Precious Metals Recovery LLC
RCRA Permit Application
Dry Hills Facility | EPA ID# NVR000088542
Eureka County, Nevada

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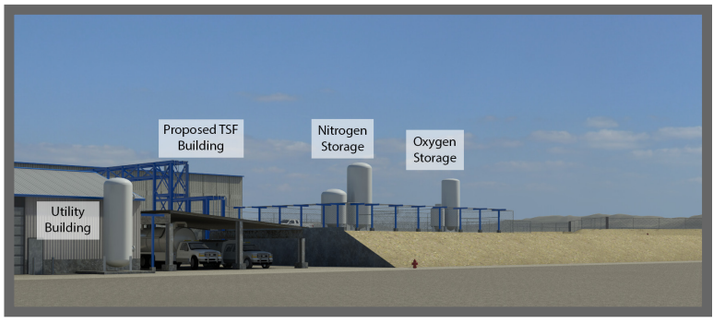

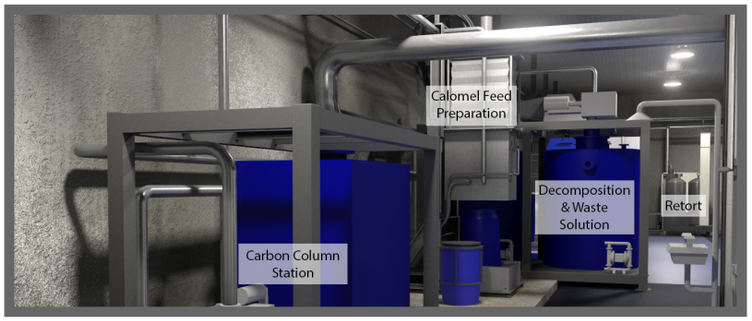

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APPENDIX 6-C

Mercury Stewardship Best Management Practices

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Mercury Stewardship
Best Management Practices

October 2003

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DISCLAIMER

This document was developed under Cooperative Agreement No. 83035101 awarded by the U.S. Environmental Protection Agency (US EPA). US EPA was involved in the drafting of this document, including making comments and suggestions intended to improve the document's scientific analysis and technical accuracy. While the document was developed through a joint US EPA/State Workgroup process, the document is a State product. The views expressed in this document do not represent an official US EPA position. US EPA has not made final decisions on any of the issues highlighted in this document. US EPA also does not endorse any products or commercial services mentioned in this document.

Best Management Practices (BMP) Manual

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I. Statement of the Problem

A. Background on Quicksilver Caucus/Environmental Protection Agency (EPA) Stewardship Workgroup

The Quicksilver Caucus is a coalition of state government organizations that was formed to address concerns about mercury pollution. To examine the options which may be appropriate for addressing existing and potential future excess supplies of elemental mercury nationwide, the Quicksilver Caucus and EPA are working together to address two charges:

(1) Develop guidance for mercury storage to ensure safe, interim storage of mercury stock (pending development of viable disposal options at a future date); and

(2) Address surplus mercury management policies and economic/ environmental issues concerning recycled mercury and the export/import of commodity grade mercury.

To undertake these charges, three workgroups were formed: the best management practices workgroup, the storage workgroup, and the markets workgroup.

The Quicksilver Caucus and EPA are also collaborating on determining ways to meet mercury reduction goals for specific water bodies where mercury pollution is caused primarily by air deposition and on providing input on EPA's draft Mercury National Action Plan.

B. Charter for the Best Management Practices Subgroup

The Best Management Practices (BMP) Subgroup was charged with examining the current national storage practices of Federal custodial agencies, commercial entities using significant amounts of mercury for industrial processes, and other entities that store mercury (including States, which temporarily accumulate mercury devices and extremely small amounts of elemental mercury for recycling) and developing a draft BMP Manual. After this BMP manual undergoes review, the subgroup will develop an Implementation Plan.

C. Overview of the BMP Manual

This document is best described as a collection of Best Management Practices (BMPs) assembled by Federal and State agencies to provide suggested practical guidelines for those engaged in interim or longer term storage (i.e., 10 to 30 years) of elemental mercury.

Mercury is a persistent, bioaccumulative, and toxic element that, when discarded, is often classified and regulated as hazardous waste. Mercury that is not regulated as a hazardous waste is, nevertheless, a hazardous material that requires proper management and storage. Most mercury wastes can conceivably be retorted and refined for reuse in mercury-containing devices or manufacturing processes. People who work with mercury

need to avoid exposure to mercury vapors because most of the mercury that is inhaled is absorbed into the body. If enough elemental mercury is absorbed, toxic effects can occur, including tremors, insomnia, headaches, sensory loss, memory loss and impaired cognitive function. It is also very important to ensure that elemental mercury is not released into the environment. Elemental mercury can be converted by certain aquatic bacteria to the very toxic form known as methylmercury, which can accumulate in the tissues of animals, fish, and humans. Some fish species can contain methylmercury levels that are many times higher than the concentrations found in the surrounding water. People who eat contaminated fish can absorb this methylmercury, which, in sufficient quantities, can cause serious neurological problems, as well as birth defects in the children of mothers exposed during pregnancy.

These guidelines do not attempt to determine whether stored elemental mercury should be technically managed as a waste or product. Users of this manual should confer with State and Federal regulatory agencies for advice when deciding how their mercury is regulated. If stored mercury is determined to be a waste, then the applicable State or Federal hazardous waste laws and regulations, including storage requirements, have to be met. In a number of States and localities, storage of a hazardous or potentially hazardous material may be subject to additional regulatory criteria that are not addressed in this manual. Regulatory standards, however, do not currently exist in all cases, particularly if mercury is regarded as a product. Therefore, the drafters of this BMP manual offer these practices, which have been used and field-tested by responsible civil and governmental custodial entities, as a compendium of suggested best management practices that can assist in safely storing elemental mercury for extended periods of time. This manual is not meant to provide any mandatory requirements, but rather provides a compendium of suggested best management practices. State and local authorities may tailor these practices to deal with site-specific conditions and individual regulatory frameworks.

For purposes of this discussion, this manual assumes that interim storage of elemental mercury will likely be needed for the next 10-30 years. It is assumed that it may take 10-30 years to develop and approve disposal treatment options; however, it may take longer. The design and construction of sites that are being newly constructed may want to consider longer term storage periods in the event that alternatives to the storage of mercury are not developed. Other possible management options (e.g., sale, treatment and disposal) are being evaluated and discussed as part of other processes and workgroups and will not be elaborated upon here.

. Also, although the focus of this manual is on a 10-30 year time frame, owners and operators of facilities that are storing for shorter periods of time should find portions of this manual useful because it addresses many common management practices that are independent of the storage time.

D. Use of this BMP Manual

This manual is designed to provide those engaged or interested in the long term storage of elemental mercury with suggested best practices for the management and storage. The recommendations are for 'best practices' in storage management, and represent a collection of successful approaches currently practiced by a number of private and governmental organizations. This manual is not a regulatory document. Once users are sure they have met any existing relevant federal, state and local government regulatory requirement, they should select ideas and procedures from this manual on a voluntary basis for application to their own storage operations. However, before making those selections, we strongly recommend that users consider two important concepts, which were used in the development of this manual-applicability and redundancy.

Applicability: Before best practices can be determined for a specific location or facility, the operator must make a careful analysis of the unique facility operation and layout as those relate to preparation of elemental mercury for storage and the conditions for storage. This should include analysis of airflows, construction features, and external conditions such as security requirements. The user should also have, as far as is practicable, a complete understanding of the conditions that will effect, or could affect, the exposure of the workforce or others to elemental mercury. A thorough understanding of the facility and possible exposure scenarios will be essential in making the appropriate choices of best practices to increase the safety of the storage operation, and allow the operator to put other factors such as cost effectiveness in context. In some cases, this may require the use of technically trained health or engineering professionals, but much of the analysis should be within the expertise of an experienced operator who knows the details of the specific storage operations.

Redundancy: This manual was developed with the principle of increasing the safety of storage of elemental mercury be establishing 'multiple layers of protection'. This means that best practices go beyond merely securing the mercury in properly sealed flasks or other containers, and considers failure scenarios where, despite proper containment, mercury is released to the environment. This protection will involve redundant steps in physical barriers, monitoring for releases, and protection of the workforce and the public from exposure as the result of accidental releases of mercury. Users should consider how they can best build redundant safety systems into their operations and adopt complementary practices that will reinforce their current storage practices and reduce the likelihood and severity of any releases.

Effective use of this manual largely depends on these two key factors. Once the user has analyzed their unique storage situation and accepted the need to develop redundant systems, the identification and adoption of the applicable best practices will be facilitated. The users' feedback from their experience in using this manual will be helpful for future editions.

II. Current Elemental Mercury Custodians

In this section we provide an overview of the entities that are currently storing or

accumulating elemental mercury or mercury devices for recycling and/or resale. Several of the custodians described here have not historically stored mercury long term. This mercury is typically either used or sold within one year. Some, like state and local governments and some private companies, have not stored it at all.

A. Defense Logistics Agency's Defense National Stockpile Center

The Defense National Stockpile program was established by Congress to minimize the U.S. dependence on foreign sources of essential materials in times of national emergency. Since 1988, the Defense Logistics Agency (DLA) has been responsible for the program and established the Defense National Stockpile Center (DNSC) to manage the program and operate storage depots nationwide.

DNSC is responsible for providing safe, secure, and environmentally sound stewardship of all commodities in the inventory. The stockpile includes approximately 65 commodities, including aluminum oxide, cobalt, ferrochrome, lead, rubber, tin, zinc, in addition to mercury.

DNSC currently has 4,890 tons (4,436 metric tons) of mercury stored in enclosed warehouses at three DNSC sites: Somerville, New Jersey; New Haven, Indiana; and Warren, Ohio; and at the U.S. Department of Energy (DOE) Y-12 National Security Complex at Oak Ridge, Tennessee. This inventory has been stored for over 40 years and consists of elemental mercury that ranges in purity from 99.5 to 99.9 percent.

Congress has declared most of the DNSC materials, including mercury, to be in excess of national defense needs and has authorized their disposition, generally by sale. In 1994, mercury sales were stopped because of concerns raised by EPA, congressional, state government, and NGO representatives about the environmental impacts. To evaluate the range of potential management alternatives for elemental mercury and the environmental impacts of these alternatives, DNSC is currently developing an Environmental Impact Statement (EIS). The draft EIS is scheduled to be published for public comment in early 2003.

B. Chlor-Alkali Facilities

Currently in the U.S., nine chlor-alkali facilities use the mercury cell process to produce chlorine and caustic soda. At any given time, each of these facilities has an average of about 300 tons of elemental mercury on-site, either in the production process or in storage for future use of in the production process. The facilities are among the largest users of mercury. The mercury is either purchased or recovered from on-site retorters (a retorter is a treatment process that thermally recovers mercury from waste) and is generally stored for a relatively short time- typically less than one year.

Newer and more efficient mercury-free technologies have been developed. As the facilities age and close, most are switching to non-mercury technologies. As a result, no new mercury cell facilities are being built in the United States.

C. Commercial Mercury Retorters

Currently, there are two main commercial retorting companies operating in the U.S. A typical commercial retorter can process a range of mercury-containing wastes, including chlor-alkali sludges, mercury-containing equipment and devices, and fluorescent lamps. After the retort process, the mercury is usually further refined ("distilled") to increase its purity (the amount of distillation usually depends on the projected end use of the mercury). The elemental mercury is then re-sold domestically and abroad. Prior to re-sale, the mercury is often stored for some period of time.

D. Department of Energy

The Department of Energy (DOE) stores about 860 metric tons (about 25,000 flasks) of elemental mercury at its Y-12 National Security Complex in Oak Ridge, Tennessee. This warehouse also contains the portion of DLA's mercury mentioned above. DOE may have other elemental mercury stored at other locations, but this information is confidential.

III. Best Management Practices

A. Security and Basic Site Procedures

1. Security Requirements

The overall goals of the security requirements are to prevent inadvertent or deliberate unauthorized entry on the active portion of the mercury storage area. The specific recommendations presented are for guidance only. The site specific security requirements unique to a specific facility should be evaluated in consultation with security experts. We recommend the following:

<u>Facility Entry</u>

- An artificial or natural barrier, which completely surrounds the active portion of the mercury storage. An example would be an 8 to 10 foot electrified or barbed wire fence. Additionally, cement barriers should be located in front of the entrance.
- A means to control entry to the storage area, such as: 24-hour attendants, armed security guards, closed circuit television monitors, special staff identification devices and locks, and controlled roadway access to the storage unit or into the facility.

<u>Staff and Vendor Background Checks</u>

- Current and prospective staff requirements should include:
    - A disclosure statement that is signed under penalty of perjury that

gives: full name and address, social security and driver's license numbers, declaration of existence of any arrest for civil or criminal violations.
- Submission to fingerprint ID procedures may be necessary to verify the disclosure statement information.

Recommended Vendor Requirements

With regard to a private company that is under consideration for managing or supplying the facility, transporting materials, or other support, the following information should be acquired:

- A description of any local, state, or federal licenses, permits, or registrations for the generation, transportation, treatment, storage, recycling, disposal, or handling of hazardous waste or hazardous materials applied for, or possessed by the individual or business concern, or by the individual or business concern under any previous name or names, in the five years preceding the filing of the statement, or, by the officers, directors, or partners of the business concern, including the name and address of the issuing agency.

- A listing and explanation of any final orders or license revocations or suspensions, or fines issued or initiated by any local, state, or federal authority, in the five years immediately preceding the filing of the statement, or any civil or criminal prosecutions filed in the five years immediately preceding, or pending at the time of, the filing of the statement, with any remedial actions or resolutions relating to the generation, transportation, treatment, storage, recycling, disposal, or handling of hazardous waste or hazardous materials.

- A listing of any agencies outside of the state that regulate, or had regulated the generation, transportation, treatment, storage, recycling, disposal, or handling of hazardous waste or hazardous materials in the five years preceding the filing of the disclosure statement.

- A listing and explanation of any federal or state conviction, judgment, fine or settlement, in the five years immediately preceding the filing of the statement, with any remedial actions or resolutions if applicable, relating to the generation, transportation, treatment, storage, recycling, disposal, or handling of hazardous waste or hazardous materials.

- A listing of all owners, officers, directors, trustees, and partners of the applicant who have owned, or been an officer, director, trustee, investor, or partner of, any company that generated, transported, treated, stored, recycled, disposed of, or handled hazardous wastes or hazardous materials and which was the subject of any of the actions described in paragraphs above for the five years preceding the filing of the statement.

2. Safety Procedures

At a minimum, a storage facility should develop strict inventory control mechanisms, a site-specific spill plan that covers the employees in the event of a release, and an emergency response plan. The emergency response plan should address public evacuation, remedial response, and procedures to be followed in the event of terrorism, fire, and other disastrous events that could cause significant mercury releases beyond the building perimeter. The plan should comply with local, state, and federal requirements and should include procedures for first responders, including fire department staff, state emergency response personnel, and local hospitals.

Following is some specific information to consider including in an emergency response plan:

- Descriptions of arrangements agreed to by local police departments, fire departments, hospitals, contractors, and State and local emergency response teams to coordinate emergency services;
- Up-to-date lists of names, addresses, and phone numbers (office and home) of all persons qualified to act as emergency coordinator and the chain-of-command of these persons;
- Up-to-date lists of all emergency equipment at the facility (such as fire extinguishing systems, spill control equipment, communications and alarm systems (internal and external), and decontamination equipment), as well as the location and a physical description of each item on the list and a brief outline of its capabilities;
- An evacuation plan for facility personnel, describing signal to be used to begin evacuation, evacuation routes, and alternate evacuation routes;
- Procedures for determining the area to be considered for evacuation; and
- Procedures addressing sensitive receptors, including day care facilities, schools, hospitals, and nursing homes

3. Personnel Training

Personnel who handle or store the mercury flasks should receive classroom or on-the-job training and refresher courses so that they can manage mercury safely and minimize any releases. Personnel who are in the storage area, but who are not actually handling or storing the mercury, should also receive training and refresher courses on the hazards of mercury, spill prevention and response, proper management and housekeeping procedures, and emergency response plan implementation. Relevant personnel should be familiar with the proper operation of emergency equipment and systems.

OSHA's Hazardous Waste Operations and Emergency Response Standard (HAZWOPER) training should be provided to facility employees. First priority for HAZWOPER training should be given to those employees directly involved in any mercury handling and emergency response, but employers should provide necessary training to all employees who could be exposed by an accidental release.

Ideally, the personnel training requirements of 40 CFR 264.16 (Part 264 are the regulations for owners and operators of hazardous waste treatment, storage, and disposal facilities) should be used as guidance for personnel even though these requirements apply to mercury that is a hazardous waste, because they are more conservative requirements.

The facility should have written procedures in place describing appropriate hygiene practices. Such practices should include, but not be limited to, the prohibition of smoking and eating in areas where mercury is stored or handled.

4. Personal Protective Equipment

Each mercury storage facility should conduct an exposure assessment for all potentially exposed employees and adopt appropriate monitoring and industrial hygiene practices. Calorimetric badges and/or personal monitoring equipment (vapor sampling devices) can be of assistance in providing information about individual and group exposure to mercury and are needed to do a comprehensive exposure assessment and monitoring program (See Section G.2.B-Air Monitoring). Such equipment is necessary to determine exposure during routine and non routine jobs. Facilities should consider the use of calorimetric badges capable of measuring below the 0.25mg/m^3 ACGIH TLV for all personnel involved in the handling or mercury, the inspection of warehouses, or other instances when personnel may need to stay in the mercury storage area for short periods of time. Mercury vapor monitoring equipment (personal monitoring equipment) should be employed whenever mercury is being actively handled or there is a question of a mercury release to air.

Personnel who stay in the mercury storage areas for extended periods (especially those involved in reflasking or repackaging activities) should be equipped with the appropriate safety equipment and clothing, including the following (note that 29 CFR can also be consulted for more information on personal protective equipment):

Respirator: Air Purifying Respirator with Mersorb cartridges*

	Half facepiece, dual cartridge respirator with NIOSH approval for mercury
Body Suit:	Tychem SL or higher* Impervious type coveralls with hoods
Gloves:	Inner surgical nitrile, silvershield*, and outer nitrile glove
Feet:	Cover shoes with booties ANSI approved safety shoes
Eyes:	Safety goggles or glasses with side shields

*(or a generic equivalent)

5. Personnel Medical Monitoring Program

All personnel should receive physical examinations prior to beginning work in a mercury storage facility. Pre-employment physical examinations establish a baseline for each employee, including determining an individual's background mercury level, and help to ensure that the employee has normal body chemistry for mercury removal (i.e., if a person does not have proper kidney function, he or she should not work around mercury). Personnel may have other considerations (e.g., pregnancy) that should be handled on a case-specific basis.

The medical monitoring program should also include periodic physical exams (e.g., every 1 -3 years), regular blood tests, and regular urinalysis by competent medical authorities to ensure the health and safety of each employee. The frequency of physical exams and tests should be determined using the exposure assessments developed based on each employee's job responsibilities. If an employee has been exposed to mercury, more frequent blood and urine tests, or interventional procedures may be necessary.

As a final suggestion, 29 CFR can be referenced for more information on employee monitoring and records retention requirements for certain types of handling requirements.

6. Facility Siting

In May 1997, EPA issued two publications[1] that discuss issues related to the siting of RCRA hazardous waste management facilities. One addresses the types of environments that pose special challenges to the siting, expansion, and operation of RCRA facilities; the other addresses the social aspects of locating RCRA facilities. Although a storage facility for elemental mercury does not pose the same risks as, say, a hazardous waste incinerator,

[1] Sensitive Environments and the Siting of Hazardous Waste Management Facilities," EPA/530-K-97-003, May 1997; and "Social Aspects of Siting RCRA Hazardous Waste Facilities," EPA/530-K-00-005, April 2000. See http://www.epa.gov/epaoswer/hazwaste/tsds/site/sites.htm for copies of these publications.

and mercury storage may not always require a RCRA permit, these publications provide some general guidelines and practices for choosing an appropriate site for storing mercury. We recommend that potential owners and operators of a mercury storage facility consult these publications as needed.

A brief summary of each publication follows.

"Sensitive Environments and the Siting of Hazardous Waste Facilities": describes the types of areas that, because of their soils, terrain, groundwater, or weather conditions, may pose significant risks of releases and possible exposures to humans and the environment. A sample list of environmentally sensitive locations includes 100 and 500 year floodplains, wetlands, Karst soils, and unstable terrain.

