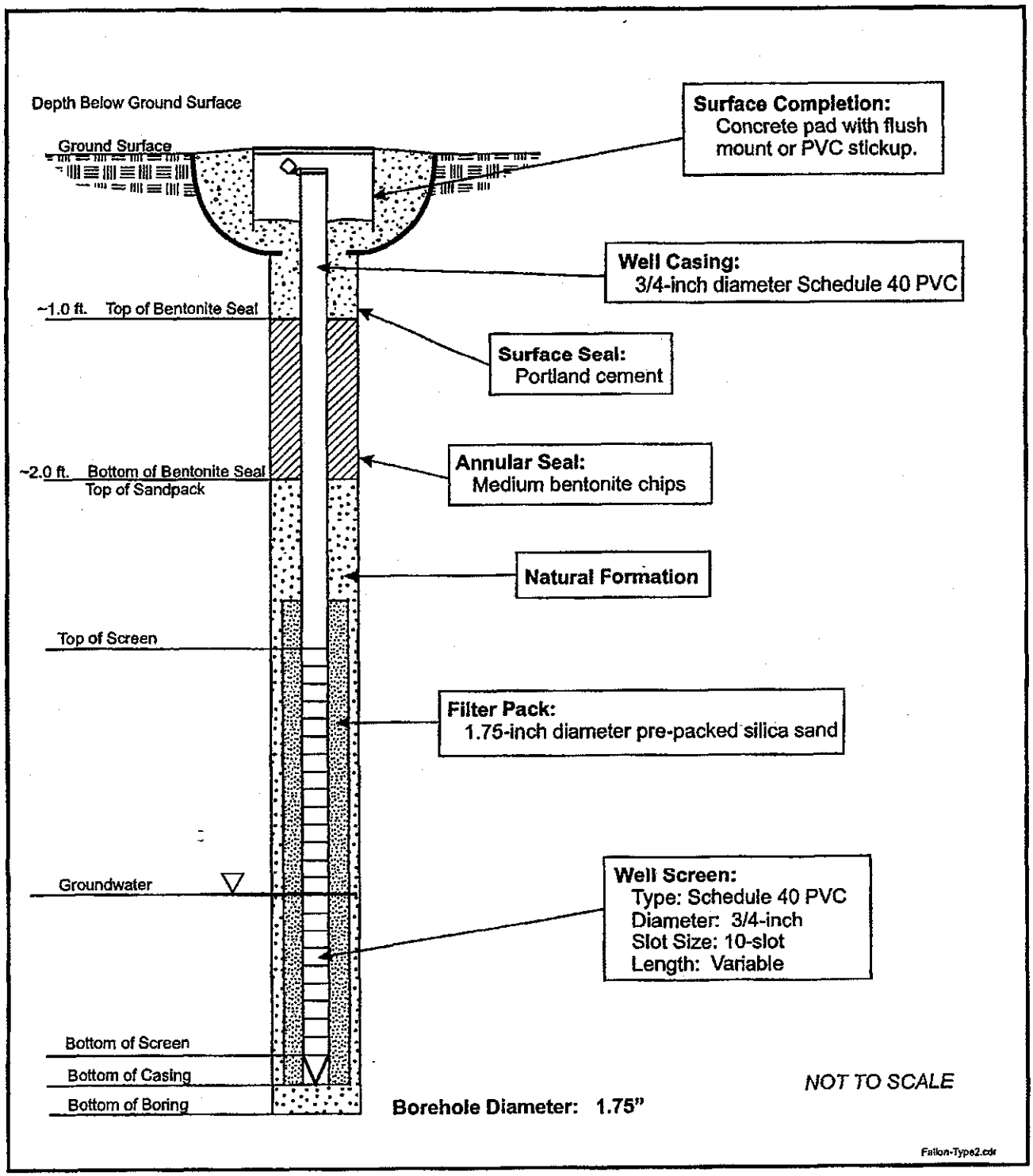


a) Note: all wells installed in September 1997 were constructed in this manner.

Battelle
. . . Putting Technology To Work

Figure G-2

WELL COMPLETION DIAGRAM PRE-PACKED SCREEN[a]



a) Note: all wells installed after September 1997 were constructed in this manner.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

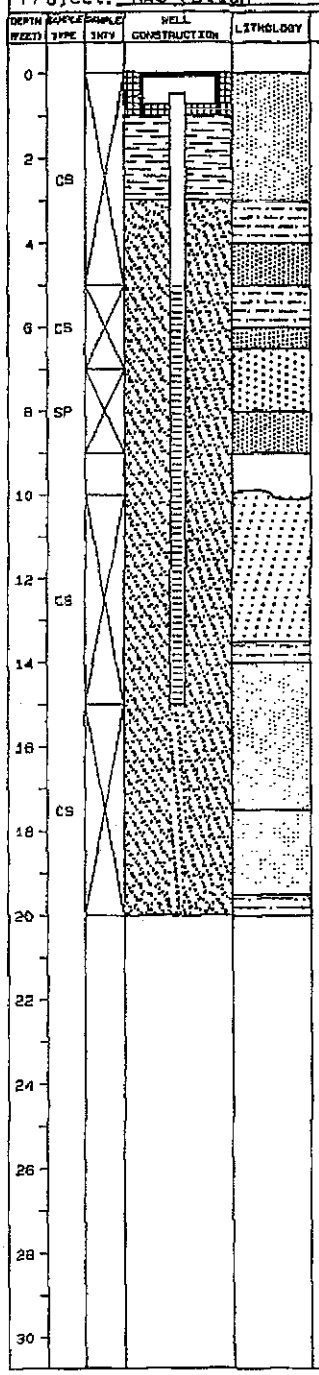
Prepared By: Bob Schlosser Date: 3/8/91 Page: 1 OF 1

Hole No.: MW21 Casing Elevation: 3925.03' Ground Elevation: 3925.59'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 13

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/10/91



DESCRIPTION

SP SAND: dark yellowish brown, (10YR4/4), fL, predominantly round, some feldspar and basalt

SM SILTY SAND: very dark grayish brown (10YR3/2)

SP SAND: as above, some scattered mL-mU

SM SILTY SAND: tight

SP SAND: as above

SW SAND: yellowish brown (10YR5/4), cL-vcU, clear, white and translucent quartz, abundant dark accessory minerals, arkosic, scattered glauconite

SP SAND: as above, scattered dark organics, calc. HNU=1 ppm

AUGER TO 10'

SP SAND: color as above, mU-cL, well rounded, arkosic, saturated

SM SANDY SILT: dark grayish brown (10YR4/2), some scattered feldspar

SP SAND: yellowish brown (10YR5/4), vfL-fL

SP SAND: olive brown, vfL, subrounded to rounded, occasionally very silty, micaceous, calcareous Fe stained vfL sand at 19.5'. CARSON RIVER-LAHONTON LAKE CONTACT

SC SILTY CLAY: light yellowish brown

CONCRETE 0'-1'
BENTONITE PELLETS (3/8") 1'-3'
FRAC SAND (8/20), 3'-20'
SLOTTED 2" PVC SCREEN (.020), 5'-15'

Well Summary Information

ornl DAK RIDGE NATIONAL LABORATORY

Prepared By: D. A. Locke Date: 11/19/91 Page: 1 OF 1

Hole No.: MW52 Casing Elevation: 3925.98' Ground Elevation: 3926.37'

Total Depth: 21.5' No. of Compl.: 1 Rig Type: CME-75 Location: Site 14

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					SM SILTY SAND: dark grayish brown (10YR4/2) vfU-fL subrounded, damp to dry.
2	CS				
4	CS				CS SILTY CLAY: color as above, black oxides, medium stiff, Fe staining locally.
6	SP				
8	CP				SM SILTY SANDY CLAY: gray (10YR5/1), moist, soft.
10	CS				
12	SP				SM SILTY SAND: color as above, fL-fU, predominantly quartz, HNU 20 ppm.
14	CS				CS SILTY SAND: brown (10YR5/3), vfL-fU, rounded.
16	SP				SW SAND: grayish brown, (10YR5/2), fL-mU, quartz.
18	SP				CS SILTY CLAY: yellowish brown (10YR5/4), damp, stiff.
20	CS				
22	SP				SC SANDY CLAY: vfL, lean.
24	SP				CONCRETE 0-1.2' BENTONITE PELLETS (3/8") 1.2'-3.0' FRAC SAND (#2), 3.0'-21.5' SLOTTED 2" PVC SCREEN (0.010") 5'-15'
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: D.R.Smuin Date: 04/7/91 Page: 1 OF 1