"Social Aspects of Siting RCRA Hazardous Waste Facilities": describes creative mechanisms that help in working effectively with communities. A key point here is to address a community's concerns early, collaboratively, and compassionately. This publication also describes actual experiences in siting a facility and examples of quality of life concerns raised by environmental justice communities when facilities are sited.

B. Warehouse

In this section we address some basic information on what should be considered when building a mercury storage facility or retrofitting an existing building to store mercury, such as the size of the warehouse, options for the layout and design, floor strength requirements, surface coatings, plumbing and drains, air flow and ventilation, and acceptable temperature range for storing elemental mercury.

Obviously, the determination of whether a mercury storage facility needs a RCRA or state hazardous waste permit will have a significant impact of all aspects of a facility design. If a permit is required, then the RCRA or state permitting process must be followed. If the storage facility is not subject to RCRA or state requirements, then most of the siting parameters will be in the form of local zoning requirements for the particular class of building and any supplemental requirements federal /state agencies may add. In general, building classes are set forth in the Uniform Building Code, and design parameters for hazardous materials storage facilities are found in the Uniform Fire Code. The design requirements in 40 CFR 264.1100 (Subpart DD-Containment buildings), with the exception of the secondary containment requirements, can also be used as guidance for the design of the mercury storage building.
The following are mercury-specific recommendations to consider.

(1) Size: The size requirements for a warehouse will depend on a number of factors, including the way the mercury will be stored (e.g., size of storage containers, height of stacks) and the amount of space that may be needed for storing future shipments of mercury. In general, the Defense Logistics Agency uses the following average storage factors:

Volume: 18 net cubic feet per short ton;
Square feet: 5.6 gross square feet per short ton

(2) Layout/Design: Mercury flasks should be stored upright on pallets off the ground, with overpacking and secondary containment as described in section F.2. of this manual, and should be stacked no more than two high. Metric ton containers should be stored using overpacking and secondary containment as described in F.2. The aisles in mercury storage areas should be wide enough to allow for the passage of inspection teams, loading machinery, and emergency equipment.

(3) Siting: The mercury storage building should be located away from highly combustible or explosive materials, human or animal food, and other materials, including clothing, that might become contaminated by the mercury. We also recommend that mercury storage buildings not be used to store other liquid wastes or materials. If other solid wastes or materials are stored in a mercury storage building, it is important to ensure that these materials are not combustible, explosive, or incompatible with mercury. The mercury storage activities should be completely segregated from any other wastes or materials.

(4) Flooring/Walls: The floor of the warehouse should be designed to withstand 50% more than the total load from the mercury that is being stored. The floor should be coated with an epoxy coating. The floor and coating should be inspected frequently to ensure that the floor has no cracks and the coating is intact. The floor of the warehouse should not have any drains or plumbing, although sloped floors could be used to assist in the collection of spills. When choosing the materials from which to construct the walls, select materials that do not readily absorb mercury vapor.

(5) Air Flow/Ventilation: While proper storage practices will prevent most releases of mercury vapors, in view of the metal's mobility and toxicity it is prudent to include redundant systems to prevent releases in the event of an unexpected occurrence. Many current facilities where mercury operations are taking place have negative pressure environments. If air is to be ventilated to the outside atmosphere, it should first be filtered through a series of sulfur- or iodine-impregnated, activated carbon filters or another appropriate filtering material. The mercury storage buildings should be designed to minimize exposure to workers and the surrounding community if an accidental release were to occur. The handling of mercury within the mercury storage area can also be minimized to reduce the risk of exposure.(6) Temperature: When mercury leaks or spills, its tendency to volatilize increases with temperature. To minimize volatilization in the event of an accidental release, the temperature in mercury storage areas should be maintained as low as is feasible, preferably at a constant temperature of 70 degrees Fahrenheit. It has been suggested that the temperature should be maintained as low as 40 degrees Fahrenheit since mercury volatizes readily at higher temperatures. Maintaining a temperature at or below 70 digress Fahrenheit, would be very expensive and would not significantly reduce losses of mercury due to vaporization because the mercury will be stored in sealed containers.

(7) Fire Safety: We recommend that a dry sprinkler should be installed, especially if the

building and/or interior furnishings contain combustible components Because containers will rupture and release mercury if exposed to very high temperatures, preference should be given to storage facilities constructed of non-combustible materials and using non-combustible materials for pallets, storage racks, and other interior furnishings to the greatest practical extent. . Current state and local fire codes should be consulted to determine whether the facility is subject to any other requirements.

(8) Signs: A sign should be placed on the entrance of the storage facility that identifies the building as a mercury storage area and states that mercury vapor is highly toxic if inhaled.

(9) Closure: When the building is no longer going to be used for storage of mercury, the mercury should be removed from the storage area and the building, storage containers, secondary containment decontaminated. A determination should be made if there has been any contamination of the flooring, soil, or subsoils. If any contamination exists, see the section on spill cleanup procedures, below, for information on how to manage it. Mercury storage facilities that are permitted to store RCRA or state-only hazardous waste must, as part of the permitting process, develop a closure plan. A RCRA- or state-permitted hazardous waste facility must also have a fiscal mechanism in place to cover closure costs.

C. Storage Containers

Two main types of mercury storage containers exist: 76-lb flasks and one metric ton containers. These containers are typically made of cast iron or carbon stainless steel. Seamless flasks and containers are recommended to eliminate the risk of breaches along the seams. Mercury storage facilities should consider requiring that mercury be transported in storage grade containers to minimize the need for reflasking and its associated risks. If mercury arrives in other types of containers[2], the mercury should be re-packaged into either the 76-lb flasks or the one metric ton containers. See the section on handling, below, for more information on reflasking.

When storing mercury in either type of container, we recommend that some head space remain in each container to allow for thermal expansion of mercury.[3]

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2 Other sizes (e.g., 1-16 pounds) and types (e.g., polyethylene, glass) of containers are often used to transport mercury.

3 Mercury's coefficient of thermal expansion is 1.82 x 10-4/°K. With a density of 13.53 kilograms per liter at 25°C (=298°K), the volume of mercury in a 76 pound flask is approximately 2.548 liters. If the temperature were increased to just below mercury's boiling point (356.9 ° C = 629.9°K), the increased volume of the mercury would be: $(1.82 \times 10^{-4}/°K) \times (629.9\ °K - 298\ °K) \times (2548\ \text{milliliters}) = 154\ \text{milliliters}$.

This represents an increase of approximately 6.0 percent from the mercury's volume at 25°C. Ten percent additional volume should, therefore, be adequate to contain the mercury in a 76 pound flask. Above its boiling point (where the vapor pressure = 1 Bar or 15 PSI) the pressure of the mercury in a closed flask would increase rapidly with temperature until the flask failed. Any reasonable containers will reach pressures high enough to rupture at the temperatures produced by a fire.

D. Transportation

Elemental mercury is considered a hazardous material under Department of Transportation (DOT) regulations. The following is a summary of DOT requirements:

Shipper Requirements

Packaging - a shipper transporting a hazardous material is required to package the material in accordance with DOT regulations. In the case of mercury, 49 CFR 172.101 requires that the material be packaged in a container meeting the requirements of packaging group III, which is a list of approved container and liner combinations. The shipper is also required to mark the containers with the appropriate diamond labels, proper shipping name, and UN number. For mercury, the label specified in 49 CFR 172.101 is "Corrosive," the proper shipping name is "Mercury," and the UN number is "UN 2809." See 49 CFR 172.301 for marking requirements of non-bulk packages

Shipping papers - shipping papers must be accurately prepared. "Less than Load" shipments, which are deliveries by a vehicle that may have shipments to other facilities on board, are usually tendered with a Bill of Lading that is similar to a hazardous waste manifest. (Note that Bills of Lading cannot be accepted for hazardous waste shipments). For mercury, the shipping papers must include, among other things, the total quantity (by net or gross mass, capacity, or as otherwise appropriate) of mercury, an emergency response telephone number, and a certification that the shipment has been properly prepared and is in compliance with all regulations.

E. Receiving

1. Notification Process Prior to Shipping

The owner or operator of a facility that receives mercury from an outside source should inform the source in writing prior to the shipment that he is authorized to accept mercury (for example, by showing the he has the appropriate license or EPA identification number, if one is necessary) and will accept the mercury that is being shipped. The facility owner/operator should keep a copy of this written notice as part of the facility operating record and should inform the outside source of any change that may affect authority to receive the mercury.

2. Manifest/Shipping Paper Verification

All shipments of mercury should be accompanied by a manifest or shipping papers and a Material Safety Data Sheet. All incoming material must conform to packaging/packing requirements, labeling requirements, shipping procedures, methods and regulations contained in applicable parts of the following Codes of Federal Regulations (CFR): 10 CFR (Energy), 29 CFR (Labor), 40 CFR (EPA), 49 CFR (Transportation). In addition, individual mercury containers should have a metal label with the following information

permanently marked, if applicable:

(1) Commodity name
(2) Name of supplier
(3) Government contract/certificate number and lot number
(4) Location of origin (country/state)
(5) Month and year packed
(6) Individual flask number followed by the total number of flasks in the lot
(7) Gross, tare, and net weights shown in pounds, ounces or kilograms under the designation
(8) Hazard warning: Caution-Poisonous-Handle with Care

3. Packing Inspection

The term "packing" refers to interior or shipping containers and includes preparation for shipping or storage, blocking, bracing, cushioning, wrapping, weatherproofing, and placement in the exterior containers. "Packaging" refers to exterior packages or liners and related techniques to protect the material from deterioration and prevent material loss or damage

Each lot of mercury should be accepted on the basis of sampling, inspection, and testing completed by the recipient or authorized designee. A Quality Assurance Inspector should be stationed at the storage facility to examine the packaging, marking, and loading for compliance with required specifications. This examination is necessary to minimize the likelihood of damage during handling and deterioration in long-term storage.

The mercury shipment should be accompanied by a chemical analysis report that demonstrates the mercury's level of purity and identifies any contaminants. If such records do not exist, the mercury must be tested on-site to ensure it is of acceptable quality and to verify that the facility is not accepting someone else's hazardous waste.

On the basis of the inspection or testing, or both, the shipment may be accepted as complying, or rejected as not complying, with the facility's requirements. An inspection report should be filed by the storage facility's Quality Assurance Inspector as to whether the shipment is accepted or rejected. The report should include all relevant information, including date of inspection, type of inspection, sampling and analysis performed, whether the analysis was performed by the inspector or producer, type and number of tests, witness, description of packaging, reason for rejection (if applicable), and signature of the inspector.

F. Handling

1. Reflasking operation

As stated above, to minimize the chance of a mercury spill or release associated with reflasking, the mercury storage facility could consider requiring that the mercury be

transported in storage grade containers. As part of this effort, entities that are delivering mercury to a storage facility could be notified of the long-term storage requirements so they can ship the mercury in ready-to-store containers.

If reflasking must take place on site, it should be conducted in a specially designated reflasking area. Relevant staff should be furnished with maximally protective equipment and follow the adopted protocol. If the reflasking operation is to include only minimal planned reflasking, the air flow/ventilation system described below may be scaled back. Some level of air flow/ventilation should be maintained in the event of an accidental release. The following practices should be observed if the facility is to be used for routine reflasking of the incoming mercury:

(1) Replacement flasks and one-ton containers must be available on site prior to the start of any reflasking operation.
(2) Mechanical devices for lifting and pouring the mercury should be on-site.
(3) All reflasking operations should occur in an area with secondary containment.
(4) The area should be monitored for mercury before and after reflasking.
(5) The reflasking area should be ventilated separately from the warehouse with a negative pressure environment.
(6) Any air ventilated outside the building form the reflasking area should first be filtered through a series of iodine impregnated activated carbon filters or another appropriate filtering material. Periodic testing of the outlet air should be undertaken to determine when the filtering material needs to be replaced.

A general reflasking operation can include the following processes:

(1) The mercury containers are transported to the reflasking area by forklift and placed on a pallet (if quantity requires).
(2) Mercury from the old containers is poured down a loading funnel into a large main storage tank and then pumped up into a much smaller head tank. After suspended solids are returned to the storage tank via an overflow line, a series of valves can be opened, allowing the mercury to gravitate from the head tank into the metering tank and a new container.
(3) Newly filled replacement flasks or one-ton containers are placed on a new pallet or a used pallet that has been cleaned and pre-tested for the presence of residual mercury. As an alternative, hard plastic composite pallets could be used to minimize the fire danger, housekeeping needs, and the chance of pallet failure.
(4) A final check is conducted using a mercury vapor detector to ensure that no mercury droplets are present on the exterior storage container.
(5) The container is tightly capped and a forklift transports the container to the storage area.

Wastes that are generated from this reflasking operation must be managed in compliance with applicable hazardous waste regulations and sent to a permitted commercial facility for appropriate treatment and disposal. Empty mercury containers can be transported to an offsite treatment facility for decontamination. Following testing and

certification, the clean flasks could then be sent to a scrap metal recycling facility.

During the reflasking operation, the following spill prevention measures should be used:

(1) Pallet transfer containment pans, which prevent or minimize contamination of floors;
(2) Secondary containment pans;
(3) Containment booms, which would help if a large spill were to occur; and
(4) Mercury monitors, to detect any mercury vapors.

Finally, air emissions must be controlled at reflasking operations. See the section on air monitoring, below, for recommended monitoring during and after mercury handling.

2. Overpacking/Secondary Containment

While we recommend that all of the following extra layers be added around the flasks, site-specific conditions may lead owners and operators of a site to only use some of these measures.

If flasks are used, the following options for additional measures could be employed:[4]

(1) Place the flasks in a thirty-gallon carbon steel (sixteen-gauge) UN-approved drum (6 flasks per drum). A typical drum has a lid with a one-half inch round, sponge rubber O-ring (gasket) around its edge to provide a seal between the drum and its lid. A steel locking ring with a bolt can be used to compress the gasket and maintain the seal. Each lid should also have a bung-hole with a leak-proof lid to permit sampling of the air inside. To separate the flasks in the bottoms of the drum, cardboard dividers can be used. (Using cardboard dividers avoids the use of nails, staples or other metallic objects).
(2) Line the drums with an epoxy-phenolic coating or a poly drum liner or alternatively, place a cushioning material that also functions as an absorbent mat in the bottom of each drum.
(3) Strap the drums together on the pallet to prevent shifting accidents.
(4) Place each pallet on a drip pan.

If one metric ton containers are used, additional containment protection can be provided by placing each container on a square pallet and a drip pan. After overpacking, the mercury should be relocated to storage bays specifically designed and dedicated to mercury storage.

G. Monitoring and Leak Detection

[4] All of these additional containment measures were recently added to the mercury that DLA is storing at the Somerville, NJ; Warren, OH; and New Haven, Indiana depots.

1. Regular monitoring

This section discusses both visual and air monitoring. Elemental mercury air monitoring is a tool to measure exposure and detect leaks during routine and extraordinary events (i.e. spills, upsets, catastrophes). An exposure assessment and industrial hygiene monitoring program needs to be prepared and periodically reviewed by a person qualified to establish such a program (e.g. certified industrial hygienist). Other monitoring programs need to be established by qualified personnel. Auditing to insure compliance with programs needs to be independently undertaken and verified by the facility's management. Management should insure that any deficiencies identified in the auditing process are corrected as quickly as possible.

At a minimum, an industrial hygiene monitoring program should be developed and implemented at the facility. The program should include an exposure assessment for the facility's workers. Occupational exposure limits for mercury are listed below:

Organization	**Value**	**Comment**
Occupational Safety and Health Administration (OSHA)	Permissible Exposure Limit (PEL) = 0.1 mg/m^3	time weighted avg. over 8 hour shift and 40 hour week
American Conference of Governmental Industrial Hygienists (ACGIH)	Threshold Limit Value (TLV) = 0.025 mg/m^3	time weighted avg. over 8 hour shift and 40 hour week
National Institute for Occupational Safety and Health (NIOSH)	Recommended Exposure Limit (REL) = 0.05 mg/m^3	time weighted avg. over 10 hour shift and 40 hour week
The Chlorine Institute5	Recommended Short-term Exposure Limit (STEL) = 0.15 mg/m^3	time weighted average over 15 minute interval

This manual recommends using the most conservative values, ACGIH's 0.025 mg/m^3 TLV and the Chlorine Institute's 0.15 mg/m^3 STEL, as the limits for worker exposure. Any monitoring results above these levels should be verified and documented, the source of the emissions should be investigated, and remedial actions should be taken.

Both active and passive sampling equipment are available to detect personnel exposure to elemental mercury vapor. Active sampling equipment measures the detectable values and renders real-time measurements, whereas passive sampling requires laboratory analysis to determine the exposure levels. Active sampling is recommended and can be achieved through a variety of means including colorimetric badges, colorimetric tubes, dosimeters, and vapor monitors.

Air monitoring for elemental mercury depends on site-specific factors of the particular

5 The Chlorine Institute's STEL is not endorsed by ACGIH or NIOSH.

storage facility, including location, construction, background levels6, storage quantity and degree of processing. The following subsections summarize general recommendations for mercury vapor monitoring. These recommendations are based mostly upon existing DLA and chlor-alkali manufacturing industry procedures. They should not be construed to imply circumvention of any existing regulations or requirements.

Finally, as discussed in the section above on safety procedures, the framework and procedures for equipment operation and calibration, monitoring, leak detection, notification of authorities, containment and cleanup of spills, and associated documentation should be predefined in an emergency response plan.

Recommended Routine Monitoring:

For all of situations described below, if there are obvious leaks, spills, or droplets of mercury, they should be identified and reported to management immediately. The date, time, inspector, location, and proximate amount of mercury should be documented. Corrective action should comply with the section of this manual on spill cleanup protocols.

If there are elevated air concentrations of mercury, then the concentration should first be double checked. Upon confirmation of a higher than background reading, the operator should notify management, obtain assistance from a second employee, don appropriate PPE, and attempt to identify the cause of the elevated reading. Confirmation can be achieved via visual inspection (for liquid mercury) or using black light testing (for mercury vapor), and vapor monitoring. If the increased air concentration is due to a leak or spill, the corrective action(s) taken should comply with the spill cleanup protocols in place at the storage facility.

Continuous monitoring – As a screening measure, all personnel, while working in the storage area (including all receiving, handling, storage, and shipping areas that are connected to an associated air handling system) should, at a minimum, wear a colorimetric badge capable of measuring below the 0.025 mg/m^3 ACGIH TLV. Manufacturers' recommendations on use and replacement of the badges should be strictly observed. While in use, monitoring results should be periodically checked against the 0.1 mg/m^3 PEL ceiling. For readings close to or above acceptable levels, re-monitor using a color detection tube and associated pump with greater specificity.

Daily monitoring – Visual inspections should be conducted during a daily walkthrough of the storage area. The stored mercury should be examined to ensure the storage containers are still intact. This is a relatively quick way to ensure the containers are not leaking and can be conducted between air monitoring inspections.

While conducting a visual inspection, it is important to ensure that the aisles remain wide enough to allow passage of inspection teams, loading machinery, and emergency equipment.

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6 Mercury background levels are anticipated to be less than 20 ng/m^3 (ASTDR 1999)

Weekly monitoring – Weekly vapor monitoring should be conducted using a portable monitoring device with a sensitivity of 1 part per million (ppm), if not 1 part per billion (ppb)[7] [reference: DLA]. Prior to use, ensure monitoring devices are calibrated according to manufacturer's specifications and background mercury vapor level(s) are identified. Details of the calibration (e.g., date, time, operator, zero, span, and background) and monitoring details (e.g., date, time, operator, results, and locations associated with any readings above background) should be recorded. Vapor monitoring should follow OSHA's Method ID-140 (1991).

While doing this monitoring, all drip pans, grease/dirt deposits, cracks, crevices, low-lying areas, and ventilation systems inside the storage facility should be closely examined for mercury accumulation, as mercury is more likely to accumulate in these areas.

Quarterly monitoring – Quarterly monitoring of the air handling system is recommended. If using sulfur- or iodine-impregnated, activated carbon filters (or something comparable), monitor the space between the filters within the air handling system using a portable monitoring device with a sensitivity of 1 ppm, if not 1 ppb. Vapor monitoring should follow OSHA's Method ID-140 (1991).

Quarterly spot-checks should be performed at random locations within the storage facility and should include: surface wiping of drip pans, pallets, door knobs, ventilation ducts, countertops, floors, light switches, PPE, and other highly suspected contaminant locations. Surface wipes should be analyzed for total and elemental mercury and follow OSHA's Method ID-145 (1989).

Monitoring upon mercury receipt – The transport vehicle interior and overpacking integrity should be visually inspected for any obvious leaks, spills, droplets, or other pools of free elemental mercury. Using a vapor monitor with a sensitivity of 1 ppm, if not 1 ppb, monitor grease/dirt deposits, cracks, crevices, low-lying areas, and ventilation system inside the transport vehicle the packaging, and inside the overpacking. All suspect mercury sources should be documented and reported to management.

Monitoring After a Large Spill or Release - Mercury monitoring beyond the frequencies and monitoring degree suggested above may be warranted after an extraordinary event. In such cases, the area should be monitored for both total mercury and mercury vapor, following OSHA Method ID-140 (1991). Ambient monitoring at or near property boundaries should also be instituted [EPA's Compendium Method IO-5 (1999)]. Finally, blood and urine sampling may be warranted after an extraordinary event for employees who may have been exposed to the mercury.

2. Water and other media monitoring

The following procedures can be used to acquire baseline data on potential storage sites, to monitor after a suspected breach of secondary containment, to determine historic

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[7] Note that DLA's Somerville Depot, along with the New Jersey Institute of Technology, rely upon the Ohio LUMEX™ and the Tekran™ vapor monitors as being state of the art.

spill and contamination information, to document potential offsite migration, and to assess the site prior to decommissioning.

Water Monitoring (wells, plumbing, drains, downstream water bodies)

Discharges- The discharge of effluents from mercury storage facilities is discouraged. However, if such discharges are possible, a baseline mercury analysis should be performed. Runoff from areas where mercury is handled should also be analyzed for total mercury (per EPA, Method 1631[8], or equivalent) in accordance with federal, state, and local requirements, or at least once per year during typical operation.

Groundwater- Total mercury analysis (using lowest available method detection limits per EPA or an equivalent method) on groundwater use and monitoring wells should be performed as a
baseline and/or once per year for users who have evidence of current or historical spills.

Plumbing/drains- Mercury may remain as a residue contaminant in plumbing/drains and drain traps. Especially important in decommissioning a user facility, analysis for total mercury is useful in determining appropriate disposal options for any residuals.

Soil and Sediment Monitoring

If a site is being considered for interim or long-term mercury storage, a baseline analysis of soils and sediments, if applicable, should be performed. Sampling protocols in EPA's SW-846 should be followed. Biased sampling for soils in low areas should be part of the preliminary set of samples. Further sampling should be conducted periodically. Soils and sediments should also be sampled if there is a breach of secondary containment and prior to facility closure.

3. Emergencies

a. Spill

If a mercury spill occurs, follow the procedures outlined in the facility spill plan.[9] Block off areas where droplets of mercury are visible using a tape or rope and post signs.

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[8] Method 1631: Guidelines Establishing Test Procedures for the Analysis of Pollutants; Measurement of Mercury in Water: This method allows for the determination of mercury at a minimum level of 0.5 parts-per-trillion and supports measurements for mercury published in the National Toxics Rule and in the Final Water Quality Guidance for the Great Lakes System. Note that SW-846, EPA's official compendium of analytical and sampling methods that have been approved for use in complying with RCRA regulations, includes three methods that may be useful: Method 7470A: Mercury in Liquid Waste (Manual Cold-Vapor Technique); Method 7471A: Mercury in Solid or Semisolid Waste (Manual Cold-Vapor Technique); and Method 7472: Mercury in Aqueous Samples and Extracts by Anodic Stripping Voltammetry (ASV) control provisions, preservation, and storage.

[9] The federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) requires reporting of any release of a hazardous substance to the environment that exceeds a substance-specific

Avoid allowing personnel to walk on or touch mercury contaminated surfaces. Authorized personnel should be notified.

The size of the spill will determine the appropriate clean it up action. A large spill is one pound, or about the equivalent of two tablespoons. A one pound spill must be reported to appropriate state and federal authorities. The following procedures should be incorporated in the facility spill cleanup plan:

(1) When cleaning up a spill staff should use sufficient personal protective equipment (PPE) to protect clothing and skin. Common PPE includes impervious gloves, shoe covers, heavy soled booties, laboratory apron, disposable coveralls, and a respirator. *Never use thin disposable gloves, as they can tear and allow mercury to lodge under the fingernails.*
(2) When respirators are required, the buddy system should be used so employees can watch the color of the end-of-service indicators on the faces each other's cartridges to know when they need to be replaced. If airline respirator hoses are used, they should not be dragged through mercury. The hoses must be checked for mercury contamination before returning them to storage.

(3) Plastic sheets should be spread over surfaces onto which mercury could drop or run and the sides of the sheets should be taped to the floor.

(4) Any dust or oil onto which mercury may have attached during spill cleanup must be removed. Use a compatible detergent or a solvent to remove oil or grime and a specialized mercury vacuum to remove dust.

(5) Rags should only be dipped in cleaning solutions once to avoid contamination of the solution and the container. The amount of mercury-contaminated liquid generated during cleanup should be minimized since contaminated liquid wastes are expensive to dispose.

(6) Mercury kits with hand-powered miniature vacuums or sponges can be used to clean up small spills. The facility should also purchase a specialized mercury vacuum and supplies of mercury indicator powder. To avoid the spread of contamination, mercury-contaminated dirt should never be swept or blown off surfaces with compressed-air nozzles. The specialized mercury vacuum should be used instead.

(7) Flowers of sulfur or "HgX" powder can be used in limited circumstances to seal in place mercury that has entered crevices inside buildings. These materials do not absorb or neutralize mercury, but form hard shells around the droplets that seal in the vapor. Mercury can also be sealed into crevices with sealer or caulk. These techniques should be used only when absolutely necessary (e.g., if removal is prohibitively expensive or the mercury is extremely hard to reach), because trapped

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reportable quantity. The reportable quantity for mercury is 1 pound (454 grams).

mercury can pose a health hazard to those who work on affected surfaces in the future. All locations where mercury has been sealed should be documented; closure plans need include special procedures to address sealed mercury. A sign and permanent label indicating that sealed mercury is present must be used. Mercury spills that occur outside buildings must be completely cleaned up.

(8) A specially designed and dedicated vacuum cleaner must be employed to cleanup large mercury spills. The vacuum's exhaust should be monitored with a mercury sniffer before use. After cleanup, it is important to remove as much mercury as possible from inside the vacuum because too much residual mercury can ruin the mercury absorber. A regular vacuum or HEPA model should never be used to clean up mercury spills because mercury amalgamates with copper in the motor, causing the vacuum to emit high concentrations of mercury vapor. The vacuum itself is contaminated and must be discarded as a hazardous waste.

(9) Resisorb® should be used to eliminate mercury vapors near surfaces, particularly after removing liquid mercury from those surfaces.

(10) Used rags, cleaning materials, protective gear, and mercury contaminated gear should be placed into double, sealable plastic bags. Large tools should be cut up before placing them into the bags. Excess air should be gently squeezed from the bags and the sealed bags should be placed into drums and labeled as hazardous waste. All applicable federal and state hazardous waste requirements must be adhered to when storing and disposing of these materials.

(11) Before removing any access barriers and returning the area to normal use, a clearance survey should be conducted. Air quality of the affected area must be monitored to assure that the cleanup, removal and ventilation resulted in acceptable air quality levels.

(12) If facility personnel become contaminated with elemental mercury, they should immediately use an eyewash station or safety shower to wash the affected area. Any contamination incident should be reported to the appropriate person on site. A mercury vapor sniffer should be used to check for residual traces of mercury under the fingernails or skin. Staff should be examined by a doctor; urine and blood tests should be administered and the results should be documented in a spill report. Follow-up tests or additional medical procedures may be required. Contaminated clothing should be tested with a mercury sniffer, removed, placed in a double, sealable plastic bag, and managed as a hazardous waste.

b. Fire

If a fire were to break out in or near the storage facility, the resulting heat would cause the mercury to expand. If the storage container does not have sufficient surge capacity,

then it might be breached.[10] More importantly, heat causes mercury to vaporize. If inhaled in sufficient concentrations, elemental mercury vapor can induce respiratory shock and death. Proper personal protective equipment can protect firefighters and other emergency response workers from harmful exposure to mercury. Refer to the discussion above of personal protective equipment for workers at mercury storage facilities.

In general, elemental mercury presents little danger of fire or explosion under normal conditions with proper safeguards (note, however, that several mercurial compounds do pose such a threat). Fireproof storage (e.g., in a facility made of non-combustible materials and away from combustible trees and grasses) can significantly reduce likely fire threats in a mercury storage facility.[11] To protect against uncommon contingencies, the storage facility should develop and implement fire management procedures (plans) to address fires due to lightning strikes, severe weather conditions, the presence of potentially combustible materials (e.g., wood storage pallets), possible ignition sources (e.g., electrical control panels, distribution circuits, and fixtures), and terrorist activities. The following include general fire prevention procedures as well as fire management practices.

Fire Prevention Procedures:

(1) Battery-powered electric forklifts should be used to transport mercury within the storage facility.

(2) Caution placards should be placed on all entryways into the Hg storage areas. Each entrance into a mercury storage area should be marked:

"CAUTION - MERCURY, METALLIC-
Highly Toxic by Inhalation."

The sign should also state that, in the event of a fire, special protective gear should be worn and special procedures should be followed.

According to the Material Safety Data Sheet for mercury, recommended extinguishing media for fighting a fire include regular dry chemicals, carbon dioxide, water, and regular foam. For larger fires, regular foam or flooding with a fine water spray is essential. Equipping the storage facility with a dry-pipe (water supply) fire suppression system, as well as emergency response equipment, is recommended. If the fire is confined to a given space, the mercury storage containers should be moved away from the fire, using utmost precaution. After the fire is out, the mercury storage containers may need to be treated with

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[10] As noted above, ten percent additional volume (or approximately 250 milliliters of headspace) should be adequate to accommodate the expansion of the mercury in a 76 pound flask up to its boiling point. At temperatures above 356.9 °C (mercury's boiling point), mercury's vapor pressure exceeds atmospheric pressure; if the pressure causes a tightly sealed mercury flask to be breached, gas phase mercury will be released.

[11] A plane crash could expose a facility to a fire. Locating a storage warehouse away from airports can minimize the risk from accidental crashes.

a water spray until they are sufficiently cooled. It is important to work with the local fire department to ensure that they are sufficiently informed, trained, and equipped to handle such fires.

Fire extinguishing media and other wastes generated in cleaning up after a fire that involves mercury may be contaminated with mercury. Therefore, appropriate personal protective equipment should be used during such cleanups. Any wastes generated from extinguishing such a fire should be presumed to contain hazardous levels of mercury and should be managed accordingly. Alternatively, representative samples of the fire extinguishing wastes can be analyzed by a laboratory to determine if they are, in fact, hazardous. If they are found not to be hazardous, the wastes may be disposed of accordingly.

4. Audits

Periodically, surprise facility audits should be conducted to ensure the established best management practices are being correctly implemented. In addition, the operations at the facility should be reviewed annually to ensure all the BMPs are being followed and to evaluate the need for additional, more stringent practices.

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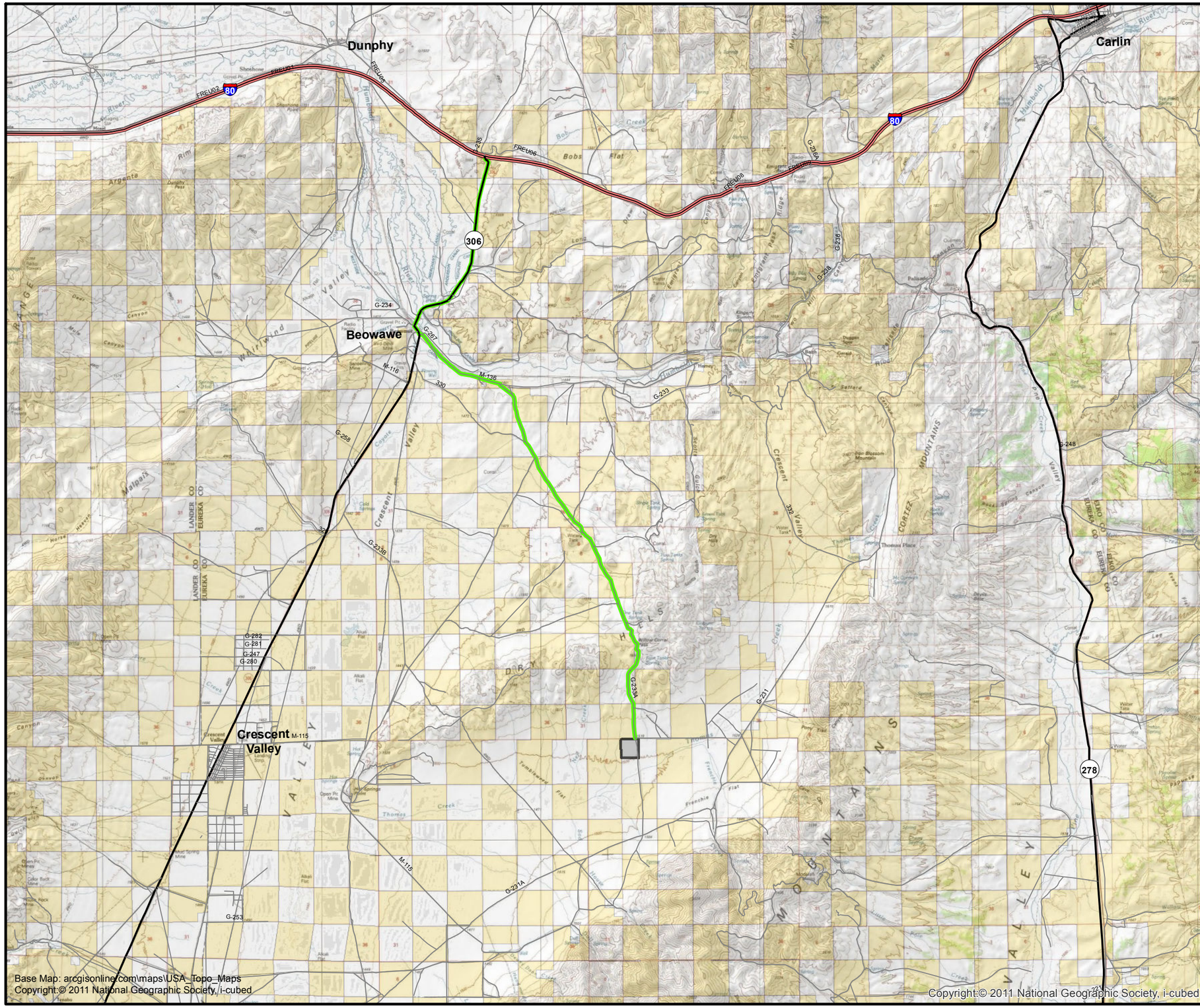
APPENDIX 10-A

Figures

This document is for reference purposes only and should not be used as a legal document. JBR makes no guarantees to the accuracy of the data contained herein or any loss resulting therefrom.



Legend

- Site T29N R50E Sec. 5 NW/4
- Access Route

Roads

- Interstate
- State Route
- Gravel/Dirt

Land Ownership

- BLM
- State
- Private

N

2 0 2 Miles

PRECIOUS METALS RECOVERY LLC

FIGURE 10.1-1
SITE ACCESS

JBR

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CP	10/30/2012
SCALE	
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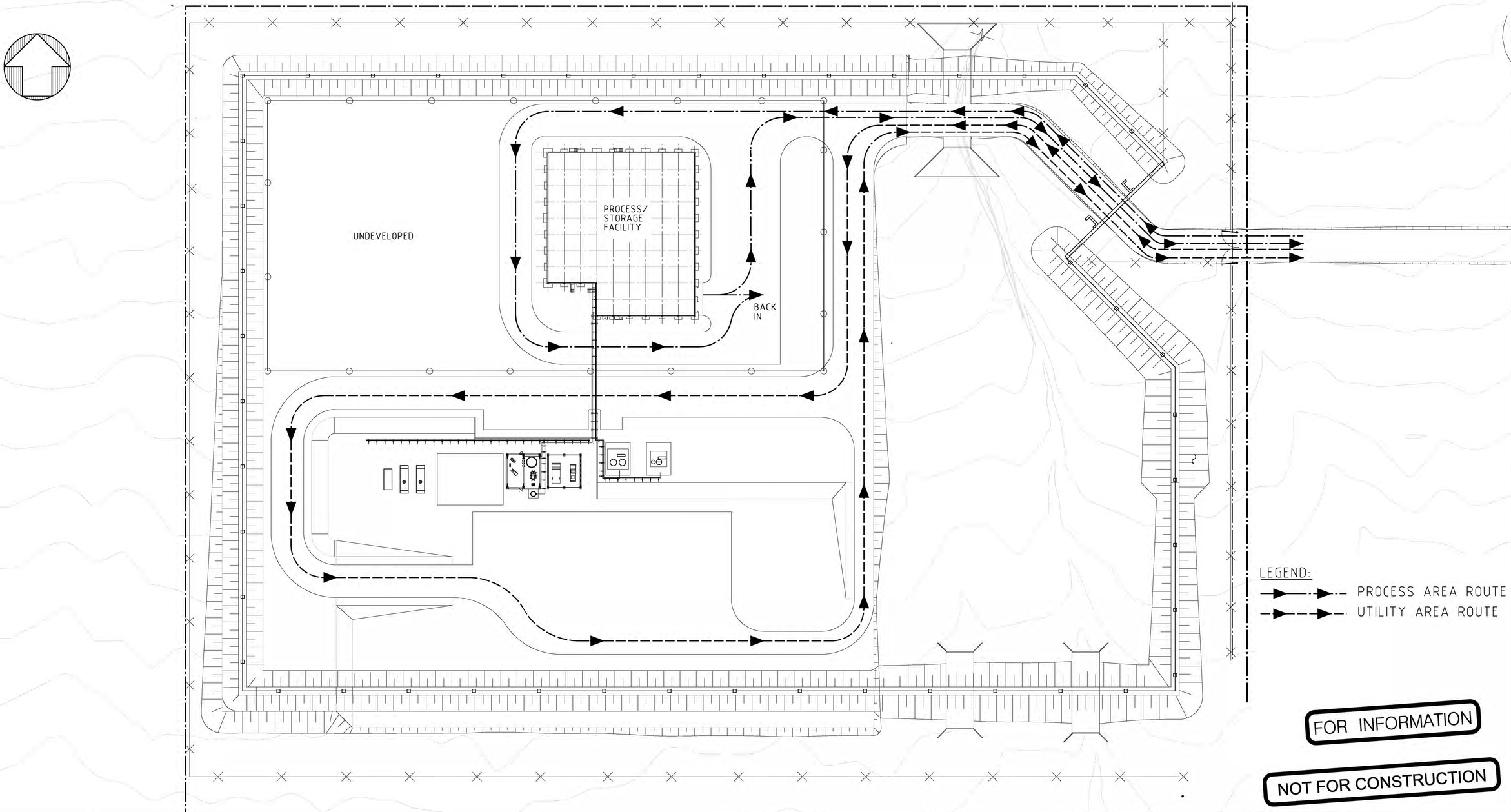


DRAWING NO.	DRAWING TITLE
REFERENCE DRAWINGS	

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE
REVISIONS					

REV.	ISSUE FOR	AUTH. BY		DATE
B	PERMIT INFORMATION	RF	SS	2012-12-14
A	PERMIT INFORMATION	RF	SS	2012-11-15
ISSUE AUTHORIZATION				

HATCH™

DESIGNED BY J. CHALMERS DATE 2012-11-15	DRAWN BY D. ROTH DATE 2012-11-15
CHECKED BY J. CHALMERS DATE 2012-11-15	DISCIP. ENGR. R. FUKUZAWA DATE 2012-11-15
PROJ. DES. COORD. J. CHALMERS DATE 2012-11-15	PROJ. ENGR. S. SENNIK DATE 2012-11-15
PROJ. MGR. M. SUCHARDA DATE 2012-11-15	

PRECIOUS METALS RECOVERY LLC

PRECIOUS METALS RECOVERY LLC
DRY HILLS FACILITY PROJECT

DRY HILLS FACILITY
TRAFFIC FLOW DIAGRAM

SCALE 1" = 60' OR AS NOTED

DWG. NO. H340940-0000-07-015-0004

REV. B

APPENDIX 11-A

COD Issuance Letter

ndep
NEVADA DIVISION OF ENVIRONMENTAL PROTECTION
protecting the future for generations

STATE OF NEVADA
Department of Conservation & Natural Resources
DIVISION OF ENVIRONMENTAL PROTECTION

Brian Sandoval, Governor
Leo M. Drozdoff, P.E., Director
Colleen Cripps, Ph.D., Administrator

October 8, 2012

Mr. Jesse R. Toepfer
Project Manager, Regional Projects Group
Precious Metals Recovery, LLC
460 West 50 North, Suite 500
Salt Lake City, UT 84101

RE: Issuance of ***Certificate of Designation*** for Precious Metals Recovery, LLC - Proposed Hazardous Waste Management Facility – Crescent Valley, Eureka County, Nevada

Dear Mr. Toepfer:

The Nevada Division of Environmental Protection has completed review of the application, as completed with the final submission on September 13, 2012, to obtain a *Certificate of Designation* for a proposed mercury storage and treatment facility, submitted by Precious Metals Recovery, LLC (PMR), a fully owned subsidiary of Barrick Gold of North America. The application is determined to be complete in regards to complying with the criteria set forth in the Nevada Administrative Code (NAC) 444.8458, which includes the facility siting criteria in accordance with NAC 444.8456.