Hole No.: PZ14-2 Casing Elevation: 3927.36 Ground Elevation: 3926.09

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 14

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				SC SILTY CLAY: brown.
6					
8	GB				SM SANDY SILTY: brown.
10	GB				Frac sand (8/20), 5'-12'. Native sand 0'-5'. PVC (.010") 1.5" screen, 9'-10', 3" PVC surface casing cemented in place.
12					
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: D.R Smuin Date: 04/7/91 Page: 1 OF 1

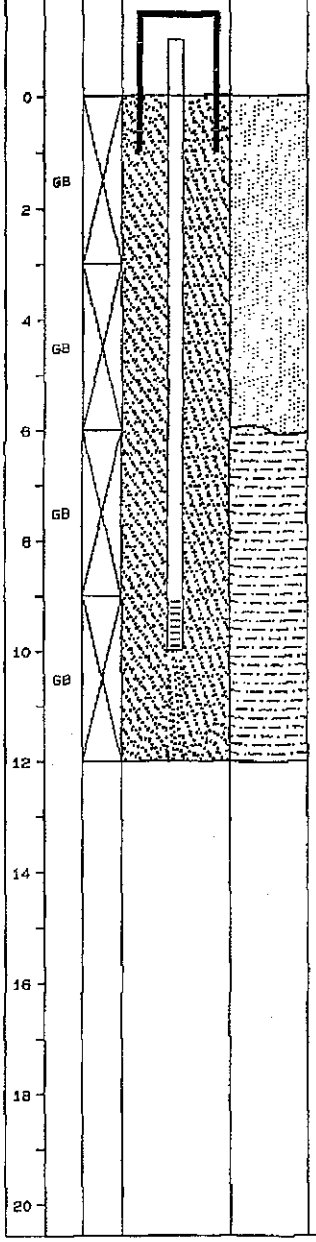
Hole No.: PZ14-3 Casing Elevation: 3928.12 Ground Elevation: 3926.90

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CBT Location: Site 14

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE ENTY	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				SP SAND: brown.
6					
8	GB				CS SILTY CLAY: brown.
10	GB				Frac sand (8/20), 0'-12', PVC (.010") 1.5" screen, 9'-10', 3" PVC surface casing cemented in place.
12					
14					
16					
18					
20					



Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: D.R.Smuin Date: 04/7/91 Page: 1 OF 1

Hole No.: PZ14-4 Casing Elevation: 3927.16 Ground Elevation: 3926.08

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CBT Location: Site 14

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				FILL: fine sand.
4	GB				SC SANDY SILT: brown.
6					
8	GB				
10	GB				CS SILTY CLAY: brown. Frac sand (8/20), 4'-12'. Native fill, 0'-4'. PVC (.010") 1.5" screen, 9'-10', 3" PVC surface casing cemented in place.
12					
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: S.A. Sturm Date: 12/4/91 Page: 1 OF 1

Hole No.: PZ14-5 Casing Elevation: 3927.24 Ground Elevation: 3927.12

Total Depth: 18.0' No. of Compl.: 1 Rig Type: CRM, U2CRT Location: Site 14

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				
6					SP SAND: medium brown, very fine grained.
8	GB				
					SP SAND: as above, wet.
10	GB				
12					
14	GB				
					SW SAND: very fine to coarse, well graded, floating product in hole. Jet casing down using wash out plug. Native sand 1'-18'. PVC (.010"), 1.5" screen, 5'-15'.
16	GB				
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

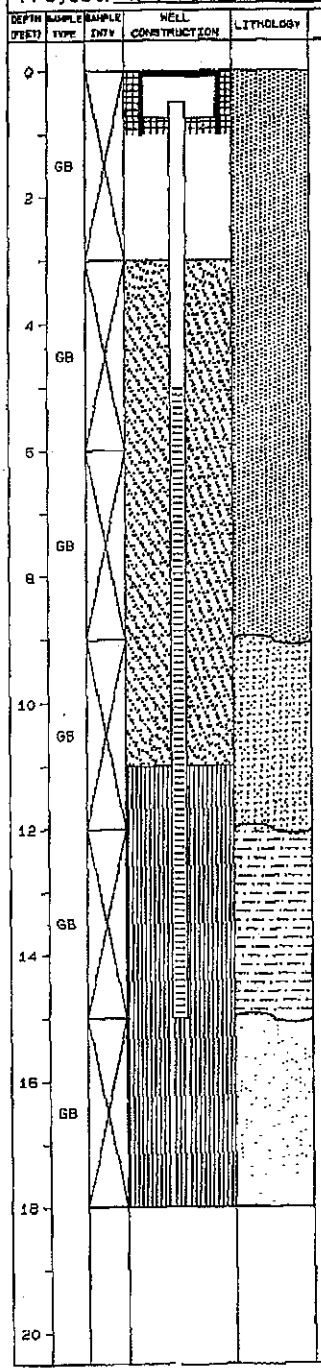
Prepared By: S.A. Sturm Date: 12/4/91 Page: 1 OF 1

Hole No.: PZ14-6 Casing Elevation: 3925.96 Ground Elevation: 3925.63

Total Depth: 18.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 14

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: R.M. Schlosser Date: 12/17/91



DESCRIPTION

SP SAND: pale brown, fine grained.

SP SAND: as above, wet.

SW SAND: well graded, visible sheen of product.

SM SILTY SAND: trace clay, brown.

SP SAND: very fine grained.

Frac sand (8/20), 3'-11'.
Native sand 11'-17'.
PVC (.010"), 1.5" screen, 5'-15'.

Site 16

Lithologic logs were not available for the following monitoring wells located at Site 16 during report development:

Well ID	Installation Date	
GTI-16-1	Y	5/31/1995
MW-16-1	Y	4/8/2004

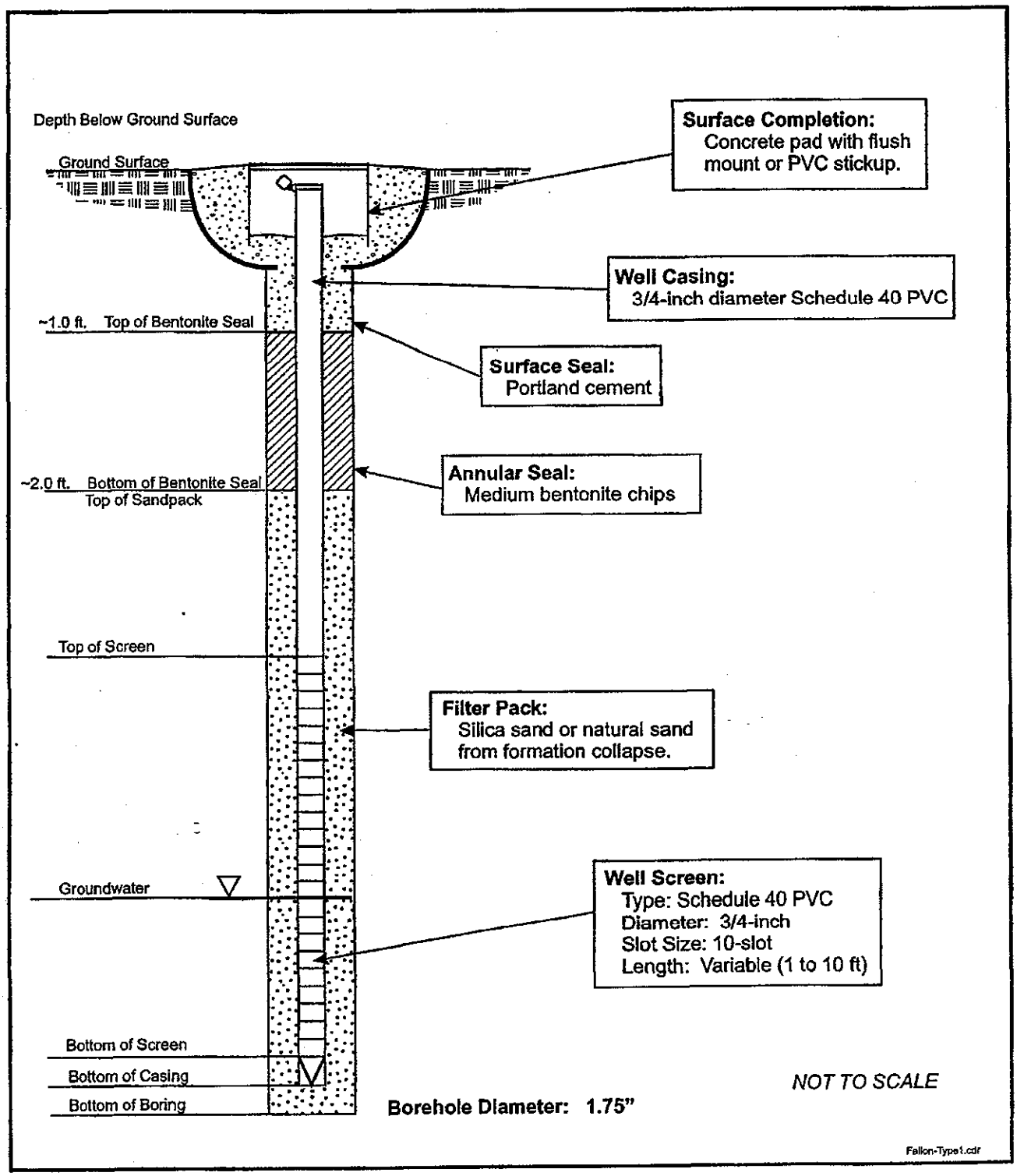
Notes & Comments:

Wells BAT-16-A, BAT-16-B, BAT-16-C, BAT-16-D, BAT-16-F, BAT-16-I, BAT-16-J, BAT-16-K, BAT-16-L, BAT-16-M-L, BAT-16-M-U, BAT-16-N, BAT-16-O, and BAT-16-P are of the construction shown on either of the next two pages, Figure G-1 or G-2. Specific well details are listed in the table (G.1-1) that immediately follows the above figures.

Battelle
. . . Putting Technology To Work

Figure G-1

WELL COMPLETION DIAGRAM SILICA/NATURAL SAND PACK[a]

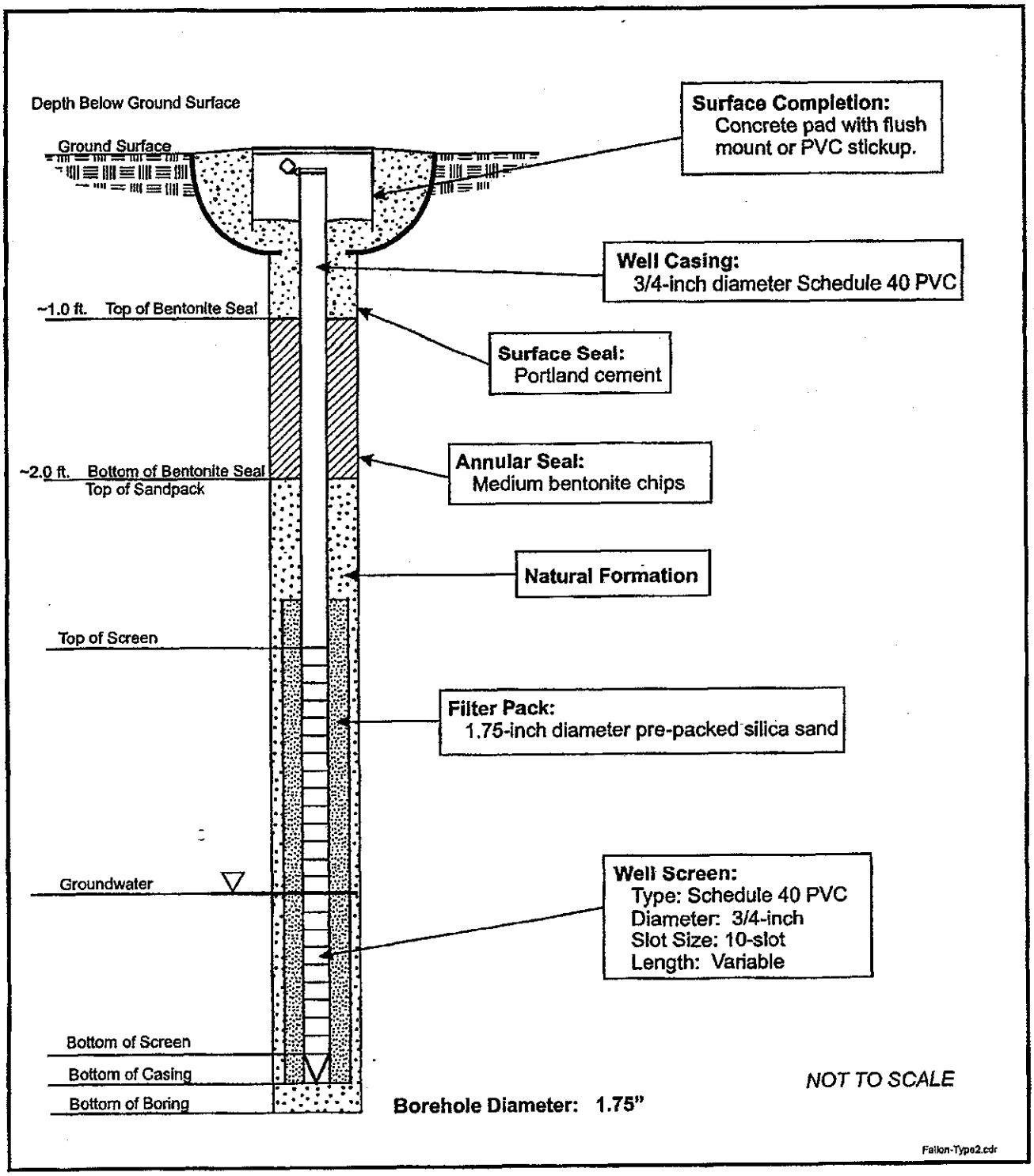


a) Note: all wells installed in September 1997 were constructed in this manner.

Battelle
. . . Putting Technology To Work

Figure G-2

WELL COMPLETION DIAGRAM PRE-PACKED SCREEN[a]



a) Note: all wells installed after September 1997 were constructed in this manner.

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

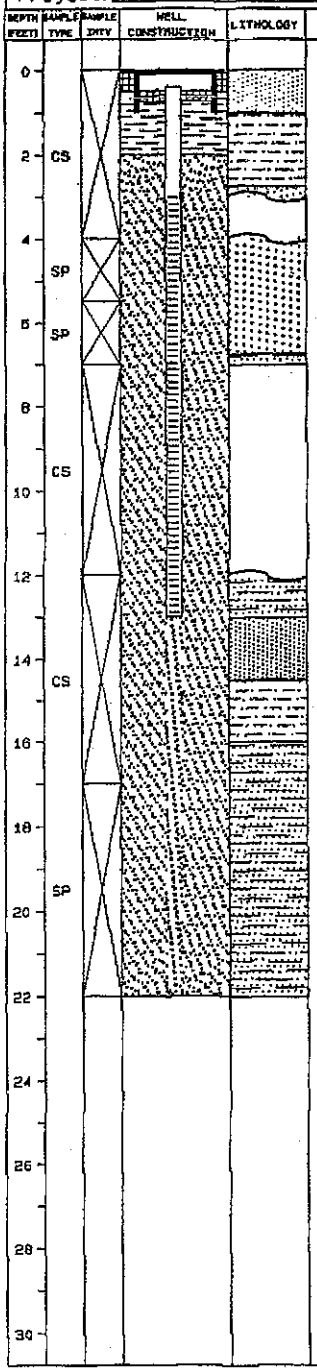
Prepared By: S.R. Sturm Date: 11/25/91 Page: 1 OF 1

Hole No.: MW66 Casing Elevation: 3923.04' Ground Elevation: 3923.17'

Total Depth: 22' No. of Compl.: 1 Rig Type: CME-75 Location: Site 16

Auger Size: 7 5/8" O.D. Sample Type: 3"x5' Continuous, 2.5"x18" "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 12/1/91



DESCRIPTION

SP SAND: brown (10YR5/2), dry, eolian.

SM SILTY SAND: brown (10YR4/3), abundant fines, common Fe oxides.

SW SAND: fU-vcU, subangular, 5% mafics

LOST 3'-4'

SW SAND: as above, below water table altered black from product.

CS CLAYEY SILT: very dark gray (10YR3/1), very thin laminae, abundant mica and evaporites.

LOST 7'-12'

CS CLAYEY SILT: as above.

SP SAND: brown, (10YR5/2), subangular, clear quartz saturated.

SM SILTY SAND: olive, vfL, abundant mica, wet, grading to,

CS SILTY CLAY: olive, abundant fines, blocky, dry.

CS SILTY CLAY : as above MARKER BED of FE stained vfL sand at 19.3'.