As authorized by the NAC, a ***Certificate of Designation*** is hereby issued to Precious Metals Recovery, LLC for the proposed Resource Conservation and Recovery Act (RCRA) mercury storage and treatment facility as described in the application at the proposed location on private property in Crescent Valley, Eureka County, Nevada.

This Certificate allows Precious Metals Recovery LLC to proceed with a RCRA permit application for the proposed hazardous waste management facility. Please note that this Certificate does not authorize any construction activities for the RCRA facility.

Be advised that pursuant to NAC 444.980, this decision may be appealed to the State Environmental Commission by filing a request within 10 days on ***Form 3*** (attached) with the State Environmental Commission, 901 South Stewart Street, Suite 4001, Carson City, Nevada 89701-5249.

If you have any specific questions or if I can be of any other assistance, you may contact me directly by phone at (775) 687-9465 or by e-mail at mleigh@ndep.nv.gov.; or Sree Kailash at (775) 687-9471 or e-mail skailash@ndep.nv.gov .

Sincerely,

M. Leigh

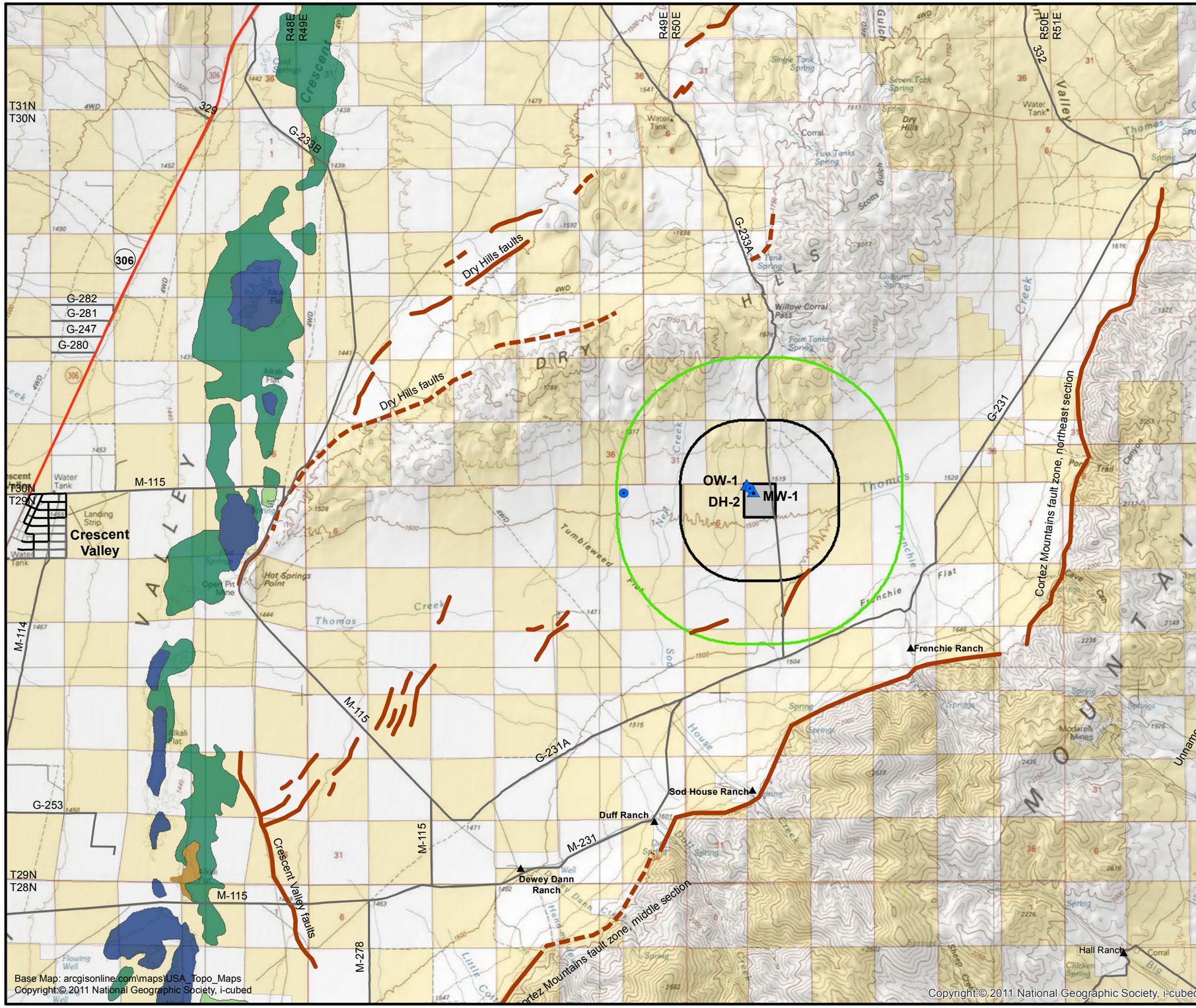
Mike Leigh, P.E.
Supervisor, RCRA Facilities Branch
Bureau of Waste Management

ML:SK:dm

Encl.: Form 3

ec: Eric Noack, Chief, Bureau of Waste Management
Sree Kailash, RCRA Facilities Branch, NDEP-BWM
Patrick Malone, Barrick Gold, Salt Lake City, Utah vie email at: pmalone@barrick.com
Rachel Shilton, JBR Environmental, Sandy, Utah via email at: rshilton@jbrenv.com

APPENDIX 11-B
Figures



Legend

- Site T29N R50E Sec. 5 NW/4
- 1 Mile Buffer
- 2 Mile buffer
- Water Well
- JBR Wells

Wetlands

- Freshwater Emergent Wetland
- Freshwater Forested/Shrub Wetland
- Lake
- Other

Quaternary Faults

- Well constrained
- Moderately constrained

Roads

- State Highway
- Road, dirt/gravel

Drainage

- Artificial Path
- Canal Ditch
- Connector
- Intermittent Stream
- Perennial Stream

Land Ownership

- BLM
- State
- Private

N

2 1 0 2 Miles

Data Sources
Water Well Data: State of Nevada Division of Water Resources (http://water.nv.gov/data/welllog/index.cfm)
Fault Data: USGS Geologic Hazards Science Center (http://geohazards.usgs.gov/qfaults/nv/Nevada.php
Wetland Data: U.S. Fish and Wildlife Service National Wetlands Inventory (http://www.fws.gov/wetlands/)

PRECIOUS METALS RECOVERY LLC

FIGURE 11.3-1
SITE MAP, WELL LOCATIONS, FAULTS, WETLANDS, AND LAND OWNERSHIP

JBR

DRAWN BY	DATE DRAWN
CP	10/30/2012
SCALE	
1:100,000	

This document is for reference purposes only and should not be used as a legal document. JBR makes no guarantees to the accuracy of the data contained herein or any loss resulting therefrom.

Path: M:\STATES\NV\Clients\Barrick\Precious_Metals_Recovery\RCRA\Fig 11.3-1 SiteMap_LandOwnership_Faults_wetlands.mxd

Crescent Valley Dean Ranch Nevada

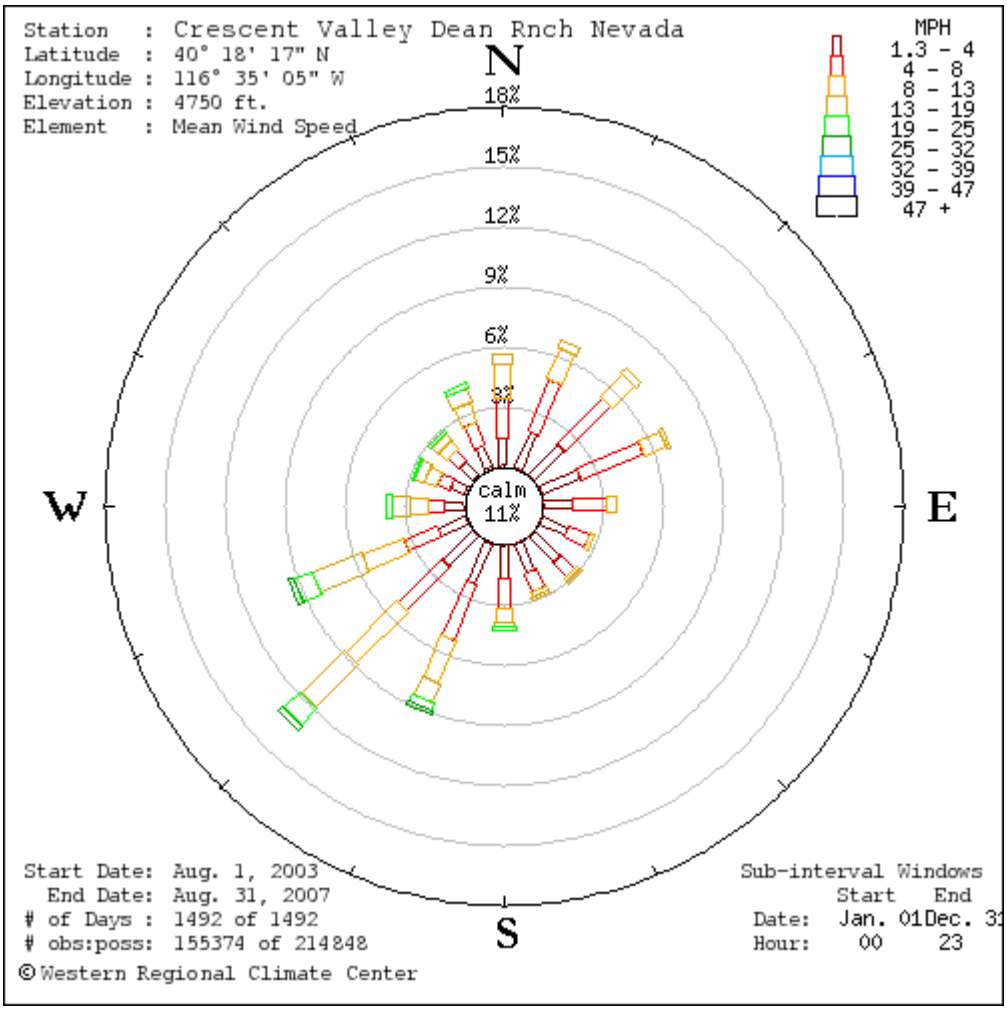
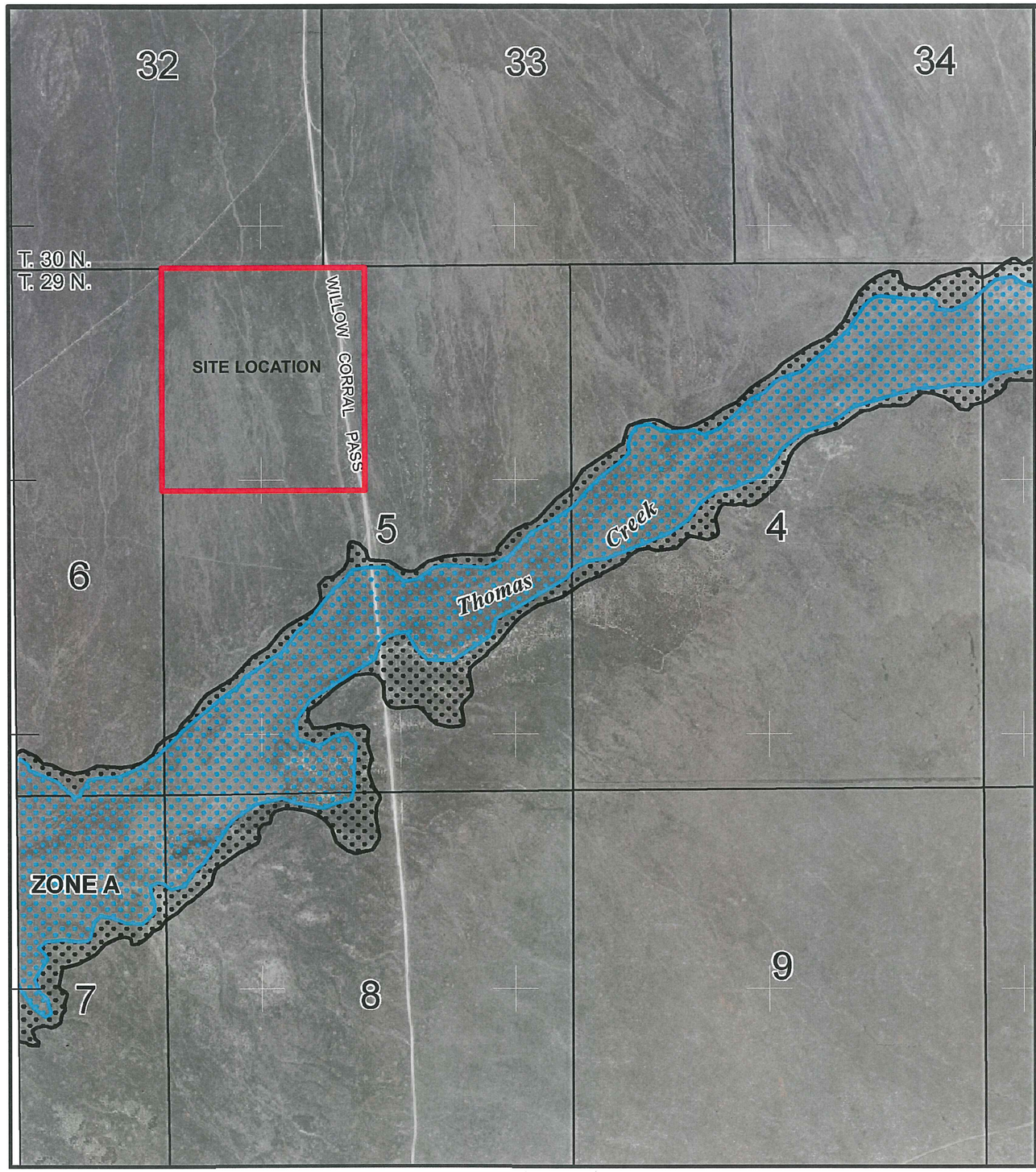


Figure 11.5-1 Crescent Valley Wind Rose

This document is for reference purposes only and should not be used as a legal document. JBR makes no guarantees to the accuracy of the data contained herein or any loss resulting therefrom.

Path: M:\STATES\NV\Clients\Barrick\Precious_Metals_Recovery\RCRA\Fig 11.12-1 Firm Panel 0600D.mxd



MAP SCALE 1" = 2000'

000 0 2000 4000 FEET

METE

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0600D

FIRM

FLOOD INSURANCE RATE MAP

EUREKA COUNTY, NEVADA

ALL JURISDICTIONS

PANEL 600 OF 2300

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
EUREKA COUNTY	320028	0600	D

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
32011C0600D

EFFECTIVE DATE
May 16, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

FLOODWAY AREAS

ZONE A — The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachement so that the 1% annual cance flood can be carried without substantial increases in

OTHER FLOOD AREAS

ZONE X — Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual channel flood.

PRECIOUS METALS RECOVERY LLC

FIGURE 11.2-1
FIRM PANEL 0600D

JBR

DRAWN BY	DATE DRAWN
CP	12/3/2012

SCALE: As Shown

APPENDIX 11-C
Legal Description

LEGAL DESCRIPTION OF RCRA FACILITY

PMR has selected a suitable site on the Dean Ranch in the Crescent Valley, located in the northwest quarter of Range 50 East, Township 29 North, Section 5 of Eureka County, Nevada, USA.

PMR proposes to build and manage a RCRA Subtitle C hazardous waste treatment and storage facility (TSF) on a parcel of land, APN #005-530-17, that will be a permitted as a RCRA Area for the proposed TSF, and will have its own EPA ID number. This land will occupy all contiguous land between the following coordinates:

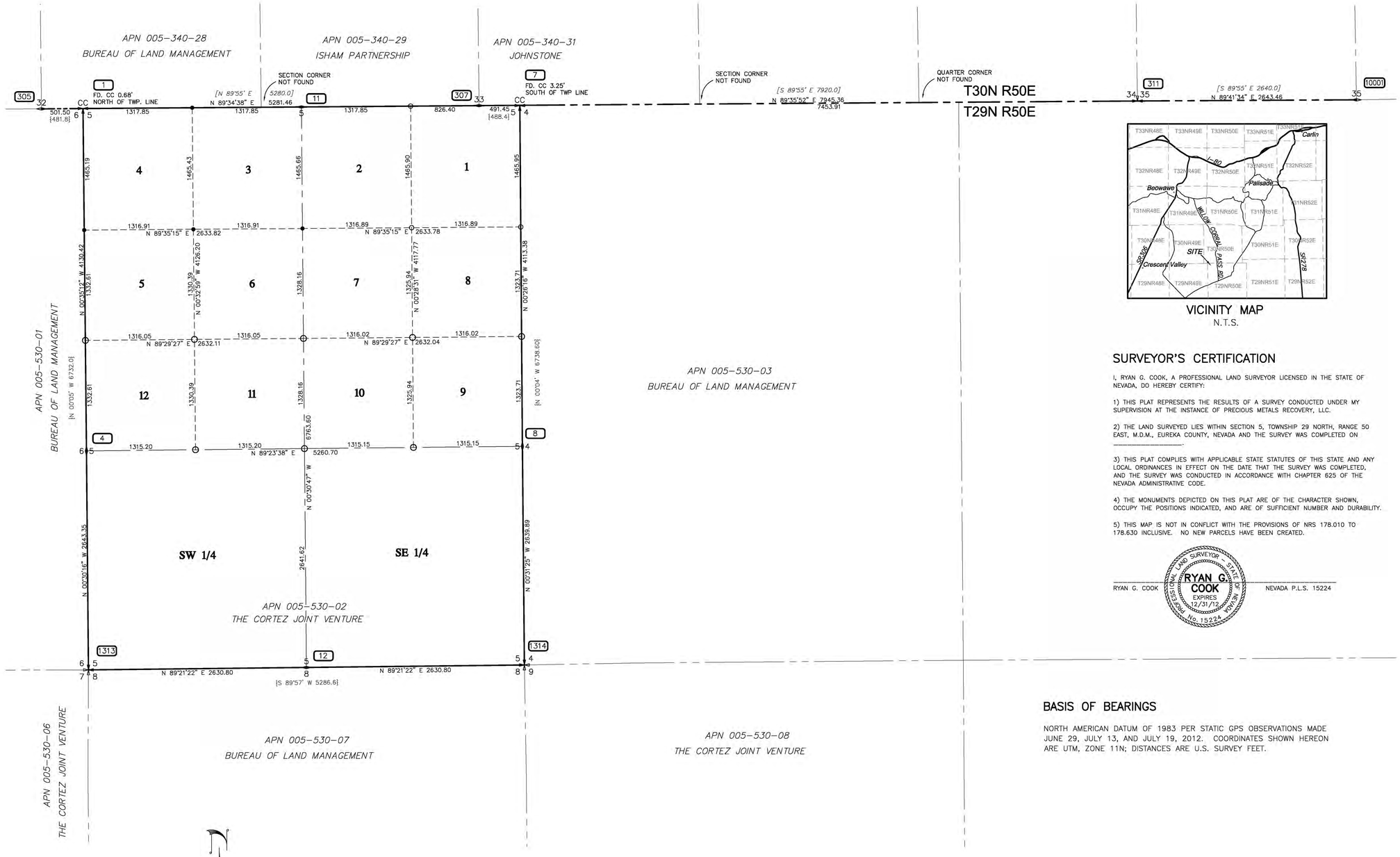
- **Northwest corner:**
  - Northing – 14,681,132.21
  - Easting – 1,816,397.44

- **Northeast corner:**
  - Northing – 14,681,132.21
  - Easting – 1,817,077.87

- **Southwest corner:**
  - Northing – 14,680,800.05
  - Easting – 1,816,397.44

- **Southeast corner:**
  - Northing – 14,680,800.05
  - Easting – 1,817,077.87

NOTE: All coordinates are given in US feet, North American Datum of 1983, UTM Zone 11.



VICINITY MAP
N.T.S.

SURVEYOR'S CERTIFICATION

I, RYAN G. COOK, A PROFESSIONAL LAND SURVEYOR LICENSED IN THE STATE OF NEVADA, DO HEREBY CERTIFY:

1) THIS PLAT REPRESENTS THE RESULTS OF A SURVEY CONDUCTED UNDER MY SUPERVISION AT THE INSTANCE OF PRECIOUS METALS RECOVERY, LLC.

2) THE LAND SURVEYED LIES WITHIN SECTION 5, TOWNSHIP 29 NORTH, RANGE 50 EAST, M.D.M., EUREKA COUNTY, NEVADA AND THE SURVEY WAS COMPLETED ON _____.

3) THIS PLAT COMPLIES WITH APPLICABLE STATE STATUTES OF THIS STATE AND ANY LOCAL ORDINANCES IN EFFECT ON THE DATE THAT THE SURVEY WAS COMPLETED, AND THE SURVEY WAS CONDUCTED IN ACCORDANCE WITH CHAPTER 625 OF THE NEVADA ADMINISTRATIVE CODE.

4) THE MONUMENTS DEPICTED ON THIS PLAT ARE OF THE CHARACTER SHOWN, OCCUPY THE POSITIONS INDICATED, AND ARE OF SUFFICIENT NUMBER AND DURABILITY.

5) THIS MAP IS NOT IN CONFLICT WITH THE PROVISIONS OF NRS 178.010 TO 178.630 INCLUSIVE. NO NEW PARCELS HAVE BEEN CREATED.

PROFESSIONAL LAND SURVEYOR — STATE OF NEVADA
RYAN G. COOK
EXPIRES 12/31/12
No. 15224

RYAN G. COOK — NEVADA P.L.S. 15224

BASIS OF BEARINGS

NORTH AMERICAN DATUM OF 1983 PER STATIC GPS OBSERVATIONS MADE JUNE 29, JULY 13, AND JULY 19, 2012. COORDINATES SHOWN HEREON ARE UTM, ZONE 11N; DISTANCES ARE U.S. SURVEY FEET.

SCALE: 1"=600'

0 600 1200 1800 2400 3000

REFERENCES

1) GLO NOTES AND PLAT OF THE SURVEY OF TOWNSHIP 29 NORTH, RANGE 50 EAST, MT. DIABLO MERIDIAN, APPROVED APRIL 14, 1902.

2) GLO NOTES AND PLAT OF THE SURVEY OF TOWNSHIP 30 NORTH, RANGE 50 EAST, MT. DIABLO MERIDIAN, APPROVED OCTOBER 14, 1874.

TOTAL AREA SURVEYED: 817.37± AC.

LEGEND

●	SET 5/8" REBAR WITH CAP PLS 15224
5 4 / 8 9	FOUND/SET SECTION CORNER AS DESCRIBED ON SHEET 2
5 4	FOUND/SET QUARTER CORNER AS DESCRIBED ON SHEET 2
○	COMPUTED POINT – NOTHING FOUND OR SET
4	GOVERNMENT LOT NUMBER
(4)	POINT NUMBER INDICATOR, REFER TO SHEET 2 FOR MONUMENT DESCRIPTIONS
{488.4}	RECORD PER R-1
[2640.0]	RECORD PER R-2

RECORD OF SURVEY
OF
Section 5
Township 29 North, Range 50 East, MDM
FOR
PRECIOUS METALS RECOVERY, LLC

EUREKA COUNTY — NEVADA

N:\DWGS\12586_BarrickPMR\Survey\Barrick_PMR_ROS.DWG ~ 5:08 PM * 25-JUL-2012

SUMMIT ENGINEERING CORPORATION
5405 MAE ANNE AVENUE, RENO, NV. 89523
PHONE: (775) 747-8550 FAX: (775) 747-8559

SHEET 1 OF 2

MONUMENT DESCRIPTIONS

1	CLOSING CORNER COMMON TO SECTIONS 5 AND 6, T29N, R50E, MDM. FOUND 15"X10"X6" STONE LYING ON SIDE WITH "CC" SCRIBED ON SOUTH FACE AND 5 NOTCHES ON TOP SIDE. FOUND METAL "T" POST 1.0' EAST OF STONE. TIED TOP CENTER HIGH POINT OF STONE AS FOUND. CLOSING CORNER IS 0.68' NORTH OF THE TOWNSHIP LINE AND THE COMPUTED POSITION FOR THE NW CORNER OF SECTION 5. SET 5/8" REBAR WITH YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" AT INTERSECTION POSITION.
4	QUARTER SECTION CORNER COMMON TO SECTIONS 5 AND 6, T29N, R50E, MDM. FOUND 12"X10"X8" STONE 0.6' OUT OF GROUND WITH "1/4" SCRIBED ON WEST FACE. FOUND 5/8" REBAR WITH NO I.D. TOUCHING SOUTH EDGE OF STONE, 0.30' SOUTH OF CENTER OF STONE. FOUND METAL "T" POST 1.2' SOUTH OF STONE. PLACED YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" ON FOUND REBAR.
7	CLOSING CORNER COMMON TO SECTIONS 4 AND 5, T29N, R50E, MDM. FOUND 14"X7"X5" STONE WITH 4 NOTCHES ON NORTH SIDE. FOUND 5/8" REBAR WITH NO ID 0.5' EAST OF CENTER OF STONE. PLACED YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" ON FOUND REBAR. CLOSING CORNER IS 3.25' SOUTH OF THE TOWNSHIP LINE AND THE COMPUTED POSITION FOR THE NE CORNER OF SECTION 5. SET 5/8" REBAR WITH YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" AT INTERSECTION POSITION.
8	QUARTER SECTION CORNER COMMON TO SECTIONS 4 AND 5, T29N, R50E, MDM. FOUND 18"X18"X12" STONE 0.5' OUT OF GROUND WITH NO VISIBLE SCRIBE MARKS. FOUND 5/8" REBAR WITH NO I.D. TOUCHING SOUTH EDGE OF STONE, 0.30' SOUTH OF CENTER OF STONE. PLACED YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" ON FOUND REBAR.
11	NORTH QUARTER CORNER FOR SECTION 5, T29N, R50E, MDM. NOTHING FOUND. PER FIELD NOTES OF GLO SURVEY, NO MONUMENT WAS ORIGINALLY SET. USING SINGLE PROPORTIONATE MEASUREMENT, SET 5/8" REBAR WITH YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" ON TOWNSHIP LINE AT MID-POINT BETWEEN COMPUTED POSITIONS FOR THE NORTHWEST AND NORTHEAST SECTION CORNERS OF SECTION 5.
12	QUARTER CORNER COMMON TO SECTIONS 5 AND 8, T29N, R50E, MDM. NOTHING FOUND. USING SINGLE PROPORTIONATE MEASUREMENT, SET 5/8" REBAR WITH YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" ON LINE AT MID-POINT BETWEEN THE SOUTHWEST AND SOUTHEAST SECTION CORNERS OF SECTION 5.

305	SOUTH QUARTER CORNER FOR SECTION 32, T30N, R50E, MDM. FOUND 10"X6"X11" GRANITE STONE WITH "1/4" SCRIBED ON TOP, LEGIBLE LOOKING SOUTH. SET 5/8" REBAR WITH YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" AT LOCATION OF CENTER OF STONE; PLACED STONE 0.5' TO THE WEST.
307	SOUTH QUARTER CORNER FOR SECTION 33, T30N, R50E, MDM. FOUND 9"X7"X12" GRANITE STONE WITH "1/4" SCRIBED ON TOP, LEGIBLE LOOKING NORTHWEST. SET 5/8" REBAR WITH YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" AT LOCATION OF CENTER OF STONE; PLACED STONE 0.5' TO THE WEST.
311	SECTION CORNER COMMON TO SECTIONS 34 AND 35, T30N, R50E, MDM. FOUND 10"X6"X19" STONE LYING ON SIDE WITH 4 GROOVES ON TOP, LEGIBLE LOOKING NORTH, AND TWO GROOVES ON BASE. SET 5/8" REBAR WITH YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" AT SOUTH END OF STONE; PLACED STONE 0.5' TO THE WEST.
1313	SECTION CORNER COMMON TO SECTIONS 5, 6, 7 AND 8, T29N, R50E, MDM. FOUND 15"X12"X6" STONE WITH 5 NOTCHES ON WEST FACE AND 5 NOTCHES ON SOUTH FACE. FOUND 5/8" REBAR WITH NO IDENTIFICATION NEXT TO STONE. PLACED YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" ON FOUND REBAR.
1314	SECTION CORNER COMMON TO SECTIONS 4, 5, 8 AND 9, T29N, R50E, MDM. FOUND 20"X13"X5" STONE WITH 4 NOTCHES ON WEST FACE AND 5 NOTCHES ON SOUTH FACE. FOUND 5/8" REBAR WITH NO IDENTIFICATION NEXT TO STONE AT FENCE CORNER. PLACED YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" ON FOUND REBAR.
1000	SOUTH QUARTER CORNER FOR SECTION 35, T30N, R50E, MDM. FOUND 10"X8"X12" GRANITE STONE WITH "1/4" SCRIBED ON NORTH FACE, LEGIBLE LOOKING SOUTH. SET 5/8" REBAR WITH YELLOW PLASTIC CAP STAMPED "SUMMIT ENGINEERING", "PLS 15224" AT LOCATION OF CENTER OF STONE; PLACED STONE 0.5' TO THE WEST.

PROFESSIONAL LAND SURVEYOR
RYAN G. COOK
EXPIRES 12/31/12
No. 15224
STATE OF NEVADA

RECORD OF SURVEY
OF
Section 5
Township 29 North, Range 50 East, MDM
FOR
PRECIOUS METALS RECOVERY, LLC

EUREKA COUNTY NEVADA

N:\DWGS\29586_BarrickPMR\Survey\Barrick_PMR_ROS.DWG ~ 5:09 PM * 25-JUL-2012

SUMMIT™ ENGINEERING CORPORATION
5405 MAE ANNE AVENUE, RENO, NV. 89523
PHONE: (775) 747-8550 FAX: (775) 747-8559

SHEET 2 OF 2

INVOICE

Office of Eureka County Recorder

Eureka County Courthouse
P.O. Box 556
Eureka, Nevada 89316

Phone (775) 237-5263
Fax (775) 237-5614

10366

2/7/13

TO: Melanie Lawson

DESCRIPTION	AMOUNT
FEE FOR RECORDING, FILING OR COPYING THE FOLLOWING INSTRUMENTS:	
Recording fee	21.00
c/c fee	1.00
c/c	
TOTAL	22.00

NEVADA LAWS REQUIRE PAYMENT OF ALL FEES IN ADVANCE.
PLEASE MAKE CHECKS PAYABLE TO "EUREKA COUNTY RECORDER."

EDFP#1701 - 7/7/09

APPENDIX 12-A

Personnel Training Plan

TABLE OF CONTENTS

1 PERSONNEL TRAINING PLAN 1

2 TRAINING PROGRAM OUTLINE - 40 CFR 270.14(b)(12) & 264.16(a)(1) 1

3 ON-SITE TRAINING - 40 CFR 264.16(a)(2) 2

4 TRAINING FOR EMERGENCIES - 40 CFR 264.16(a)(3) 2

5 OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) - 40 CFR 264.16(a)(4) & 264.16(c) 2

6 RECORDKEEPING - 40 CFR 264.16(d) 3

7 PERSONNEL TRAINING PLANS - 40 CFR 264.16(d) 3

8 ENVIRONMENTAL AWARENESS TRAINING - 40 CFR 264.16(d) 5

9 SPILL PREVENTION AND EMERGENCY RESPONSE TRAINING 5

10 HAZARDOUS WASTE/MATERIALS TRAINING 6

1 PERSONNEL TRAINING PLAN

This training plan has been developed for personnel who will be employed and contracted to work at the proposed mercury Treatment and Storage Facility (TSF). The training of personnel is essential to the efficient operation of the facility and the protection of human health and the environment. This training plan will be implemented for those individuals whose job descriptions require they handle or manage hazardous materials and hazardous wastes. Contractors will be required to attend training before performing work at the proposed TSF, and new employees will be required to attend training within six months of their date of hire (as per OSHA requirements, 29 CFR 1910.120). Annual refresher training will be required thereafter to all applicable personnel.

Personnel lacking the specified training will not be allowed to work unsupervised until completing the required training. The training will focus in detail on areas directly related to the management of hazardous waste and spill response measures. The manager of the proposed TSF will direct the training. The type and quantity of training given to each employee will be relevant to the employee's job tasks and hired position. The training plan will include classroom instruction, individual study of operating procedures, and on-the-job training.

The training plan will be written in accordance with company policy and the regulatory requirements of 40 CFR 264.16 and 40 CFR 270.14(b)(12).

2 TRAINING PROGRAM OUTLINE - 40 CFR 270.14 (b)(12) & 264.16(a)(1)

The purpose of this Training Program is to ensure the safe operation and maintenance of hazardous waste areas. The training will take place primarily at the proposed TSF. Some training may take place off-site if the manager of the proposed TSF determines the employee(s) would receive better training in an alternate classroom environment. Such off-site training might include the required OSHA 1910.120 Hazardous Materials (HAZMAT) training, joint training exercises with local emergency response organizations, classes offered at local schools, and by equipment suppliers. Each training element in the training plan will be designed to ensure that all workers at the facility are properly trained in the procedures relevant to the positions in which they are employed. Personnel will <u>not</u> be allowed to work in unsupervised areas until they have successfully completed the appropriate level of training for their positions and responsibilities.

Course content for all personnel training activities will be reviewed at least annually and updated as required to keep materials current with hazardous waste management regulations and practices. Alternative training (e.g., paper-based self study courses and web-based training) may be taken to meet specific training requirements. Files listing the requisite skills, education, and training for workers and their duties and responsibilities for each job descriptions, as well as the

name of each worker filling a job description will be maintained by the manager of the proposed TSF.

3 ON-SITE TRAINING - 40 CFR 264.16(a)(2)

The training plan will be directed by the manager of the proposed TSF, who will be trained in hazardous waste management procedures, the operation of the facility, and emergency procedures, and is responsible for coordinating training courses. The on-site training will include an overview of state and federal hazardous waste management regulations, and will emphasize compliance with the applicable RCRA requirements.

4 TRAINING FOR EMERGENCIES - 40 CFR 264.16(a)(3)

Employees will be made familiar with the Chemical Accident Prevention Program (CAPP) requirements, Emergency Procedures, Contingency Plan, and the Waste Analysis Plan. Employees will be trained to respond effectively to emergencies and familiarized with emergency procedures, emergency equipment, and emergency systems including:

- Procedures for using, inspecting, repairing, and replacing facility emergency and monitoring equipment
- Use and limitations of personal protective equipment (PPE)
- Key parameters for automatic system shutdowns
- Communications and alarm systems
- Response to fires and explosions
- Response to contamination incidents
- Shutdown of operations

5 OCCUPATIONAL SAFETY AND HEALTH ADMINISTRATION (OSHA) - 40 CFR 264.16(a)(4) & 264.16(c)

Employees will be required to receive emergency response training pursuant to 29 CFR 1910.120(p)(8) and 1910.120(q). All employees will complete their 40-Hour HAZMAT training, and the required 8-hour annual refresher.

6 RECORDKEEPING - 40 CFR 264.16(d)

Recordkeeping is further discussed in Section 9 of the Part B RCRA Permit Application.

The following records will be maintained at the proposed TSF:

- The job title for each position and the name of the employee filling each job.
- A written job description for each position.
- A written description of the type and amount of both introductory and continuing training that will be given to each person filling a position.
- Records that document the training or job experience required under RCRA.
- All records that have been given to and completed by facility personnel.

Training records of current employees will be kept until closure of the proposed TSF. Training records of former employees will be kept for at least three years from the date the employee last worked at the proposed TSF.

7 PERSONNEL TRAINING PLANS - 40 CFR 264.16(d)

Training will include the following information:

- The effect that personal performance has on health, safety, and the environment.
- Workers' roles and responsibilities in achieving compliance with the proposed TSF's environmental policies and obligations.
- Potential consequences of deviating from specific procedures.
- Detailed descriptions of material hazards, toxicity, routes of exposure, engineering controlled systems, and proper operation of such systems.
- Demonstrations and drills (classroom and on-the-job training) addressing emergency procedures and exposure minimization techniques.

Personnel Training Plans - General Training - 40 CFR 264.16(d)

General Training (GT) will establish and maintain procedures to ensure employees, contractors, and subcontractors at each level of responsibility are subject to GT, task specific training, and

refresher training. GT addresses the specific hazards inherent to the proposed TSF's processes including, but not limited to the following:

- New hire orientation.
- Barrick Environmental and Safety Policies.
- Site orientation.
- General risk identification.
- Emergency actions.
- Code of conduct.
- Workplace hygiene.
- Periodic lectures to provide refresher information on the environment, hygiene, and safety.

Personnel Training Plans - Task Specific Training - 40 CFR 264.16(d)

Task specific training will be provided for each separate activity. All operators responsible for managing HAZMAT and/or hazardous waste in addition to personnel responsible for emergency response will receive the appropriate training for dealing safely and effectively with these activities.

Applicable training requirements include hazard communication (29 CFR 1910.120), emergency action, preparedness, and prevention, which involve training in the physical and health hazards of chemicals in the work area. Protective measures including work practices and personal protective equipment, an explanation of labeling systems, and Material Safety Data Sheets (MSDS) will also be taught.

Safety and health hazards training is also required which can include training on:

- Confined space entry.
- Lock Out-Tag Out.
- Respirator use.
- PPE.
- Powered vehicles.
- Fall protection.

- Working with toxic chemicals: mercury and mercury-bearing materials, nitrogen, oxygen, caustics (e.g., hydrochloric acid, sodium hydroxide), and fuels.
- Emergency response.

Personnel Training Plans- Project Management - 40 CFR 264.16(d)

The training requirements will also include training for managers and supervisors to ensure they understand the Contingency Plan and the Environmental Management System (EMS), are aware of their responsibilities, and have the appropriate knowledge to carry out these responsibilities.

8 ENVIRONMENTAL AWARENESS TRAINING - 40 CFR 264.16(d)

All employees and contractors performing regular or routine work at the facility will be required to attend environmental awareness training. The purpose of the environmental awareness training is to promote shared environmental values and to clearly identify accountability and responsibility for waste management. This training includes:

- An understanding of hazardous substances and the risks associated with a release.
- An understanding of the potential outcomes associated with an emergency created when hazardous substances are present.
- The ability to recognize and identify the presence of hazardous substances in an emergency.
- An understanding of the notification responsibilities when materials are observed outside of normal process conditions.

9 SPILL PREVENTION AND EMERGENCY RESPONSE TRAINING

This training will provide employees and contractors with a detailed overview of the spill prevention response procedures and hazardous waste/materials management. In addition, employees and contractors will be provided with information on storage areas for spill prevention and response equipment. The procedures outlined in the following plans will provide:

- Emergency preparedness and response management.
- Preparedness and prevention.
- Hazardous materials/waste contingency.

At least two personnel trained for spill response will be present on site during normal operations. All personnel will be trained and familiar with emergency and spill response resources, including equipment location and access, spill contingency, and appropriate emergency spill response

procedures. Emergency/spill response training will be conducted annually, and will consist of at least the following topics:

- Emergency response.
- Contingency Plan.
- Emergency alerting/notification and response procedures.
- Emergency equipment.
- Pre-emergency planning.
- Communications and alarm systems.
- Standard operating procedures for using, inspecting, repairing and replacing facility emergency and monitoring equipment.
- Key parameters for automatic system shutdowns.
- Response to environmental incidents.
- Review of fire and explosion hazards.
- Chemical characteristics of wastes, including: chemical and biological hazards, principles of toxicology, routes of exposure, required engineering controls, and environmental risks.
- Types and limitations of PPE, including review and practice with PPE in addition to annual respirator fit testing.
- Proper operation of industrial trucks and other machinery (1910.178(l)).
- Basic first aid.

10 HAZARDOUS WASTE/MATERIALS TRAINING

This training will include information on workplace hazardous waste, HAZMAT, and transportation of dangerous goods for all employees that use or are responsible for chemicals on site.