CONCRETE 0-.5'
BENTONITE PELLETS (3/8") .5'-2.0'
FRAC SAND (#2), 2.0'-22.0'
SLOTTED 2" PVC SCREEN (0.010") 3.0'-13.0'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M.Schlosser Date: 04/8/91 Page: 1 OF 1

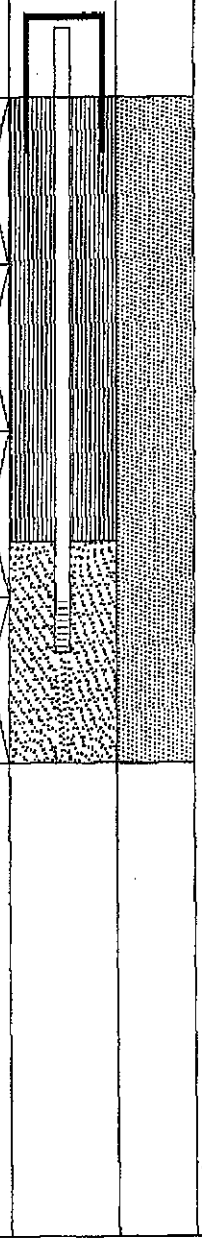
Hole No.: PZ16-1 Casing Elevation: 3925.10 Ground Elevation: 3923.34

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CAT Location: Site 16

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				
6					SP SAND: brown, fine to medium grained.
8	GB				SP SAND: as above, wet.
10	GB				SP SAND: as above, silty.
12					Frac sand (8/20), 8'-10'. Native sand 0'-8'. PVC (.010) 1.5" screen, 9'-10'. 4" PVC surface casing cemented in place.
14					
16					
18					
20					



Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: S.C.Hall Date: 04/8/91 Page: 1 OF 1

Hole No.: PZ16-2 Casing Elevation: 3925.63 Ground Elevation: 3924.21

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 16

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				
6					SP SAND: brown, fine to medium grained.
8	GB				SW SAND: medium to coarse grained, well graded.
10	GB				Frac sand (8/20), 7'-10'. Native sand 0'-7'. PVC (.010") 1.5" screen, 9'-10', 4" PVC surface casing cemented in place.
12					
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M.Schlosser Date: 04/5/91 Page: 1 OF 1

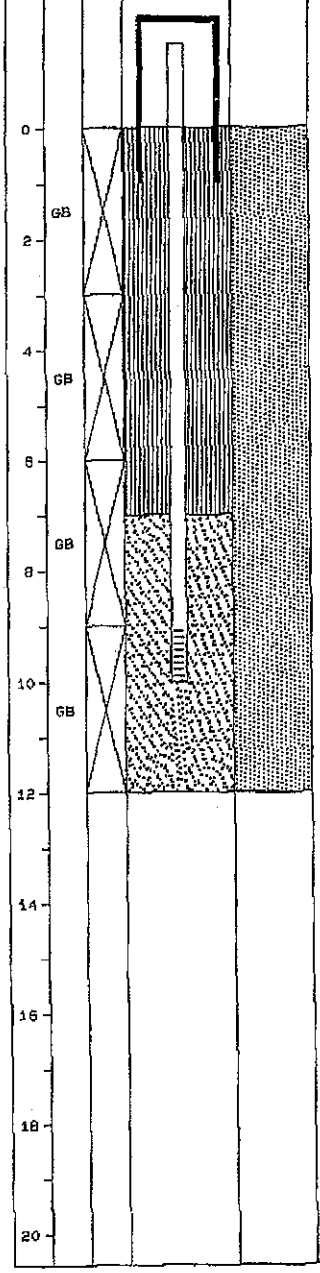
Hole No.: FZ16-3 Casing Elevation: 3924.47 Ground Elevation: 3923.04

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 16

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				SP SAND: medium brown, medium grained.
6					
8	GB				SP SAND: as above, stained gray from fuel.
10	GB				Frac sand (8/20), 7'-10'. Native sand 0'-7'. PVC (.010") 1.5" screen, 9'-10', 4" PVC surface casing cemented in place.
12					
14					
16					
18					
20					



Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M.Schlosser Date: 04/6/91 Page: 1 OF 1

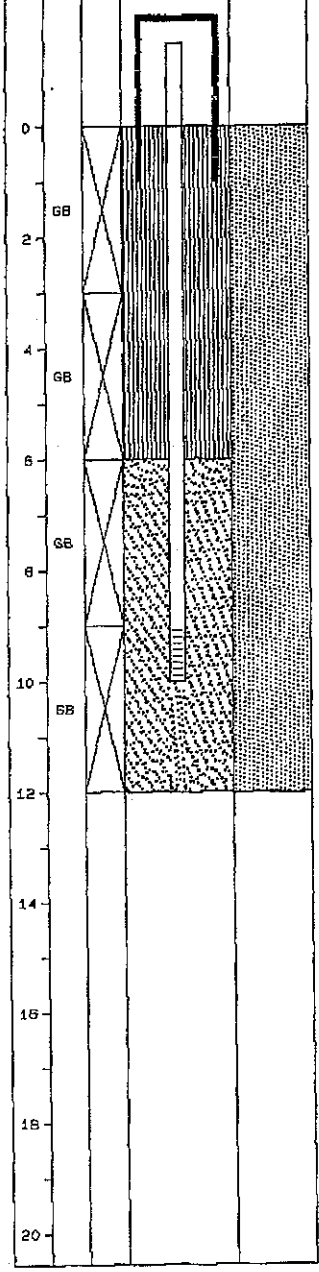
Hole No.: PZ16-4 Casing Elevation: 3926.34 Ground Elevation: 3924.88

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 16

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE ENTRY	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				SP SAND: medium brown, medium grained.
6					
8	GB				SP SAND: as above, stained gray from fuel.
10	GB				Frac sand (8/20), 6'-10'. Native sand 0'-6'. PVC (.010") 1.5" screen, 9'-10', 4" PVC surface casing cemented in place.
12					
14					
16					
18					
20					



Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M.Schlosser Date: 04/6/91 Page: 1 OF 1

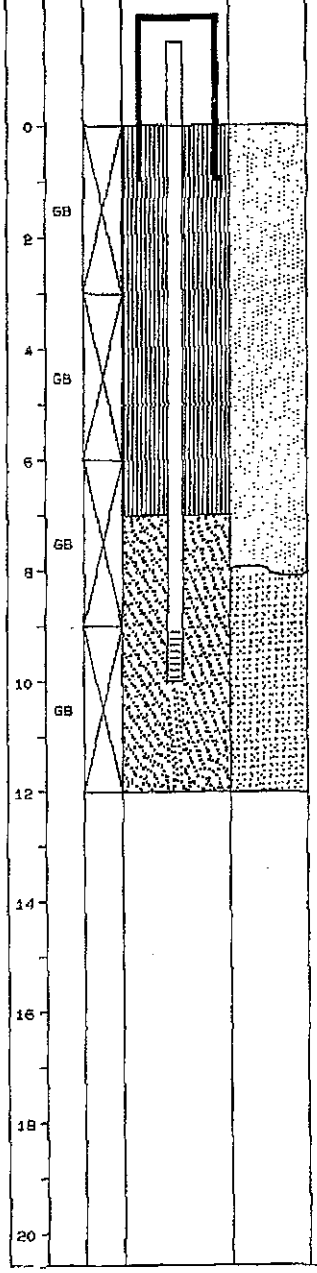
Hole No.: PZ16-5 Casing Elevation: 3925.84 Ground Elevation: 3924.77

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 16

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				SP SAND: medium brown, very fine grained.
6					
8	GB				SW SAND: color as above, fair grading.
10	GB				Frac sand (8/20), 7'-10'. Native sand 0'-7'. PVC (.010") 1.5" screen, 9'-10', 4" PVC surface casing cemented in place.
12					
14					
16					
18					
20					



Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M.Schlosser Date: 04/6/91 Page: 1 OF 1

Hole No.: PZ16-6 Casing Elevation: 3923.75 Ground Elevation: 3922.48

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 16

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	SB				
4	GB				SP SAND: medium brown, medium grained.
6					
8	GB				SP SAND: as above, stained gray from fuel.
10	GB				Frac sand (8/20), 5'-10'. Native sand 0'-5'. PVC (.010") 1.5" screen, 8'-9', 4" PVC surface casing cemented in place.
12					
14					
16					
18					
20					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: D.R.Smuin Date: 04/6/91 Page: 1 OF 1