Additional safe chemical handling training will be conducted for employees handling or working in the vicinity of materials such as: nitrogen, oxygen, acids, bases, fuels, etc. Retraining on hazardous waste and materials management topics will occur annually, and retraining for transportation will be completed every two years.

All employees will be required to attend 40-hour Hazardous Waste Operations and Emergency Response (HAZWOPER) training or equivalent, and an annual 8-hour refresher course. In addition to the 40-hour training, all employees will receive response training to become familiarized with the spill response resources. Training includes knowledge of the resources (manpower, equipment, and supplies), locations and appropriate use of spill response measures. This training will comply with OSHA 1910.120 HAZWOPER training requirements.

Emergency Medical Technician

At least one Emergency Medical Technician (EMT) will be on-site during the proposed TSF's normal working hours.

Hazardous Waste Storage Operators

Operators are responsible for ensuring that the hazardous waste storage areas are in compliance with all applicable health, safety, and environmental laws, regulations, and policies. They are also responsible for carrying out the appropriate immediate actions in the event of an emergency.

The operators are required to conduct and document daily, weekly, and monthly inspections. The training will include, at a minimum, the RCRA hazardous waste accumulation and satellite accumulation (40 CFR 262.34(a)(4) and 262.34 (c), and 273.16) requirements.

Hazardous Waste Operators

As required in 40 CFR Part 262 Subpart C Transportation Requirements and 49 CFR 172.704, initial training will include a class overview of RCRA and Department of Transportation (DOT) requirements.

Specialized Training

Additional specialized training will be necessary for working in specific areas that require specialized knowledge regarding waste management activities. Some of these topics include equipment usage, warehouse/storage, transportation, removal of contaminated soils, and laboratory waste management.

Staff involved with waste handling will be trained in the safe operation of these items. The specialized training programs will be identified and developed by the manager of the proposed TSF.

Refresher Training

Following general and task-specific training, refresher training will be provided at least annually and as needed to cover new procedures or related changes. Employees will be kept informed of regulatory changes which impact their responsibilities. Training modules for employees of the

proposed TSF and contractors will be developed to ensure this continuing education. Where on-site training is not adequate or available, out-sourced training will be utilized.

APPENDIX 13-A

Closure Plan

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1 CLOSURE PLAN

This Closure Plan has been developed for the proposed mercury Treatment and Storage Facility (TSF), proposed to be built by Precious Metals Recovery LLC (PMR), and will be named the Dry Hills Facility.

The proposed TSF will be located in Eureka County, approximately 40 miles west of Elko, Nevada and 12 miles east of the town of Crescent Valley. It will be located in the northwest corner of Section 5, Township 29 North, Range 50 East, Mount Diablo Meridian, in an unincorporated area of Eureka County.

The proposed TSF will be permitted as a Resource Conservation and Recovery Act (RCRA) Subtitle C hazardous waste management unit. The RCRA-permitted area will occupy approximately 5 acres of contiguous land, whereupon a totally enclosed structure is proposed to be constructed wherein mercury and mercury-bearing materials (i.e., hazardous waste) may be treated and managed. No hazardous waste will be treated, stored, or managed outside of the RCRA-permitted area.

The building, referred to as the "proposed TSF Building" will occupy approximately 34,000 square feet, and is designed to treat, store, and manage mercury and mercury-bearing materials as described throughout Section 1 of the Part B RCRA Permit Application.

The proposed TSF location along with its support buildings and non-RCRA storage tanks are illustrated on drawings in Appendix 1-A of the permit application.

This Closure Plan was prepared in accordance with the requirements of 40 CFR 270.14(b)(13), 264.111, 264.112, 264.113, 264.118, 264.178, 264.197, and 264.603. Clean closure is planned for the proposed TSF. Clean closure will be accomplished by removal of all hazardous waste units and waste from the site. The Closure Plan assumes a conservative scenario where maximum waste inventory is stored on-site and a third party contractor is hired to conduct closure. As the last stage of closure, the site will be restored to pre-disturbance conditions.

This Closure Plan addresses the demolition, removal, transport and disposal of the proposed TSF, removal and disposal of waste generated during demolition, and transfer of stored elemental mercury at the time of closure.

2 ACCESS CONTROL – 40 CFR 270.14

A description of site security is presented in Section 1.7 of the Part B RCRA Permit Application.

3 MONITORING WELLS

Groundwater monitoring is discussed in Section 20 of the Part B RCRA Permit Application.

Based on a thorough review of 40 CFR 270 and 40 CFR 264, it has been concluded that groundwater monitoring is not mandated for the proposed TSF, because no regulated land based unit is associated with the proposed TSF. Furthermore, based on a thorough review of 40 CFR

270.14(b), it has been concluded that the post-closure groundwater monitoring requirements are not applicable, because the proposed TSF is planned to be clean closed.

4 LOCATION OF SOLID WASTE MANAGEMENT UNITS – 40 CFR 264.112

The general facility layout is presented in Appendix 1-A. All processing activities and Hazardous Waste Management Units (HWMUs) will be confined within the proposed TSF Building. The site is located on undisturbed land with no history of hazardous waste or industrial activity. Solid Waste Management Units (SWMUs) are not addressed in this Closure Plan because no releases have been identified.

Management practices will be implemented to ensure inspection plans and schedules are procedurally executed to detect any release from the proposed TSF. The details of the Inspection Plan are presented in Section 4.0 of the Part B RCRA Permit Application and Appendix 4-A. Air emission monitoring will be conducted to detect a release from the common exhaust duct, as described in Section 1.2 of the Part B RCRA Permit Application. Also described in Section 1.2, are the design provisions for continuous air monitoring within the proposed TSF Building, which will be used to detect mercury vapor.

5 ROADS – 40 CFR 264.112

The access roads to the proposed TSF will not be removed at closure. Facility roads and parking areas will be demolished and removed. The area will be graded to transition into the surrounding undisturbed land.

6 BUILDINGS AND OTHER STRUCTURES – 40 CFR 264.112

The proposed TSF Building (see Appendix 1-A) will enclose the mercury process, treatment, and storage units and will accept elemental mercury and mercury-bearing materials. The process area will house a retort and oxidation treatment system and a tank leach system. Storage areas will comprise the majority of the proposed TSF Building. Elemental mercury will be stored on-site until it can be transferred to a National Repository or another appropriate location. Disposal of hazardous waste is not anticipated to occur at the proposed TSF.

The foundation, floor, walls, ceilings, and roof of the proposed TSF are all part of the proposed TSF Building envelope, described in Section 1 of the RCRA Part B Permit Application. An enclosed loading and unloading area is located inside the proposed TSF Building. Negative pressure will be maintained during the waste removal and decommissioning of the treatment systems when the proposed TSF undergoes closure.

Demolition of the storage area is not anticipated to require decontamination prior to closure unless an area has a history of a spill. Exposed surfaces will be sampled to confirm lack of contamination. Wet decontamination will be kept to a minimum to minimize the volume of liquid waste requiring management.

If there has been a release of hazardous waste to the exterior of the proposed TSF, appropriate spill response measures will be taken. Once the area has been cleaned, it will be sampled to verify that no metal concentrations in soil are in excess of preconstruction conditions. Any locations where contamination is discovered will be further investigated to identify the possible source and extent of contamination. If a reportable quantity for any constituent of concern is discovered, notification of the National Response Center and Nevada Division of Environmental Protection's Hotline will be made as soon as reasonable. Once the source and extent of contamination is determined, a corrective action plan will be formulated and implemented after consultation with regulatory agencies.

7 HEALTH AND SAFETY

Management practices at the proposed TSF will be implemented to ensure procedures for the protection of worker health and safety are followed by those involved in closure activities. For the purpose of this Closure Plan, the levels of worker protection are defined as follows:

Level B Protection

- Self contained breathing apparatus.
- Air lines and tanks.
- Steel-toe boots.
- Boot covers.
- Protective coveralls.
- Chemically resistant gloves.
- Eye protection.
- Hard hat.

Level C Protection

- Air purifying respirator and cartridges.
- Steel-toe boots.
- Boot covers.
- Protective overalls.
- Chemically resistant gloves.
- Hard hat.
- Eye Protection.

Level D protection includes the standard health and safety equipment for construction activities.

8 PARTIAL CLOSURE OF A UNIT – CFR 264.112

In accordance with 40 CFR 264.112, the steps for partial closure have been identified. Partial closure activities for a specific unit at the proposed TSF will be consistent with the closure activities for final closure. Partial closure activities will follow these general steps:

- Update Closure Plan.
- Notify NDEP of intent.
- Stop accepting waste in the unit.
- Process the waste contained in the unit.

- Empty the unit.
- Dismantle the unit.
- Stage the generated wastes for disposal.
- Execute Sampling Plan. Cut into sections, if necessary, and crush the unit.
- Stage the debris for disposal, including characterization.
- Send offsite for appropriate disposal.

9 FINAL CLOSURE – 40 CFR 264.111 AND 264.112

In accordance with 40 CFR 264.111 and 264.112, the steps for final closure have been identified. The general steps to be undertaken during final closure of the proposed TSF include:

- Update Closure Plan.
- Notify NDEP of intent.
- Stop accepting shipments.
- Process containers in storage.
- Remarket excess reagents.
- Empty tank and processing systems contents into containers.
- Dismantle tank systems.
- Process residues and generated wastes in retort, as necessary.
- Execute Sampling Plan. Remove ancillary equipment and associated piping.
- Stage wastes for disposal.
- Execute the sampling plan.
- Remove residues from the retort system.
- Close the retort system.
- Dismantle and stage for disposal.
- Demolish the TSF.
- Remove all accumulated materials from the structure.

- Remove racks.
- Clean all surfaces.
- Execute Sampling Plan.
- Demolish the interior walls.
- Remove roof and ceiling structure.
- Remove HVAC system.
- Demolish remainder of structure.
- Stage debris for disposal.
- Transport debris to appropriate facility for disposal.
- Sample soil, as necessary.
- Grade and revegetate.
- Monitor vegetation for two years.

10 NOTIFICATION OF CLOSURE – 40 CFR 264.112

In accordance with 40 CFR 264.112, at least 45 days before initiation of closure activities, PMR will notify the required regulatory agencies and will begin closure activities on a date specified in the notice. The notice will include a revised Closure Plan and a detailed schedule identifying the time frame for closing.

11 START OF CLOSURE – 40 CFR 264.112

In accordance with 40 CFR 264.112, closure of the facility will begin on the closure date specified in notification letter to the NDEP. The first steps in closure of the facility will be to stop accepting mercury-bearing waste and to begin staging of stored elemental mercury for transfer to an appropriately licensed facility. The stored inventory of mercury-bearing waste may be treated or shipped off-site prior to physical demolition of the proposed TSF Building areas. Non-essential equipment and empty storage areas may be partially closed while the inventory is being processed.

Closed storage areas may be used to stage decommissioned equipment prior to being transported for disposal.

12 DECONTAMINATION

Since the units are planned for disposal, only decontamination appropriate for the safety of the demolition crew will be conducted. Units will be emptied, dismantled into manageable sections,

and staged for either scrap or for disposal at an appropriate landfill. It is anticipated that most units at the proposed TSF will be demolition debris.

13 CONTAINER STORAGE AREAS – 40 CFR 264.178

In accordance with 40 CFR 264.178, the entire inventory of stored containers will be removed from the proposed TSF during the first stage of closure. Containers of elemental mercury will be transported to a National Repository; stored containers of mercury-bearing waste will be processed; containers of residue will be transported to an appropriate disposal site; and waste generated at the proposed TSF will be transported to an appropriate disposal site. A permitted hazardous waste transporter will be contracted to transport the wastes.

The process of closing container storage areas will follow these general steps:

- Stop accepting waste.
- Process waste currently in storage.
- Stage elemental mercury containers for transfer to an appropriately licensed facility.
- Consolidate wastes into common areas.
- Remove the spill trays and stage for disposal.
- Remove storage racks.
- As areas are emptied, conduct thorough inspections.
- Identify areas of potential contamination.

14 TANK CLOSURE PROCESS – 40 CFR 264.197

In accordance with 40 CFR 264.197, tanks will be drained of liquid. If sludge is present, it will be removed. The drained liquid, whether it is reagent or waste, will be transported to an appropriate facility for disposal. Each tank system will be dismantled into manageable sections and disposed at an appropriate disposal site. No decontamination, other than required for worker safety, will occur for tanks destined for hazardous waste disposal.

Tanks will be located within the proposed TSF in areas where secondary containment is provided. No contamination of soil from a tank system is expected at the proposed TSF.

The process of decontaminating tank systems, when necessary, will follow these general steps:

- Empty the tank.
- Flush the inside surface of each unit with a steam pressure sprayer.
- Clean outer surface of the tank with detergent.

- Wipe test both the inside and the outside surfaces.
- Test for the appropriate disposal landfill.
- Characterize rinsate and dispose of it appropriately.

15 PROCESS PIPES AND ANCILLARY EQUIPMENT – 40 CFR 264.197

In accordance with 40 CFR 264.197, pipes and ancillary equipment will be closed with the processing unit it supports. The process of decontaminating pipes and ancillary equipment, when necessary, will follow these general steps:

- Isolate and disconnect each section of a system component or pipe.
- Flush the inside surface of each section.
- Clean the outside with detergent.
- Wipe test both the inside and the outside surfaces.
- Characterize rinsate and dispose of it appropriately.
- Test for the appropriate disposal landfill.

16 PROCESSING EQUIPMENT – 40 CFR 264.601

Processing equipment includes the filter press, the oxidation unit, and the retort. These units are not included in the descriptions above.

In accordance with 40 CFR 264.601, the filter press will be closed after the last batch of waste has been processed. All remaining liquid residue and sludge will be removed. Similar to each tank system, the filter press will be dismantled into manageable sections to be transported to an appropriate disposal facility.

The oxidation unit will be closed in conjunction with the retort. Closure of the retort and associated systems will begin with continuous operation at the maximum temperature for 72 hours with an empty chamber. After 72 hours, the system will be shut down and allowed to cool. The system will be dismantled into manageable sections, and transported to an appropriate disposal facility

The process of closing the processing equipment will follow these general steps:

- Run the retort system (including oxidation unit and baghouse) at the maximum authorized temperature.
- Allow to cool.
- Dismantle the system.
- Isolate each component.

- Remove and dispose of scrubber solutions and baghouse residues.
- Test to determine appropriate disposal option.
- Unit components may be dismantled into manageable sections as necessary.

17 OTHER UNITS – 40 CFR 264.228, 264.258, 264.280, 264.310, 264.351, & 264.575

The proposed TSF is not designed to include all types of hazardous waste treatment units. Because some types of treatment, storage, or disposal units are not included in the design of the proposed TSF, no closure procedure has been developed for those units. The types of units omitted from this plan are identified below.

Surface Impoundments – 40 CFR 264.228

This section is not applicable to the proposed TSF. Surface impoundments are not included in the Closure Plan for the proposed TSF, because the design for the proposed TSF does not include surface impoundments.

Waste Piles – 40 CFR 264.258

This section is not applicable to the proposed TSF. Waste piles are not included in the Closure Plan for the proposed TSF, because the design for the proposed TSF does not include waste piles.

Land Treatment – 40 CFR 264.280

This section is not applicable to the proposed TSF. Land treatment is not included in the Closure Plan for the proposed TSF, because the design for the proposed TSF does not include land treatment.

Landfills – 40 CFR 264.310

This section is not applicable to the proposed TSF. Landfills are not included in the Closure Plan for the proposed TSF, because the design for the proposed TSF does not include landfills.

Incinerators – 40 CFR 264.351

This section is not applicable to the proposed TSF. Incinerators are not included in the Closure Plan for the proposed TSF, because the design for the proposed TSF does not include incinerators.

Drip Pads – 40 CFR 264.575

This section is not applicable to the proposed TSF. Drip pads are not included in the Closure Plan for the proposed TSF, because the design for the proposed TSF does not include drip pads.

18 PROCESS FLOORS AND BUNDING – 40 CFR 264.112

In accordance with 40 CFR 264.112, the process of closing the proposed TSF Building will follow these general steps:

- Use wet mop and a mercury vacuum to clean floors, as necessary.
- If no history of spill has occurred in the area, no further decontamination will be conducted.
- When the area is closed and while still ventilated, the floor will be demolished and disposed in an industrial landfill.
- If there has been a release in the area during operation of the proposed TSF, a core sample will be taken of the concrete in the local spill area.
- Determine appropriate disposal.

19 BUILDING WALLS AND CEILINGS – 40 CFR 264.112

In accordance with 40 CFR 264.112, the process of closing the proposed TSF Building will follow these general steps:

- Use a mercury vacuum to clean surfaces, as necessary.
- Wipe the surfaces, as necessary.
- Determine appropriate disposal.
- When the area is closed and while still ventilated, surfaces will be demolished, starting with the interior partitions.

20 VENTILATION SYSTEM

The process of closing the ventilation system will follow these general steps:

- The ventilation system will be the last system to be decommissioned.
- Dismantle the duct work and remove the units.
- Wipe the inside and outside surfaces, as necessary.
- Determine appropriate disposal.

21 STAGING DISMANTLED AND DEMOLISHED DEBRIS – 40 CFR 264.112

As the decommissioning progresses, wastes will be transported for appropriate disposal. The debris will be staged in emptied storage areas designated for this purpose during the closure process.

22 PHYSICAL REMOVAL – 40 CFR 264.112

In lieu of testing, material may be considered characteristic hazardous waste and managed appropriately.

23 DISPOSAL OF DEMOLITION EQUIPMENT AND CLOTHING – 40 CFR 264.112

Demolition equipment will be decontaminated or may be considered hazardous waste and transported for appropriate disposal.

Contaminated clothing, gloves, plastic sheeting, wipes, etc., generated during closure will be considered to be hazardous waste and will be transported to an appropriate disposal landfill.

24 FLOOR AND FOUNDATION – 40 CFR 264.112

In accordance with 40 CFR 264.112, the process of evaluating the floor and foundation for closure will follow these general steps:

- Inspect the floors for indication of spills.
- Take one core sample from floor in local area of each hazardous waste unit or suspect area.
- If floor samples indicate contamination may have penetrated the foundation, the location will be marked for additional sampling.
- Verify extent of contamination.
- Demolish and remove concrete.
- Segregate contaminated material and dispose of appropriately.
- Collect soil samples in areas where contamination was indicated in concrete samples.

25 REMOVE CONTAMINATED SOIL, AS NECESSARY.CLEANUP AND SAMPLING OF EXTERIOR SITE AREA – 40 CFR 264.112

In accordance with 40 CFR 264.112, the process of cleaning and sampling the exterior site area for closure will follow these general steps:

- Inspect exterior area for indication of contamination.
- Sample any area where visual inspection indicates possible contamination.
- Identify extent of contamination.
- Remove contaminated soil.
- Dispose of contaminated soil as appropriate.

26 SAMPLING AND ANALYSIS – 40 CFR 264.112

In accordance with 40 CFR 264.112, the sampling plan and analytical testing during the closure activities will follow the procedures specified in the Waste Analysis Plan found in Appendix 2-A of the permit application.

A detailed closure sampling plan will be submitted to NDEP for review prior to start of closure activities. The closure sampling plan will reflect the conditions at the proposed TSF at the time of closure.

For purposes of closure cost estimation, the following sampling program was assumed.

Table 26-1: Sampling Program for Closure Cost Estimation

Sample Type	Location	Number of Samples
Concrete Core		
	Calomel Feed Preparation	1
	Filter Press	1
	Retort	1
	Oxidation Unit	1
	Decomposition Tank	1
Total Concrete Cores		5
Wipe Samples		
	Decomposition Tank	6
	Waste Solution Tank	6
	Waste Solution Collection Tank	6
	Waste Solution Settling Tank	6
	Waste Solution Storage Tank #1	6
	Waste Solution Storage Tank #2	6
	Calomel Feed Preparation	10
	Filter Press	10
	Retort	5
	Oxidation Unit	5

Sample Type	Location	Number of Samples
	Calomel Storage Area	17
	Carbon Storage Area	10
	Elemental Mercury Storage Area	20
Total Wipe Samples		113

MISCELLANEOUS UNITS POST CLOSURE CARE – 40 CFR 264.603

This section is not applicable to the proposed TSF. The miscellaneous units at the proposed TSF are not land-based units and will be located within the area of the proposed TSF. No contamination of the soil is expected from a miscellaneous unit at proposed TSF. The units will be removed from the site upon closure leaving no source for a post closure release.

APPENDIX 15-A
CostPro Closure Cost Estimate Data

Precious Metals Recovery LLC

Address: HC 66 Box 1250
Crescent Valley
NEVADA
89821-1250

Contact: Rich Haddock
(801) 990-3773

Comments: New Mercury Management facility, not yet permitted or under construction
There are no incinerators at this facility, but this is the closest option to use for the retorts.
The calomel leach treatment units should be evaluated as tank systems.

There are no containment buildings, deep injection wells, drip pads, land treatment units, landfills, surface impoundments, or waste piles associated with this faciltiy.
There is a solar field and ancillary support structures that are not listed options.

Activity	Units	Closure Cost
Container Storage Area	1	$10,870,926.66
Incinerators/BIFs	2	$39,167.43
Tank Systems	9	$48,669.72
		$10,958,763.81
Additional Costs		$0.00
Total Estimated Cost		**$10,958,763.81**

Container Storage Areas Summary (CS_02-1)

Removal of Waste (CS-03)	$3,825.59	
Demolition and Removal of Pads (CS-04)	$5,786,342.28	
Removal of Process Equipment (CS-05)	$15,284.82	
Removal of Soil (CS-06)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$7,155.54	
Sampling and Analysis (SA-02)	$6,442.73	
Monitoring Well Installation (MW-01)	$74,104.48	
Transportation (TR-01)	$11,844.00	
Treatment and Disposal (TD-01)	$2,535,894.08	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$8,440,893.52	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$590,862.55	
Certification of Closure (CS-07)	$0.00	
Subtotal	$9,031,756.07	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$1,806,351.21	
Landfill Closure (Cover Installation) (CI-02)	$32,819.38	
TOTAL COST OF CLOSURE	$10,870,926.66	

Container Storage Areas Inventory (CS_01-1)

MAXIMUM PERMITTED CAPACITY

Volume of liquid waste	23,643.0	gal
Volume of solid waste	24.0	yd3
Percent of loose solid debris	0.0	%
Percent of drummed solid waste	100.0	%
Percent of baled waste or other monolithic waste	0.0	%
Volume of loose solid debris	0.0	yd3
Volume of solid waste in drums	24.0	yd3
Volume of monolithic waste	0.0	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM PAD

Length (excluding any curbs or berm)	13.0	ft
Width (excluding any curbs or berm)	12.0	ft
Surface Area of Containment System Pad	156.0	ft2
Surface Area of Containment System Pad in yd2	17.3	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM PAD

Thickness	0.5	ft
Volume of Containment System Pad	78.0	ft3
Volume of Containment System Pad in yd3	2.9	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM BERM

Inside Perimeter	50.0	ft
Height	0.5	ft
Surface Area of Containment System Berm	25.0	ft2
Surface Area of Containment System Berm in yd2	2.8	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM BERM

Thickness	0.5	ft
Volume of Containment System Berm	12.5	ft3
Volume of Containment System Berm in yd3	0.5	yd3

SURFACE AREA OF OTHER STRUCTURES

Surface Area of Other Structures	89,600.0	ft2
Surface Area of Other Structures in yd2	9,955.6	yd2

VOLUME OF OTHER STRUCTURES

Volume of Other Structures	96,444.0	yd3

Facility: Precious Metals Recovery LLC **Unit:** Container Storage 03/05/2013

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft
Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

AREA OF SITE TO BE GRADED WITHOUT SOIL REMOVAL

Length	640.0	ft
Width	340.0	ft
Area of Site to be Graded Without Soil Removal	217,600.0	ft2
Area of Site to be Graded Without Soil Removal in yd2	24,177.8	yd2

Notes: Pigs are liquid waste
One pig is one tonne of mercury
One pig holds 19 gallons

Calomel is a slurry waste considered to be liquid waste
Carbon is solid waste with no free liquids

Container Storage Areas Removal of Waste (CS_03-1)

REMOVAL OF LOOSE SOLID DEBRIS

Volume of loose debris waste	0.0	yd3
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per yd3	$2.02	per yd3
Cost to Remove Loose Solid Debris	$0.00	

REMOVAL OF DRUMMED WASTE

Number of Drums	519	Drums
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per drum	$3.51	
Cost to Remove Waste in Drums	$1,821.69	

REMOVAL OF SOLID MONOLITHIC WASTE

Number of monolithic forms	0.0	Forms
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per form	$14.02	per Form
Cost to Remove Monolithic Waste	$0.00	

DRY SWEEP STORAGE PROCESS, HANDLING AREA

Surface area to dry sweep	78,400.0	ft2
Surface area to dry sweep in thousand square feet (MSF)	78.4	MSF
Labor and equipment cost per ft2	$25.56	per MSF
Cost to Dry Sweep Area	$2,003.90	
TOTAL COST OF WASTE REMOVAL	$3,825.59	

Demolition and Removal of Pads and Containment (CS_04-1)

DEMOLITION OF PAD AND CONTAINMENT SYSTEM

Area of pad and containment system	30,000.0	ft2
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$65.61	per Work Hour
Work rate to demolish one ft2 of pad	0.0300	Work hr per ft2
Number of hours required to remove the pad and berm	900.0	Work hrs
Cost to Demolish the Pad and Containment System	$59,049.00	

REMOVAL AND LOADING OF DEMOLISHED PAD AND CONTAINMENT SYSTEM

Volume of materials constituting the pad and containment system debris	96,447.4	yd3
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$82.65	per Work Hour
Work rate to remove one yd3 of pad	0.2670	Work hr per yd3
Number of hours required to remove the pad and containment system	25,751.5	Work hrs
Subtotal of labor and equipment cost to remove and load the pad and containment system	$2,128,361.48	
Number of debris box containers needed to hold the pad and containment system	4,823	Containers
Cost of one 20-yd -capacity debris box container (rent per week)	$746.10	per Container
Cost of debris box containers	$3,598,440.30	
Cost of mobilization and demobilization (flat rate)	$491.50	
Cost to Remove and Load the Pad and Containment System	$5,727,293.28	
TOTAL COST TO DEMOLISH, REMOVE AND LOAD PAD AND CONTAINMENT SYSTEM	$5,786,342.28	

Removal of Process Equipment (CS_05-1)

SOLIDIFICATION OR STABILIZATION PROCESS EQUIPMENT

Quantity	13
Unit Cost	$1,100.14
Extended Cost	$14,301.82

CONVEYOR SYSTEM (40 FOOT SECTIONS)

Quantity	0
Unit Cost	$1,944.37
Extended Cost	$0.00

HOPPERS

Quantity	0
Unit Cost	$183.50
Extended Cost	$0.00

SHREDDERS

Quantity	0
Unit Cost	$1,838.21
Extended Cost	$0.00

BALERS

Quantity	0
Unit Cost	$1,838.21
Extended Cost	$0.00

FRONT-END LOADERS

Quantity	0
Unit Cost	$491.50
Extended Cost	$0.00

BACKHOES

Quantity	2
Unit Cost	$491.50
Extended Cost	$983.00

TOTAL COST TO REMOVE PROCESS EQUIPMENT $15,284.82

Backfill and Grading Summary (BF_01-1)

Backfilling Excavated Areas (BF-02)	$0.00
Grading to Provide Positive Slope (BF-03)	$0.00
Backfilling Storage, Process, and Containment Pits (BF-04)	$0.00
TOTAL COST OF BACKFILL AND GRADING	$0.00

Cover Installation Inventory (CI_01-1)

AREA OF COVER

Length	0.0	ft
Width	0.0	ft
Area of Cover	0.0	ft2
Area of Cover in yd2	0.0	yd2

VOLUME OF UNDIFFERENTIATED FILL

Thickness of Fill Layer	0.0	ft
Volume of Fill Layer	0.0	ft3
Volume of Fill Layer in yd3	0.0	yd3

VOLUME OF CLAY LAYER

Thickness of Clay Layer	0.0	ft
Volume of Clay Layer	0.0	ft3
Volume of Clay Layer in yd3	0.0	yd3

VOLUME OF SAND OR GRAVEL

Thickness of Sand or Gravel Layer	0.0	ft
Volume of Sand or Gravel Layer	0.0	ft3
Volume of Sand or Gravel Layer in yd3	0.0	yd3

VOLUME OF EARTHEN LAYER

Thickness of Earthen Layer	0.0	ft
Volume of Earthen Layer	0.0	ft3
Volume of Earthen Layer in yd3	0.0	yd3

VOLUME OF TOPSOIL LAYER

Thickness of Topsoil	0.0	ft
Volume of Topsoil Layer	0.0	ft3
Volume of Topsoil Layer in yd3	0.0	yd3

Cover Installation Summary (CI_02-1)

Installation of Undifferentiated Fill (CI-03)	$0.00	
Installation of Clay Layer (CI-04)	$0.00	
Installation of Geomembrane (CI-05)	$0.00	
Installation of Drainage Layer (CI-06)	$0.00	
Installation of Earthen Layer (CI-07)	$0.00	
Installation of Topsoil (CI-08)	$491.50	
Establishment of Vegetative Cover (CI-09)	$25,068.76	
Installation of Colloid Clay Liner (CI-10)	$0.00	
Installation of Asphalt Cover (CI-11)	$0.00	
Subtotal of Closure Costs	$25,560.26	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$1,789.22	
Survey Plat (CI-12)	$0.00	
Subtotal	$27,349.48	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$5,469.90	
TOTAL COST OF COVER	$32,819.38	

Installation of Topsoil (CI_08-1)

PURCHASE AND DELIVERY OF TOPSOIL

Volume of topsoil required	0.0	yd3
Compaction factor	0.2500	
Volume of additional topsoil required	0.0	yd3
Total volume of topsoil required	0.0	yd3
Cost of topsoil per yd3	$26.05	per yd3
Subtotal of cost to purchase topsoil	$0.00	
Cost of delivery of topsoil per yd3	$6.54	per yd3
Subtotal of cost to deliver topsoil	$0.00	
Cost to Purchase and Deliver Topsoil	$0.00	

SPREADING AND COMPACTING OF TOPSOIL

Labor and equipment cost per yd3 to spread topsoil	$1.85	per yd3
Subtotal of labor and equipment cost to spread topsoil	$0.00	
Labor and equipment cost per yd3 to compact topsoil	$0.39	per yd3
Subtotal of labor and equipment cost to compact topsoil	$0.00	
Cost of mobilization and demobilization (flat rate)	$491.50	
Cost to Spread and Compact Topsoil	$491.50	
TOTAL COST OF INSTALLATION OF TOPSOIL	$491.50	

Establishment of Vegetative Cover (CI_09-1)

SOIL PREPARATION

Area of cover	198,400.0	ft2
Area of cover in thousand square feet (MSF)	198.4	MSF
Labor and equipment cost per MSF	$47.18	per MSF
Subtotal of labor and equipment cost to prepare soil	$9,360.51	
Cost of mobilization and demobilization (flat rate)	$491.50	
Cost to Prepare Soil	$9,852.01	

SEEDING, FERTILIZING, AND MULCHING

Labor, material, and equipment cost per MSF	$74.22	per MSF
Subtotal of labor and equipment cost to seed, fertilize, and mulch	$14,725.25	
Cost of mobilization and demobilization (flat rate)	$491.50	
Cost to Seed, Fertilize, and Mulch	$15,216.75	
TOTAL COST OF ESTABLISHMENT OF VEGETATIVE COVER	$25,068.76	

Decontamination Summary (DC_01-1)

Decontamination of Unit by Steam Cleaning or Pressure Washing (DC-02)	$0.00
Decontamination of Unit by Sandblasting (DC-03)	$0.00
Decontamination of Heavy Equipment (DC-04)	$7,155.54
TOTAL COST OF DECONTAMINATION	$7,155.54

Decontamination of Heavy Equipment (DC_04-1)

Number of hours needed to decontaminate all heavy equipment	16.0	Work hrs
Cost of steam cleaner rental per hour	$8.57	per Hour
Subtotal of steam cleaner rental costs	$137.12	
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per hour	$67.29	per Work Hour
Subtotal of labor costs to decontaminate by steam cleaning	$1,076.64	
Ratio of decontamination fluid to hour	100.0	gals per hr
Volume of decontamination fluid generated	1,600.0	gal
Decontamination fluid container type:	Drums	
Number of drums required to contain decontamination fluid for removal	30	Drums
Cost of one drum	$82.42	per Drum
Cost of drums needed to contain decontamination fluid	$2,472.60	
Cost of construction of temporary decontamination area for heavy equipment.	$2,261.96	
Cost of demolition of temporary decontamination area for heavy equipment.	$1,207.22	
TOTAL COST OF DECONTAMINATION OF HEAVY EQUIPMENT	$7,155.54	

Monitoring Well Installation (MW_01-1)

PROJECT ENGINEERING

Number of wells	5	Wells
Labor and equipment per well for initial determination of well elevation and field stakeout	$103.22	per Well
Cost to determine well elevation and initial field stakeout	$516.10	
Development of drawings, including details of borings	$365.68	
Engineering recommendation	$832.60	
Cost to Perform Preproject Engineering	$1,714.38	

EQUIPMENT MOBILIZATION AND DEMOBLIZATION

Mobilization and demobilization cost of drilling rig and crew	$540.65	

WELL INSTALLATION - 2-INCH-DIAMETER

Total number of boreholes to be drilled	5	Boreholes
Total depth of boreholes	950.0	ft
Labor and equipment cost per foot	$70.30	per ft
Cost to drill 2-inch-diameter well	$66,785.00	
Well plug, screen, and seal	$286.72	per Well
Cost to plug, screen, and seal all wells	$1,433.60	
Cost to Install 2-inch-Diameter Wells	$68,218.60	

WELL INSTALLATION - 4-INCH-DIAMETER

Total number of boreholes to be drilled	0	Boreholes
Total depth of boreholes	0.0	ft
Labor and equipment cost per foot	$80.14	per ft
Cost to drill 4-inch-diameter well	$0.00	
Well plug, screen, and seal	$535.62	per Well
Cost to plug, screen, and seal all wells	$0.00	
Cost to Install 4-inch-Diameter Wells	$0.00	

WELL COMPLETION - 2-INCH- OR 4-INCH-DIAMETER WELL

Total number of all wells	5	Wells
Well completion cost	$726.17	per Well
Cost to complete 2-Inch- or 4-inch-Diameter Wells	$3,630.85	
TOTAL GROUNDWATER WELL INSTALLATION COST	$74,104.48	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	0	Samples
Number of Wipe Sample Locations	113	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$983.80
Wipe Sample (SA-06)	$5,458.93
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$6,442.73

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES

Number of corings to be drilled	5	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	5.0	Work hrs
Cost of Collection per Sampling Event	$373.70	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$610.10	per Event

SAMPLING EVENTS

Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$983.80	

Facility: Precious Metals Recovery LLC **Unit:** Container Storage 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	1	$1,220.20	0	$610.10

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	113	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	56.5	Work hrs
Cost of Collection per Sampling Event	$4,848.83	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$610.10	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$5,458.93	

Facility: Precious Metals Recovery LLC **Unit:** Container Storage 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	1	$1,220.20	0	$610.10

Analysis of Subsurface Soil Samples (SA_11-1)

ANALYSIS OF SUBSURFACE SOIL SAMPLES

Enter the number of sampling events	0	Events
Cost of analysis per sampling event for subsurface soil sample	$0.00	per Event
TOTAL COST OF ANALYSIS OF SUBSURFACE SOIL SAMPLES	$0.00	

Treatment and Disposal Summary (TD_01-1)

Treatment and Disposal of Wastes (TD-02)	$2,535,894.08
Treatment and Disposal of Decontamination Fluids (TD-03)	$0.00
Total Cost of Treatment and Disposal	$2,535,894.08

Treatment and Disposal of Waste (TD_02-1)

SOLID WASTE TREATMENT AND DISPOSAL

Solid Waste Type (Optional: Enter Name)	D009	
Volume in yd3 of solid waste to be treated and disposed of	886.0	yd3
Treatment and disposal costs per yd3	$1,700.00	per yd3
Cost to Treat and Dispose of Solid Waste	$1,506,200.00	

LIQUID WASTE TREATMENT AND DISPOSAL

Liquid Waste Type (Optional: Enter Name)	mercury	
Volume in gallons of liquid waste to be treated and disposed of	18,063.0	gal
Treatment and disposal costs per gallon	$8.16	per Gallon
Cost to Treat and Dispose of Liquid Waste	$147,394.08	

DRUMMED WASTE TREATMENT AND DISPOSAL

Drummed Waste Type (Optional: Enter Name)	D009	
Number of drums to be treated and disposed of	519	Drums
Treatment and disposal costs per drum	$1,700.00	per Drum
Cost to Treat and Dispose of Drummed Waste	$882,300.00	
TOTAL COST FOR TREATMENT AND DISPOSAL OF WASTE	$2,535,894.08	

Notes: This scenario uses 1024 pigs (19463 gallons) of mercury; 76 drums of calomel; 60 drums of carbon.
Disposal cost for liquid waste is 8.16 per gallon and 1700.00 per cubic yard for solid waste.

Treatment and Disposal of Decon Fluid (TD_03-1)

Volume of decontamination fluid generated from closure activities

Volume of decontamination fluid from Primary Unit	0.0	gal
Volume of decontamination fluid generated by steam cleaning or pressure washing (DC-02)	0.0	gal
Volume of decontamination fluid from heavy equipment (DC-04)	0.0	gal
Total Volume of Decontamination Fluid	0.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per hour	$76.09	per Work Hour
Work rate to pump decontamination fluid to a holding tank	0.0001	Work hr per gal
Number of hours required to pump decontamination fluid to a holding tank	0	Work hrs
Subtotal of labor and equipment costs to pump decontamination fluid to a holding tank	$0.00	
Number of days required to rent a holding tank	0	Days
Holding tank rental fee (10,000 gal tank per day)	$185.79	per Day
Number of tanks required	0	Tanks
Subtotal of tank rental costs	$0.00	
Cost for treatment and disposal	$0.39	per Gallon
Treatment and disposal costs for bulk liquid	$0.00	
TOTAL COST TO TREATMENT AND DISPOSE OF DECONTAMINATION FLUID AS A BULK LIQUID	$0.00	

Transportation of Waste (TR_01-1)

TRANSPORTATION OF WASTE IN DRUMS

Number of drums of waste	519	Drums
Number of truckloads needed to transport waste in drums	7	Truckloads
Type of waste	Hazardous	
Number of miles	300.0	Mi
Cost per mile	$5.64	per Mile
Cost to transport one truckload of 55-gallon drums	$1,692.00	per Truckload
Cost to transport Waste in Drums	$11,844.00	

TRANSPORTATION OF BULK LIQUID

Gallons of liquid waste	0.0	gal
Number of truckloads needed to transport bulk free liquid waste	0	Truckloads
Type of waste	Hazardous	
Number of miles	300.0	Mi
Cost per mile	$5.64	per Mile
Cost to transport one truckload of bulk liquids	$1,692.00	per Truckload
Cost to Transport Bulk Liquid Wastes	$0.00	

TRANSPORATION OF BULK WASTE

Number of waste debris boxes	0	Containers
Number of truckloads needed to transport bulk waste	0	Truckloads
Type of waste	Hazardous	
Number of miles	300.0	Mi
Cost per mile	$5.64	per Mile
Cost to transport one truckload of bulk waste	$1,692.00	per Truckload
Cost to Transport Bulk Waste	$0.00	
TOTAL COST OF TRANSPORTATION OF WASTE	$11,844.00	

Incinerators and BIFs Summary (IB_02-1)

Removal of Waste Residue (IB-03)	$13,840.91	
Decontamination of the Unit (IB-04)	$3,581.47	
Disassembly of Ancillary Piping (IB-05)	$512.51	
Demolition and Removal (IB-06)	$900.22	
Removal of Soil (IB-07)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$1,584.23	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$20,419.34	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$1,429.35	
Certification of Closure (IB-08)	$0.00	
Subtotal	$21,848.69	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$4,369.74	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$26,218.43	

Incinerators and BIFs Inventory (IB_01-1)

UNIT DESCRIPTION

Type of incinerator or BIF	Oxidation	
Type of Air Pollution Control Device (APCD)	Baghouse	
Type of heat recovery system	None	
Length of ancillary piping	75.0	ft

MAXIMUM VOLUME OF SCRUBBER LIQUID

Maximum Volume of Scrubber Liquid	10,000.0	gal

MAXIMUM VOLUME OF NONLIQUID WASTE

Volume of incinerator or BIF ash	8.0	yd3
Volume of baghouse/cyclone/ESP dust	8.0	yd3
Volume of Nonliquid Waste	16.0	yd3