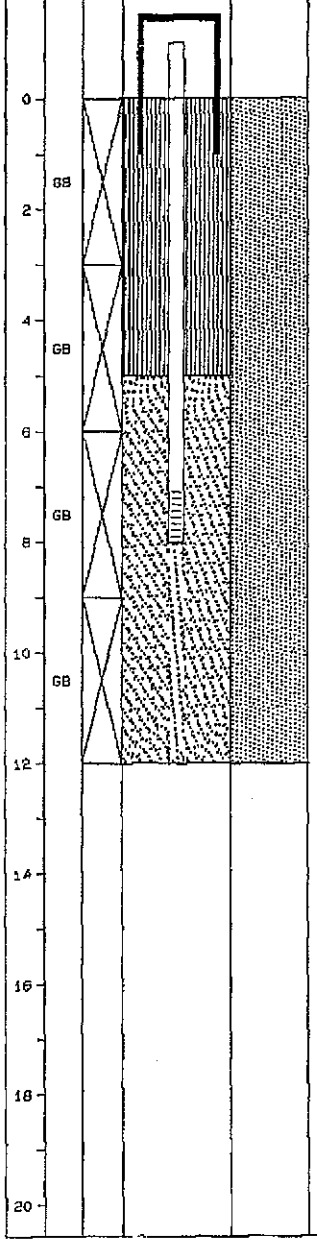
Hole No.: PZ16-7 Casing Elevation: 3926.43 Ground Elevation: 3925.51

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 16

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				SP SAND: silty in part, medium grained.
6					
8	GB				SP SAND: as above, no silt.
10	GB				Frac sand (8/20), 5'-10'. Native sand 0'-5'. PVC (.010") 1.5" screen, 7'-8', 4" PVC surface casing cemented in place.
12					
14					
16					
18					
20					



Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: R.M.Schlosser Date: 04/8/91 Page: 1 OF 1

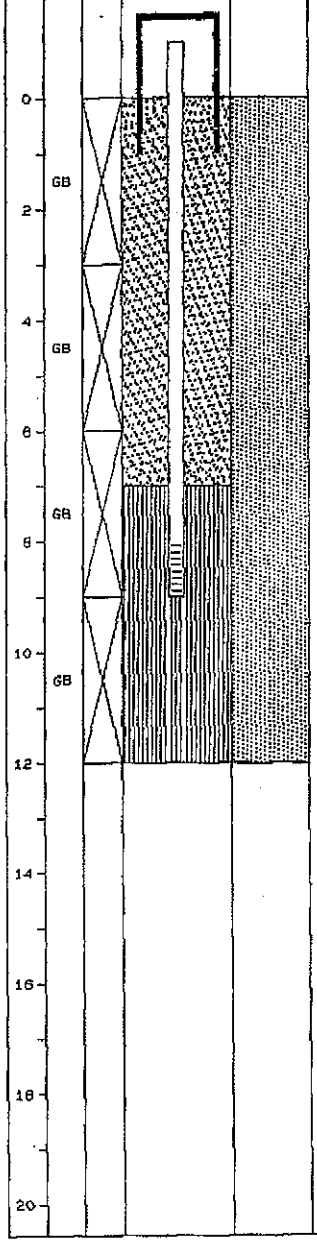
Hole No.: PZ16-8 Casing Elevation: 3924.41 Ground Elevation: 3922.87

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRT Location: Site 16

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 4/8/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				
4	GB				SP SAND: mediun brown, medium grained.
6					
8	GB				SP SAND: as above, stained gray from product.
10	GB				Frac sand (8/20), 0'-7'. Native sand 7'-12'. PVC (.010") 1.5" screen, 8'-9', 3" PVC surface casing cemented in place.
12					
14					
16					
18					
20					



Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: S.R.Sturm Date: 12/13/91 Page: 1 OF 1

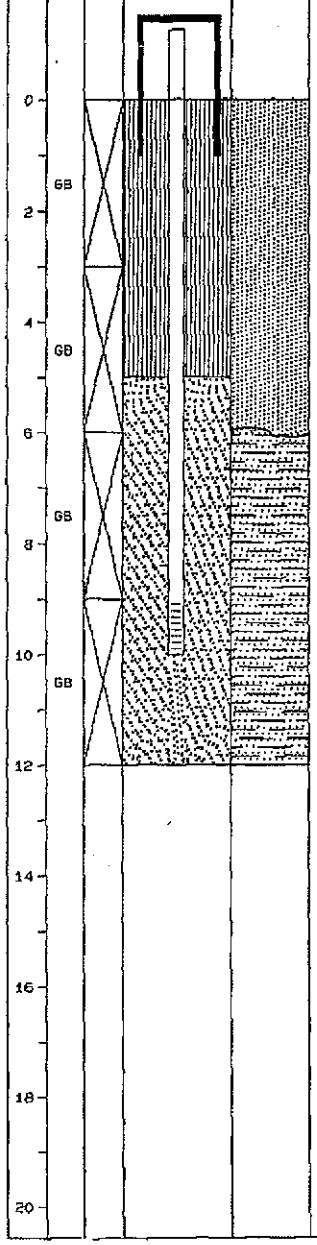
Hole No.: PZ16-9 Casing Elevation: 3924.30 Ground Elevation: 3924.18

Total Depth: 12.0' No. of Compl.: 1 Rig Type: ORNL U2CRI Location: Site 16

Auger Size: 4" Sample Type: Grab

Project: NAS Fallon Data Verified By: J.L. Zutman Date: 12/14/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2	GB				SP SAND: yellowish brown, silty in part.
4	GB				
6					
8	GB				SC SILTY CLAY: dark brown.
10	GB				PVC (.010") 1.5" screen, 9'-10'. Protective surface casing, 3" PVC.
12					
14					
16					
18					
20					



Site 18

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: W.H. Burke Date: 3/10/91 Page: 1 OF 1

Hole No.: MW31 Casing Elevation: 3924.13' Ground Elevation: 3924.28'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Sites 9 and 18

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS.

Project: NAS Fallon Data Verified By: David Smyth Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					SP SAND: pale brown (10YR6/3), mL-fU, subangular, micaceous, calcareous
2	CS				SP SAND: strong brown (7.5YR5/6), vfU, calcareous
4					SP SAND: light brownish gray (10YR5/2), vcL-cU, some feldspar and dark accessory minerals SM SILTY SAND: brown (10YR5/3), vfL, damp, Fe stained
6	CS				
8	SP				SP SAND: as above, wet
10					AUGER 9'-10' SP SAND: yellowish brown (10YR5/4), fU-fL, subangular to subrounded, predominantly quartz
12	CS				
14					SP SAND: brown (10YR5/3), vfL, subangular - subround silty in part
16					
18	CS				SM SILTY SAND: olive gray (5Y5/2), subangular - subrounded, green silt, fining with depth, buff colored root hairs, calcareous. CL CLAY: light gray (2.5Y7/2), sandy, Fe stained bed at 19.5', calcareous
20					NEAT CEMENT 0'-1' BENTONITE PELLETS (3/8") 1'-3' FRAC SAND (8/20) 3'-19' SLOTTED 2" PVC SCREEN (0.010") 5'-15' NATIVE SAND 19'-20'
22					
24					
26					
28					
30					

Site 20

Lithologic logs were not available for the following monitoring wells located at Site 20 during report development:

Well ID	Installation Date
BA20-MW01	1/30/2007
BA20-MW02	1/31/2007
BA20-MW03	1/29/2007
BA20-MW04	1/30/2007
BA20-MW05	1/31/2007

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

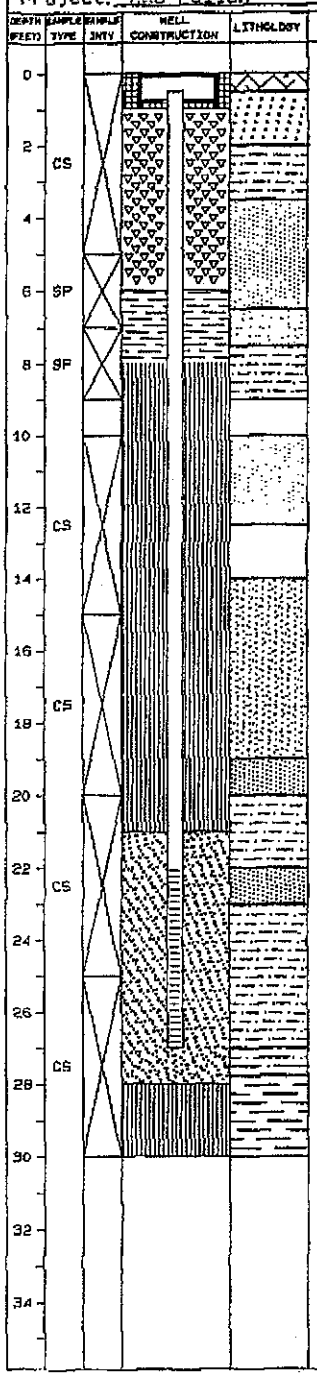
Prepared By: Bob Schlosser Date: 3/11/91 Page: 1 OF 1

Hole No.: MW33L Casing Elevation: 3925.82' Ground Elevation: 3926.17'

Total Depth: 30.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 20

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91



DESCRIPTION

FILL: sand and gravel

SP SAND: yellowish brown (10YR5/6), cL-cU, sub-angular-subround, dry

SM SANDY SILT: very dark brown (10YR2/2), abundant oxidation and root hairs

SP SAND: color as above, some arkosic content

SW SAND: yellow brown (10YR5/4), fL-cU, loosely consolidated, abundant basalt, arkosic

SM SANDY SILT: dark yellowish brown (10YR4/6), abundant root hairs, micaceous

AUGER 9'-10'

SP SAND: brownish yellow, fU-cL, fining downward mottled olive occasionally around root hairs

SW SAND: grayish brown (10YR5/2) fL-cU, angular to subangular, predominantly clear quartz

LOST 14'-15'

SW SAND: color as above, fL-vcU, some scattered 3-4 mm pebbles, very well graded, micaceous, micaceous, arkosic, very slightly calcareous

SP SAND: yellowish brown (10YR5/4), fU-mL, clear and milky quartz

SM SANDY SILT: brown (10YR5/3), soft, some oxidation

SP SAND: color as above fL-mL

SM SANDY SILT: as above

SC SILTY CLAY: wet

CL CLAY: olive, silty in part, blocky at 29.5' calacareous

CONCRETE 0'-1'
NEAT CEMENT (6/1) 1'-6'
BENTONITE PELLETS (3/8") 6'-8'
FRAC SAND (8/20), 21'-28'
SLOTTED 2" PVC SCREEN (0.010") 22'-27'
NATIVE FILL 8'-21', 28'-30'

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

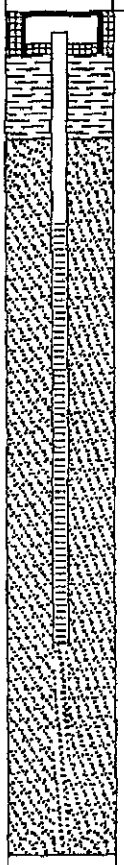
Prepared By: Bob Schlosser Date: 3/12/91 Page: 1 OF 1

Hole No.: MW33U Casing Elevation: 3925.86' Ground Elevation: 3926.17'

Total Depth: 20.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 20

Auger Size: 8" O.D. Sample Type: NONE

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					
2					NO SAMPLES TAKEN. SEE MW33L FOR LITHOLOGY
4					AUGER TO 20'
6					
8					
10					CONCRETE 0'-1' SLOTTED 2" PVC SCREEN (0.010"), 5'-15' BENTONITE PELLETS (3/8"), 1'-3' FRAC SAND (8/20), 3'-20'
12					
14					
16					
18					
20					
22					
24					
26					
28					
30					

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: Bob Schlosser Date: 3/12/91 Page: 1 OF 1

Hole No.: MW36 Casing Elevation: 3928.22' Ground Elevation: 3928.43'

Total Depth: 25.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Site 20

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2'"Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 3/22/91

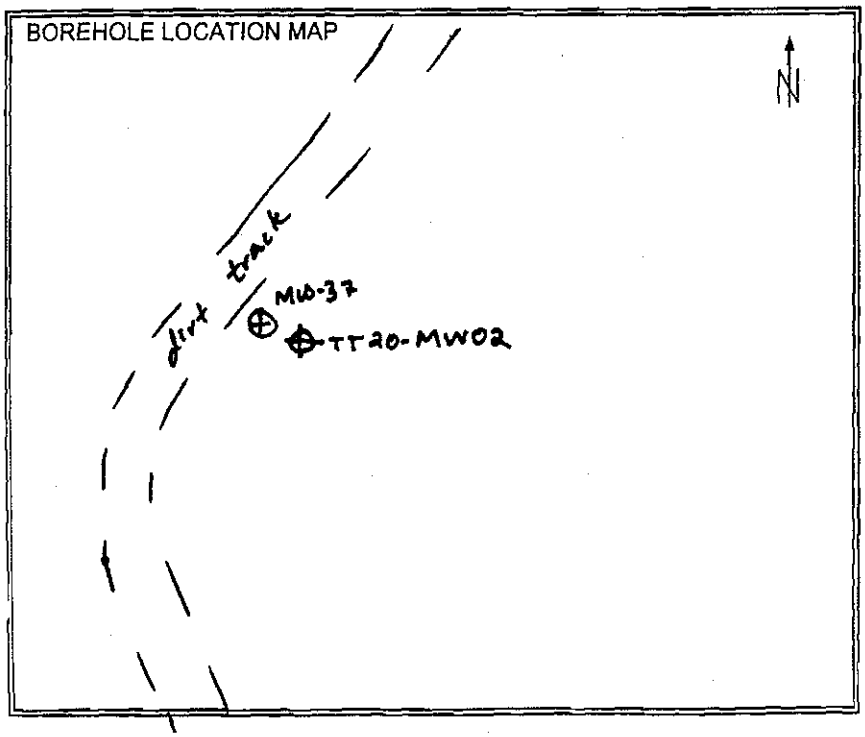
DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					SP SAND: brown (10YR4/3), fU-mL
2	CS				SW SAND: light yellowish brown (10YR6/4), mL-vcU, subangular to subrounded, abundant dark accessory minerals
4					SP SAND: as above, fL-mL
6	SP				SP SAND: dark grayish brown, some organics and Fe staining locally
8	SP				SP SAND: as above, fU, silty in part
					AUGER TO 10'
10					SM SANDY SILT: very dark gray brown (10YR3/2), mottled very dark gray (2.5YN3/)
12	CS				
14					SW SAND: grayish brown (10YR5/2), fU-vcL, micaceous, loosley consolidated, calcareous in part
16					SW SAND: as above, becoming vfL-cL
18	CS				SP SAND: brown (10YR5/3), fU, abundant dark accessory minerals, micaceous, non calcareous
20					SW SAND: dark gray, mL-vcL, very calcareous
					SP SAND: brown (10YR5/3), fL, very calcareous
22	CS				SM SILTY SAND: dark yellowish brown, tight
24					CONCRETE 0'-1' BENTONITE PELLETS (3/8") 1.'-3.' FRAC SAND (8/20), 3'-15.5' SLOTTED 2" PVC SCREEN (0.010") 5'-15' NATIVE FILL 15.5'-25'
26					
28					
30					

BOREHOLE LOG

Tt

Boring ID: —	
Monitoring Well ID: TT20-MW02	
Project Number: 4302.300.04.03	Project Name: NAS Fallon Drill + Install
Client: Navy	
Site: 20	
Borehole Location (Township, Range, Section):	
Logged By: J. Vaugh	
Reviewed By:	Review Date:
Drilling Contractor: Gregg Drilling	
Drill Rig Type/Method: Marl MS Rhino	
Sampler Type: direct pushing sleeve liner	
Borehole Diameter (inches): 8.0	to: 18.5 feet bgs
Overdrilled Diameter (inches): —	to: — feet bgs
Drill Start Date: 3-15-08	Drill Start Time: 0734
Drill Finish Date: 3-15-08	Drill Finish Time: 0800
Total Borehole Depth (feet bgs): 18.5	
Soil Boring Backfill Date: —	Soil Boring Backfill Time: —
Ground Surface Reference Elevation (feet msl):	
Depth to 1st Saturated Zone (feet bgs): 5.0	Date: 3-15-08 Time: 0745
Depth to Other Water-Bearing Zones (feet bgs): —	
Depth to Water After Drilling (feet bgs): —	
Well Completion Date: 3-15-08	Well Completion Time: 0848
Screen Interval (feet bgs): 3.0-18.0	Total Well Depth (feet bgs): 18.5
Well Diameter (inches): 2.067" ID, 2.375" OD	Well Casing Material: pvc, 0.010 slot screen
Static Water Level After Well Installation (feet bgs): 5.0'	

BOREHOLE LOCATION MAP



NOTES/REMARKS

Replacement well for MW-37

BOREHOLE LOG

Installation: ~~NT~~ NAS Fallon
CTO:
BORING ID:

DATE: 3/15/08
LOGGED BY: Jordan Vaughn

MW ID: TT20-MW-02

Sampler Type	Sample Interval	Time	Recovered/Driven (in./in.)	Blow Counts/6 in.	Physical Analysis	Chemical Analysis	PID Reading (ppm)	Well Construction info	Depth (feet bgs)	USCS Type/Designation	Soil Description	% Gravel	% Coarse Sand	% Medium Sand	% Fine Sand	% Silt/Clay
		0744								SM	0-0-5.0 silty sand, dark grayish brown (2.5Y 4/2), loose, low plasticity, moist, subangular qtz, felsp, volc. lithics, biot.				80	20
									1							
									2							
									3							
									4							
		0745							5 ▽							
										SM	5.0-6.5. Silty sand, dark grayish brown (10YR 4/2), ~~soft~~ loose, low plasticity, wet, subangular qtz, felds, biot, volc. lithics.				75	25
									6							
									7	SP	6.5-10.5, sand, yellowish brown (10YR 5/4), very loose, non plastic, subangular qtz, felds, volc. lithics, biot.	50	40		5	5
		0747							8							
									9							
									10							
									11	SC	10.5-~~12.0~~ 11.5 clayey sand, dark grayish brown (10YR 4/2), ~~soft~~ loose, mod. plasticity, wet, subangular qtz, felds, biot.				60	40
		0749							12	CL	11.5-12.0, clay, dark grayish brown (10YR 4/2), stiff, low plasticity, moist.					100
									13	SW	12.0-18.5, sand, yellowish brown (10YR 5/4), very loose, non plastic, subangular qtz, felds, volc. lithics, biot.	30	70			
									14							
									15							
		0752							16							
									17							
		0800 ~~0800~~							18		TD at 18.5'					
									19							
									20							

Site 21

Lithologic logs were not available for the following monitoring wells located at Site 21 during report development:

Well ID	Installation Date
MW-94	3/28/1996
BA21-MW01	2/6/2007
BA21-MW02	2/6/2007
BA21-MW03	2/6/2007
BA21-MW04	2/1/2007
BA21-MW05	2/5/2007

Well Summary Information

ornl OAK RIDGE NATIONAL LABORATORY

Prepared By: Bob Schlosser Date: 7/11-13/90 Page: 1 OF 1

Hole No.: MW12L Casing Elevation: 3930.20' Ground Elevation: 3930.45'

Total Depth: 85.0' No. of Compl.: 1 Rig Type: Schramm T-685 Location: Group II upgradient

Auger Size: 8" O.D. Sample Type: 3"x5' Continuous, 2.5"x2' "Calif. Method" SS

Project: NAS Fallon Data Verified By: David Smuin Date: 7/14/90

DEPTH (FEET)	SAMPLE TYPE	SAMPLE INTV	WELL CONSTRUCTION	LITHOLOGY	DESCRIPTION
0					AUGER TO 15' AND BEGIN SAMPLING. SEE MW12U FOR LITHOLOGY
2					
4					
6					
8					
10					
12	CS				
14					
16					CL CLAY: silty in part, blocky, micaceous, limonite staining on partings, damp
18	CS				SP SAND: very fine grained, with clay interbedded
20					CL CLAYEY SILT: with 4-5 cm very fine sand at 21', strong limonite staining, CARSON RIVER-LAHONTON LAKE contact but not well developed.
22	CS				
24					CL CLAYEY SILT: light olive gray, (5y6/2) with interbedded very fine grained sand
26					
28	CS				
30					SP SAND: fine to medium grained, limonite stained
32	CS				CL CLAY: dark greenish gray, fU sand, mottled black
34					CL CLAY: black, plastic, tight, mottled with clay greenish gray, 4 cm gypsum bed at 34.5'
36					SP SAND: dark grenish gray (5GY4/1), medium to coarse grained, micaceous, subangular to rounded mostly clear quartz, some dark accessory mins., grading to SW SAND, medium to coarse grained (mL-cU) scattered vcL, very angular
38	CS				
40					
42	CS				
44					SP SAND: as above
46					PROBLEMS WITH AUGER, RUN IN HOLE WITH CENTER BIT TO CLEAN OUT HOLE. CENTER BIT HUNG UP IN AUGER, TRIP OUT OF HOLE, REPLACE AUGER. CLEAN OUT HOLE WITH CENTER BIT. NO SAMPLES FROM 45'-55'
48					
50					
52					
54					
56					SP SAND: very dark gray (5Y4/1), medium grained, micaceous
58	CS				
60					CL CLAY: varigated, thin beds of very dark gray green and black
62	CS				
64					SP SAND: very dark gray (5Y5/1), fine grained
66					CL CLAY: black as above, sticky, fish bones
68	CS				SP SAND: very fine grained (10YRN3/), predominantly fine grained, rounded, thin beds of evaporites on bedding planes, appear varved.
70	CS				
72					NO SAMPLE 72'-75' auger cuttings appear to be SP SAND as above.
74					
76					
78	CS				CL CLAY: black, silty in part, sandy in part
80					SW SAND: very dark gray, medium to coarse grained (mL-cL), loosly consolidated
82	CS				
84					CL CLAY: black, thinly bedded, very stiff
86					SLOTTED PVC SCREEN (0.010") 74'-84'
88					BENTONITE PELLETS (1/4") 67'-69'
90					CEMENT BENTONITE GROUT (6/1) 1'-67'
					FRAC SAND (8/12) 69'-85'

Basewide

Lithologic logs were not available for the following Basewide monitoring wells during report development:

Well ID	Installation Date
MW-80	3/14/1996

APPENDIX D
RESPONSE TO REGULATORY AGENCY COMMENTS

RESPONSE TO REGULATORY AGENCY COMMENTS ON BASEWIDE WELL UTILIZATION PLAN, NAVAL AIR STATION FALLON, FALLON, NEVADA

This document presents the Department of the Navy responses to comments from Mr. Ramon Naranjo from the Nevada Division of Environmental Protection (NDEP) on the Basewide Well Utilization Plan (WUP) for Naval Air Station (NAS) Fallon. The comments from NDEP addressed below were dated August 9, 2010.

RESPONSES TO NDEP COMMENTS

1. Comment: **The Navy should downsize the figures to show abandoned wells, recommended active monitoring wells used for water quality and water table measurements at a site by site basis. It is very difficult to discern where spatial data gaps are for each IRP site and what wells will be abandoned in the currently submitted format. It is not necessary to include locations such as velocity sensor locations, monitoring wells with pressure transducers or make the distinction between supplemental wells and active wells. Keep in mind, the electronic and paper versions of these reports are reviewed by the public and often involve scanning the documents.**

Response: The basewide monitoring well network includes a number of wells that are located significantly beyond the boundary of the Installation Restoration Program (IRP) sites; as a result, most of the figures in the report are plates. However, to respond to this request and to supplement the basewide plate maps provided, the Navy will add a series of 11 inch x 17 inch quadrant maps to the final version of the WUP that show (1) the recommended active monitoring wells used for water quality and water level monitoring, and (2) the locations of the wells recommended for well abandonment (plugging). As a result of the density of well locations in the vicinity of the IRP sites, active monitoring wells and wells to be abandoned will remain as separate geographic information system layers rather than on the same quadrant maps. Per NDEP's request, velocity sensor and pressure transducer locations and supplemental well locations will not be included in the quadrant maps; however, the plates provided in the draft WUP will remain unchanged.

The specific active IRP and underground storage tank-restoration (UST-R) sites are the focus of the Remedial Investigation (RI) addenda reports and corrective action plans and, as a result, site-specific maps are presented in these reports, rather than in the basewide WUP. The quadrant maps that will be added to the final basewide WUP will show the locations of the perimeter/sentinel wells, in addition to the wells located within the boundaries of the active IRP sites.

2. Comment: Elaborate on the distinction between monitoring wells that will be sampled for water quality analysis semi-annually (blue fill color), observations wells used semi-annual water level, but not water quality sampling (orange fill) and supplemental wells (yellow and pink fill). Based on NDEP's previously transmitted concerns, monitoring wells used in the network need be viable for both level and water quality or should be replaced. Provide the number of occurrences the supplemental wells or piezometers have been used to justify keeping them as a part of the monitoring program.

Response: The comment refers to Figure 2-1 and Table 2-1 of the draft WUP. The well locations designated with blue fill color correspond to the wells that are currently being sampled for water quality on a semiannual basis; all of these "blue" wells that are sampled for water quality are also measured for water levels at the time of sampling. The orange fill color denotes a larger subset of additional wells where water level measurements are collected semiannually, but are not currently being sampled for water quality. Both the well locations indicated with orange and yellow fill (indicated on the legend as "Supplemental Wells") meet all of the criteria described in State of Nevada Administrative Code (NAC) Chapter 534, "Underground Water and Wells," including Nevada Revised Statutes 2005 Chapter 534 and the NDEP "Guidance Document for Design of Groundwater Monitoring Wells" and discussed in Section 2.1 of the WUP.

Any well indicated by blue, orange, or yellow fill could be added to the "active well list," depending on the goals and objectives set by the Navy, in coordination with the state. As stated in the executive summary and Section 3.0 of the WUP, *"The monitoring well network is dynamic. The Navy will modify the monitoring well network, as necessary, to ensure that the wells used for future IRP activities at NAS Fallon follow NAC 534 standards. The current basewide groundwater monitoring program is intended to determine the stability of contaminants, monitor whether they are migrating off base, and to further develop and refine the basewide conceptual model. Any proposed changes to the basewide monitoring well network, analytical suite, or frequency will be documented in biannual monitoring reports and discussed with the state."*

The wells and piezometers represented with pink fill are wells that are being kept for measuring water levels and, in some cases, floating fuel product thicknesses in support of current and future remediation strategies. Although these wells may not meet all of the NAC 534 standards, such as optimal well diameters for sample collection, they are suitable measuring points for observing changes in water levels and floating fuel product thicknesses. For example, in the vicinity of IRP Sites 2 and 4, many of the GTI-series wells (pink fill designations) are measured and skimmed weekly as part of the ongoing Site 2 removal action. Similarly, in the vicinity IRP Site 16 and the E4X drain, the SPZ-/DPZ-series piezometers and stilling well (orange fill designation) would not be appropriate for

groundwater quality monitoring but are key components of measuring water level and temperature variations along the E4X drain.

Tables 2-1 (Basewide Groundwater Monitoring Well Network) and 2-2 (Wells and Piezometers Recommended for Plugging) have been revised to include columns that indicate the number of times a well was sampled from 1988 through 2010 and, when available, the date the well was last sampled during that timeframe.

3. Comment: Include in Tables 2-1 to 2-3 the number of previous water quality sampling occurrences in order to determine whether the wells to be abandoned have a long sample history and should be replaced. Tables 3-2 and 3-3 indicate monitoring wells that will be used for semi-annual water quality monitoring. From this list it appears IRP sites will lack sufficient spatial coverage in the active monitoring program to determine plume status. The Navy needs to elaborate on the details of this table.

Response: The response has been broken into two parts to address (a) comments related to Tables 2-1 to 2-3 and (b) comments related to Table 3-2. There is no Table 3-3 in the report.

a. As discussed in the response to comment 2, Tables 2-1 and 2-2 have been revised to include columns that indicate the number of times a well was sampled from 1988 through 2010 and, when available, the date the well was last sampled during that timeframe. Table 2-3 (Other Items to Evaluate) includes piezometers and observation wells that generally do not meet all of the NAC 534 standards; many of these locations were discovered during the 2007 and 2008 field activities or were used during previous pilot studies. The items in Table 2-3 do not have a long sampling history and additional information, other than what was provided, is not readily available. Further evaluation is needed to determine whether any of these locations would have merit as observation wells for future remedial strategies.

b. Table 3-2 indicates the number of wells that are currently sampled semiannually for water quality or water level measurements, additional supplemental wells that are available for water quality or water levels that comply with NAC 534 standards, additional piezometers or observation wells that are available to support remedial monitoring, and wells and piezometers that are recommended for plugging. As discussed in the executive summary and Section 3.0 of the WUP and the response to comment 2, "*The monitoring well network is dynamic.*" As a result, the final WUP will include both tables and figures that indicate the wells that will be sampled for water quality and water levels in 2011. In Fall 2010, a total of 44 wells were sampled. In addition to the 38 wells sampled in Spring 2010 samples

were also collected from Southern Operable Unit (OU) monitoring wells MW-18L, MW-24, MW-27, MW-73, MW-75, and MW-77 for volatile organic compounds, polynuclear aromatic hydrocarbons, and total dissolved solids. For 2011, the Navy plans to increase the spatial coverage in the Southern OU to include the following locations for semiannual water quality monitoring: wells MW-19, MW-54, MW-63, MW-16-3, and TT16-MW15 (a replacement well for GTI-16). In the vicinity of Site 3, the Navy also plans to conduct semiannual groundwater quality monitoring at the following additional locations: TT03-MW02, TT03-MW03, TT03-MW06, and MW-42L. Conversely, the Navy does not plan to conduct additional groundwater quality monitoring at the following basewide sentinel well locations in 2011: MW-33U, MW-83, TTBW-MW07 and TTBW-MW17. Monitoring well MW-33U is already sampled as part of the landfill monitoring program. Monitoring well MW-83 is proximal to basewide monitoring well TTBW-MW03; the concentrations of organic compounds detected are well below action levels. Similarly, TTBW-MW17 is proximal to TTBW-MW02 and has very low detections of organic compounds. All organic compounds measured were below analytical method detection limits in samples collected from monitoring well TTBW-MW-07 in 2008 and 2009.

The current focus of the basewide monitoring is to determine the stability of contaminant plumes, monitor whether contaminants are migrating off base, and to further develop and refine the basewide conceptual model. The long-term focus of groundwater monitoring will be based on the results of the remedial investigation/feasibility studies (RI/FS), record of decision (ROD), and resultant remedial design/remedial action plans, in accordance with the various steps of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) process, as outlined below.

Concurrent with the basewide groundwater monitoring program, a series of RI Report addenda are in progress for the various active IRP sites and are being documented in accordance with CERCLA. As stated in Section 1.2.3 of the WUP, the focus of the IRP is on moving an IRP site from identification and investigation to cleanup and closure. Once the RODs are finalized, remedial design documents will consist of plans and specifications for applying site remedies that will include consideration of monitored natural attenuation and associated groundwater monitoring plans. The bulk of the cleanup and groundwater monitoring to ensure the performance and success of the remedy usually occur during this phase.

In summary, Table 3-2 in the WUP summarizes the number and function of wells that are actively being used for groundwater monitoring, existing supplemental wells that comply with the NAC 534 standards and can be used for future groundwater monitoring, as

well as those wells that are recommended to be plugged. Specific groundwater monitoring strategies for the various IRP sites will be components of the remedial design, in accordance with the cleanup process documented in CERCLA. The long-term spatial coverage of the monitoring wells will be tied to the remedial action objectives and resultant cleanup and monitoring strategies that are defined in the remedial design, following the ROD. This information will be added to the WUP summary presented in Section 3.0.

4. Comment: The Navy needs to provide justification for maintaining the 84 wells or piezometers that are defined as remedial use wells or piezometers at Site 2, 4 and 14.

Response: Many wells at Sites 2, 4, and 14 contain free product. The 84 wells that will be maintained at these sites provide information on the presence or absence of free product at these locations, which help define the nature and extent of free product occurrence. Additionally, some of these wells are skimmed on a regular basis during the Site 2 and 4 product removal efforts. Finally, these wells allow for continued monitoring of free product during current and future remediation efforts to monitor changes in the free product plume and ensure that remedial activities do not result in migration of the free product to areas previously clear of free product.

5. Comment: The Navy needs to identify and mitigate any piezometer or monitoring well that are not being actively used that may contribute to preferential flow of contaminants or free product.

Response: As stated above, these 84 wells at Sites 2, 4, and 14 are currently monitored (at least annually, in some cases weekly) for the presence or absence of free product. In most likely remediation scenarios, these wells will be used to monitor for reductions in free product thickness or to confirm that remedial activities do not cause unintended migration of free product to previously uncontaminated areas. The presence or absence of these wells is not likely to have any effect on free product flow.

The Navy has identified in Figure 2-2 and Table 2-2 wells that will be plugged in the future. Investigations, including the RIs and semiannual sampling, have shown that the plumes have remained stable over the past 3 years.

6. Comment: The subject document lacks discussion and recommendations of the status of the monitoring network for each IRP site. The Navy needs to determine if additional monitoring wells are needed to monitor the plume status in a discussion and provide recommendations for future monitoring.

Response: Please refer to the response to comment 3. The need for additional monitoring wells will be based on the remedial action objectives presented in the ROD for the specific IRP sites as part of the CERCLA process. The remedial design documents and plans will provide the specifics for long-term groundwater monitoring, based on the accepted cleanup remedy. In the interim, starting in 2008, surface water and groundwater sampling results are being presented in a series of biannual hydrologic basewide monitoring reports. A summary of the results, including an assessment of groundwater quality and plume stability and recommendations for future interim groundwater monitoring, are being presented in the biannual reports. These reports are intended to supplement, not replace, the reports generated as part of the CERCLA process.

7. Comment: **Based on the completion of the subject document, the Navy will need to develop a long term Data Quality Objective monitoring plan for the IRP program to determine the appropriate sampling frequency, natural attenuation parameters and optimal sample locations for each site. The plan must include a review of current and past contaminant plume and water table maps.**

Response: See the responses to comments 3 and 6.