SURFACE AREA OF INCINERATOR OR BIF

Surface area of combustion chamber(s)	850.0	ft2
Surface area of APCD	1,000.0	ft2
Surface area of heat recovery equipment	0.0	ft2
Surface area of exhaust gas duct	675.0	ft2
Surface area of stack	300.0	ft2
Surface Area of Incinerator or BIF	2,825.0	ft2

SURFACE AREA OF ANCILLARY PIPING AND CONTAINMENT AREAS

Surface area of ancillary piping	75.0	ft2
Surface area of containment areas	400.0	ft2
Surface area of other structures	0.0	ft2
Surface Area of Ancillary Piping and Containment Areas	475.0	ft2

VOLUME OF MATERIAL TO BE DEMOLISHED AND REMOVED

Volume of materials constituting the incineration system	0.0	ft3
Volume of ancillary piping materials	75.0	ft3
Volume of other miscellaneous materials (such as containment areas) to be removed	0.0	ft3
Volume of Materials to be Demolished and Removed	75.0	ft3
Volume of Materials to be Demolished and Removed in yd3	2.8	yd3

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft

Facility: Precious Metals Recovery LLC **Unit:** Oxidation Reactor 03/05/2013

Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Incinerators and BIFs Rem. of Waste Residue (IB_03-1)

REMOVAL, TREATMENT, AND DISPOSAL OF SCRUBBER LIQUID

Maximum volume of scrubber liquid	10,000.0	gal
Cost to remove, treat, and dispose of scrubber liquid per gallon	$1.14	per Gallon
Total Cost to Remove, Treat, and Dispose of Scrubber Liquid	$11,400.00	

REMOVAL, TREATMENT, AND DISPOSAL OF NONLIQUID WASTE RESIDUE

Maximum volume of nonliquid waste	8.0	yd3
Maximum volume of nonliquid waste converted to tons	5.4	Tons
Volume Conversion Factor	0.6750	
Cost to remove, treat, and dispose of nonliquid waste per ton	$452.02	per Ton
Total Cost to Remove, Treat, and Dispose of Nonliquid Waste	$2,440.91	
TOTAL COST OF REMOVAL OF WASTE RESIDUE	$13,840.91	

Incinerators and BIFs Decontamination of the Unit (IB_04-1)

Surface area of unit to be cleaned	864.0	ft
Choose the appropriate level of PPE:	Protection Level D	
Labor and equipment cost per work hour	$64.65	per Work Hour
Work rate required to clean the unit	0.0405	Work hr per ft2
Number of hours required to clean the unit	35.0	Work hrs
Subtotal of labor and equipment cost to clean unit by steam cleaning	$2,262.75	
Rate	1.0	gals per ft2
Volume of decontamination fluid	864.0	gal
Decontamination fluid is contained in:	Drums	
Number of drums required to contain decontamination fluid	16	Drums
Cost of one drum	$82.42	
Cost of drums needed to contain decontamination fluid	$1,318.72	
TOTAL COST OF DECONTAMINATION OF THE UNIT	$3,581.47	

Disassembly of Ancillary Piping (IB_05-1)

Length of ancillary piping to be disassembled	75.0	ft
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$45.76	per Work Hour
Work rate required to disassemble one foot of ancillary piping	0.1500	Work hr per Ft
Number of hours required to disassemble ancillary piping	11.2	Work hrs
TOTAL COST OF DISASSEMBLY OF ANCILLARY PIPING	$512.51	

Incinerators and BIFs Demolition and Removal (IB_06-1)

Total volume of unit to be demolished	1,730.0	yd3
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$78.60	per Work Hour
Work rate required to demolish and remove one ft3	0.0030	Work hr per yd3
Number of hours required to demolish and remove the unit	5.2	Work hrs
Subtotal of labor and equipment cost to demolish and remove the unit	$408.72	
Cost of mobilization and demobilization (flat rate)	$491.50	
TOTAL COST OF DEMOLITION AND REMOVAL	$900.22	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	5	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$759.58
Wipe Sample (SA-06)	$824.65
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$1,584.23

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES		
Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event
ANALYSIS OF DRILLING SAMPLE		
Cost of Analysis per Sampling Event	$610.10	per Event
SAMPLING EVENTS		
Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$759.58	

Facility: Precious Metals Recovery LLC **Unit:** Oxidation Reactor 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	1	$1,220.20	0	$610.10

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	5	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	2.5	Work hrs
Cost of Collection per Sampling Event	$214.55	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$610.10	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$824.65	

Facility: Precious Metals Recovery LLC **Unit:** Oxidation Reactor 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	1	$1,220.20	0	$610.10

Analysis of Subsurface Soil Samples (SA_11-1)

ANALYSIS OF SUBSURFACE SOIL SAMPLES

Enter the number of sampling events	0	Events
Cost of analysis per sampling event for subsurface soil sample	$0.00	per Event
TOTAL COST OF ANALYSIS OF SUBSURFACE SOIL SAMPLES	$0.00	

Treatment and Disposal Summary (TD_01-1)

Treatment and Disposal of Wastes (TD-02)	$0.00
Treatment and Disposal of Decontamination Fluids (TD-03)	$0.00
Total Cost of Treatment and Disposal	$0.00

Treatment and Disposal of Waste (TD_02-1)

SOLID WASTE TREATMENT AND DISPOSAL

Solid Waste Type (Optional: Enter Name)	0	
Volume in yd3 of solid waste to be treated and disposed of	0.0	yd3
Treatment and disposal costs per yd3	$0.00	per yd3
Cost to Treat and Dispose of Solid Waste	$0.00	

LIQUID WASTE TREATMENT AND DISPOSAL

Liquid Waste Type (Optional: Enter Name)	0	
Volume in gallons of liquid waste to be treated and disposed of	0.0	gal
Treatment and disposal costs per gallon	$0.00	per Gallon
Cost to Treat and Dispose of Liquid Waste	$0.00	

DRUMMED WASTE TREATMENT AND DISPOSAL

Drummed Waste Type (Optional: Enter Name)	0	
Number of drums to be treated and disposed of	0	Drums
Treatment and disposal costs per drum	$0.00	per Drum
Cost to Treat and Dispose of Drummed Waste	$0.00	
TOTAL COST FOR TREATMENT AND DISPOSAL OF WASTE	$0.00	

Transportation of Waste (TR_01-1)

TRANSPORTATION OF WASTE IN DRUMS

Number of drums of waste	0	Drums
Number of truckloads needed to transport waste in drums	0	Truckloads
Type of waste	Hazardous	
Number of miles	300.0	Mi
Cost per mile	$5.64	per Mile
Cost to transport one truckload of 55-gallon drums	$1,692.00	per Truckload
Cost to transport Waste in Drums	$0.00	

TRANSPORTATION OF BULK LIQUID

Gallons of liquid waste	0.0	gal
Number of truckloads needed to transport bulk free liquid waste	0	Truckloads
Type of waste	Hazardous	
Number of miles	300.0	Mi
Cost per mile	$5.64	per Mile
Cost to transport one truckload of bulk liquids	$1,692.00	per Truckload
Cost to Transport Bulk Liquid Wastes	$0.00	

TRANSPORATION OF BULK WASTE

Number of waste debris boxes	0	Containers
Number of truckloads needed to transport bulk waste	0	Truckloads
Type of waste	Hazardous	
Number of miles	300.0	Mi
Cost per mile	$5.64	per Mile
Cost to transport one truckload of bulk waste	$1,692.00	per Truckload
Cost to Transport Bulk Waste	$0.00	
TOTAL COST OF TRANSPORTATION OF WASTE	$0.00	

Incinerators and BIFs Summary (IB_02-1)

Removal of Waste Residue (IB-03)	$886.41	
Decontamination of the Unit (IB-04)	$6,540.71	
Disassembly of Ancillary Piping (IB-05)	$100.67	
Demolition and Removal (IB-06)	$491.50	
Removal of Soil (IB-07)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$2,065.60	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$10,084.89	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$705.94	
Certification of Closure (IB-08)	$0.00	
Subtotal	$10,790.83	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$2,158.17	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$12,949.00	

Incinerators and BIFs Inventory (IB_01-1)

UNIT DESCRIPTION		
Type of incinerator or BIF	1	
Type of Air Pollution Control Device (APCD)	1	
Type of heat recovery system	0	
Length of ancillary piping	15.0	ft
MAXIMUM VOLUME OF SCRUBBER LIQUID		
Maximum Volume of Scrubber Liquid	500.0	gal
MAXIMUM VOLUME OF NONLIQUID WASTE		
Volume of incinerator or BIF ash	0.5	yd3
Volume of baghouse/cyclone/ESP dust	0.5	yd3
Volume of Nonliquid Waste	1.0	yd3
SURFACE AREA OF INCINERATOR OR BIF		
Surface area of combustion chamber(s)	600.0	ft2
Surface area of APCD	450.0	ft2
Surface area of heat recovery equipment	0.0	ft2
Surface area of exhaust gas duct	250.0	ft2
Surface area of stack	250.0	ft2
Surface Area of Incinerator or BIF	1,550.0	ft2
SURFACE AREA OF ANCILLARY PIPING AND CONTAINMENT AREAS		
Surface area of ancillary piping	36.0	ft2
Surface area of containment areas	0.0	ft2
Surface area of other structures	0.0	ft2
Surface Area of Ancillary Piping and Containment Areas	36.0	ft2
VOLUME OF MATERIAL TO BE DEMOLISHED AND REMOVED		
Volume of materials constituting the incineration system	0.0	ft3
Volume of ancillary piping materials	0.0	ft3
Volume of other miscellaneous materials (such as containment areas) to be removed	0.0	ft3
Volume of Materials to be Demolished and Removed	0.0	ft3
Volume of Materials to be Demolished and Removed in yd3	0.0	yd3
VOLUME OF CONTAMINATED SOIL TO BE REMOVED		
Length	0.0	ft
Width	0.0	ft

Facility: Precious Metals Recovery LLC **Unit:** Retort 03/05/2013

Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Incinerators and BIFs Rem. of Waste Residue (IB_03-1)

REMOVAL, TREATMENT, AND DISPOSAL OF SCRUBBER LIQUID

Maximum volume of scrubber liquid	500.0	gal
Cost to remove, treat, and dispose of scrubber liquid per gallon	$1.14	per Gallon
Total Cost to Remove, Treat, and Dispose of Scrubber Liquid	$570.00	

REMOVAL, TREATMENT, AND DISPOSAL OF NONLIQUID WASTE RESIDUE

Maximum volume of nonliquid waste	1.0	yd3
Maximum volume of nonliquid waste converted to tons	0.7	Tons
Volume Conversion Factor	0.6750	
Cost to remove, treat, and dispose of nonliquid waste per ton	$452.02	per Ton
Total Cost to Remove, Treat, and Dispose of Nonliquid Waste	$316.41	
TOTAL COST OF REMOVAL OF WASTE RESIDUE	$886.41	

Incinerators and BIFs Decontamination of the Unit (IB_04-1)

Surface area of unit to be cleaned	1,586.0	ft
Choose the appropriate level of PPE:	Protection Level D	
Labor and equipment cost per work hour	$64.65	per Work Hour
Work rate required to clean the unit	0.0405	Work hr per ft2
Number of hours required to clean the unit	64.2	Work hrs
Subtotal of labor and equipment cost to clean unit by steam cleaning	$4,150.53	
Rate	1.0	gals per ft2
Volume of decontamination fluid	1,586.0	gal
Decontamination fluid is contained in:	Drums	
Number of drums required to contain decontamination fluid	29	Drums
Cost of one drum	$82.42	
Cost of drums needed to contain decontamination fluid	$2,390.18	
TOTAL COST OF DECONTAMINATION OF THE UNIT	$6,540.71	

Disassembly of Ancillary Piping (IB_05-1)

Length of ancillary piping to be disassembled	15.0	ft
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$45.76	per Work Hour
Work rate required to disassemble one foot of ancillary piping	0.1500	Work hr per Ft
Number of hours required to disassemble ancillary piping	2.2	Work hrs
TOTAL COST OF DISASSEMBLY OF ANCILLARY PIPING	$100.67	

Incinerators and BIFs Demolition and Removal (IB_06-1)

Total volume of unit to be demolished	0.0	yd3
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$78.60	per Work Hour
Work rate required to demolish and remove one ft3	0.0030	Work hr per yd3
Number of hours required to demolish and remove the unit	0.0	Work hrs
Subtotal of labor and equipment cost to demolish and remove the unit	$0.00	
Cost of mobilization and demobilization (flat rate)	$491.50	
TOTAL COST OF DEMOLITION AND REMOVAL	$491.50	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	2	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$610.10
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$759.58
Wipe Sample (SA-06)	$695.92
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$2,065.60

Drilling and Subsurface Soil Samples - 2.5-Inch-Diameter-Holes (SA_03-1)

DRILLING AND SUBSURFACE SOIL SAMPLE COSTS - 2.5-INCH-DIAMETER-HOLES

Number of borings to be drilled	0	Borings
Enter depth of boreholes (sum of all)	0	ft
Choose the appropriate drilling method	Auger Boring - Level D	
Labor and equipment cost per work hour	$100.97	per Work Hour
Choose the appropriate drilling method	Hollow-Stem Auger 2.5-Inch	
Work rate to drill 2.5-inch-diameter hole	0.3050	Work hr per Ft
Number of hours required to drill 2.5-inch diameter hole	0.0	Work hrs
Cost of Drilling 2.5-Inch Borings per Sampling Event	$0.00	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$610.10	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF DRILLING AND SUBSURFACE SOIL SAMPLES FOR CLOSURE - 2.5-INCH-DIAMETER-HOLES	$610.10	
TOTAL COST OF SAMPLING AND ANALYSIS OF DRILLING AND SUBSURFACE SOIL SAMPLES FOR POST-CLOSURE CARE PER EVENT - 2.5-INCH-DIAMETER-HOLES	$610.10	per Event

Facility: Precious Metals Recovery LLC **Unit:** Retort 03/05/2013

Drilling and Subsurface Soil Samples - 2.5-Inch-Diameter-Holes (SA_03)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	1	$1,220.20	0	$610.10

Drilling and Subsurface Soil Samples - 4-Inch-Diameter-Holes (SA_04-1)

DRILLING AND SUBSURFACE SOIL SAMPLE COSTS - 4-INCH-DIAMETER-HOLES

Number of borings to be drilled	0	Borings
Enter depth of boreholes (sum of all)	0	ft
Choose the appropriate drilling method	Auger Boring - Level D	
Labor and equipment cost per work hour	$100.97	per Work Hour
Choose the appropriate drilling method	Hollow-Stem Auger 4-Inch	
Work rate to drill 4-inch-diameter hole	0.3560	Work hr per Ft
Number of hours required to drill 4-inch diameter hole	0.0	Work hrs
Cost of Drilling 4-Inch Borings per Sampling Event	$0.00	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$0.00	per Event

SAMPLING EVENTS

Number of sampling events	0	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF DRILLING AND SUBSURFACE SOIL SAMPLES FOR CLOSURE - 4-INCH-DIAMETER-HOLES	$0.00	
TOTAL COST OF SAMPLING AND ANALYSIS OF DRILLING AND SUBSURFACE SOIL SAMPLES FOR POST-CLOSURE CARE PER EVENT - 4-INCH-DIAMETER-HOLES	$0.00	per Event

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES		
Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event
ANALYSIS OF DRILLING SAMPLE		
Cost of Analysis per Sampling Event	$610.10	per Event
SAMPLING EVENTS		
Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$759.58	

Facility: Precious Metals Recovery LLC **Unit:** Retort 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	1	$1,220.20	0	$610.10

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	2	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	1.0	Work hrs
Cost of Collection per Sampling Event	$85.82	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$610.10	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$695.92	

Facility: Precious Metals Recovery LLC **Unit:** Retort 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	1	$1,220.20	0	$610.10

Analysis of Subsurface Soil Samples (SA_11-1)

ANALYSIS OF SUBSURFACE SOIL SAMPLES

Enter the number of sampling events	0	Events
Cost of analysis per sampling event for subsurface soil sample	$0.00	per Event
TOTAL COST OF ANALYSIS OF SUBSURFACE SOIL SAMPLES	$0.00	

Treatment and Disposal Summary (TD_01-1)

Treatment and Disposal of Wastes (TD-02)	$0.00
Treatment and Disposal of Decontamination Fluids (TD-03)	$0.00
Total Cost of Treatment and Disposal	$0.00

Treatment and Disposal of Waste (TD_02-1)

SOLID WASTE TREATMENT AND DISPOSAL

Solid Waste Type (Optional: Enter Name)	0	
Volume in yd3 of solid waste to be treated and disposed of	0.0	yd3
Treatment and disposal costs per yd3	$0.00	per yd3
Cost to Treat and Dispose of Solid Waste	$0.00	

LIQUID WASTE TREATMENT AND DISPOSAL

Liquid Waste Type (Optional: Enter Name)	0	
Volume in gallons of liquid waste to be treated and disposed of	0.0	gal
Treatment and disposal costs per gallon	$0.00	per Gallon
Cost to Treat and Dispose of Liquid Waste	$0.00	

DRUMMED WASTE TREATMENT AND DISPOSAL

Drummed Waste Type (Optional: Enter Name)	0	
Number of drums to be treated and disposed of	0	Drums
Treatment and disposal costs per drum	$0.00	per Drum
Cost to Treat and Dispose of Drummed Waste	$0.00	
TOTAL COST FOR TREATMENT AND DISPOSAL OF WASTE	$0.00	

Transportation of Waste (TR_01-1)

TRANSPORTATION OF WASTE IN DRUMS

Number of drums of waste	0	Drums
Number of truckloads needed to transport waste in drums	0	Truckloads
Type of waste	Hazardous	
Number of miles	300.0	Mi
Cost per mile	$5.64	per Mile
Cost to transport one truckload of 55-gallon drums	$1,692.00	per Truckload
Cost to transport Waste in Drums	$0.00	

TRANSPORTATION OF BULK LIQUID

Gallons of liquid waste	0.0	gal
Number of truckloads needed to transport bulk free liquid waste	0	Truckloads
Type of waste	Hazardous	
Number of miles	300.0	Mi
Cost per mile	$5.64	per Mile
Cost to transport one truckload of bulk liquids	$1,692.00	per Truckload
Cost to Transport Bulk Liquid Wastes	$0.00	

TRANSPORATION OF BULK WASTE

Number of waste debris boxes	0	Containers
Number of truckloads needed to transport bulk waste	0	Truckloads
Type of waste	Hazardous	
Number of miles	300.0	Mi
Cost per mile	$5.64	per Mile
Cost to transport one truckload of bulk waste	$1,692.00	per Truckload
Cost to Transport Bulk Waste	$0.00	
TOTAL COST OF TRANSPORTATION OF WASTE	$0.00	

Facility: Precious Metals Recovery LLC **Unit:** Decomposition Tank 03/05/2013

Tank Systems Summary (TS_02-1)

Removal of Waste (TS-03)	$17.30	
Tank System Purging (ignitable waste only) (TS-04)	$0.00	
Flushing the Tank and Piping (TS-05)	$0.00	
Excavation, Disassembly, and Loading (TS-06)	$0.00	
Demolition and Removal of Containment System (TS-07)	$0.00	
Removal of Soil (TS-08)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$2,675.70	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$2,693.00	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$188.51	
Certification of Closure (TS-09)	$0.00	
Subtotal	$2,881.51	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$576.30	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$3,457.81	

Tank Systems Inventory (TS_01-1)

UNIT DESCRIPTION AND MAXIMUM PERMITTED CAPACITY

Type of tank system	Aboveground	
Height or length of tank	6.0	ft
Diameter of tank	5.0	ft
Maximum permitted capacity of the tank	400.0	gal
Total length of ancillary piping	170.0	ft
Nominal diameter of ancillary piping	2.0	in
Maximum capacity of ancillary piping	27.7	gal
Maximum capacity of tank and ancillary piping	427.7	gal

SURFACE AREA OF TANK SYSTEM

Surface area of tank (interior and exterior)	227.8	ft2

VOLUME OF TANK SYSTEM TO BE REMOVED

Volume of Tank System to be Removed	57.2	ft3
Volume of Tank System to be Removed in yd3	2.1	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM PAD

Length	24.0	ft
Width	12.0	ft
Surface Area of Secondary Containment System Pad	288.0	ft2
Surface Area of Secondary Containment System Pad in yd2	32.0	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM PAD

Thickness	0.5	ft
Volume of Secondary Containment Pad	5.3	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM BERM

Total Length	70.0	ft
Height	0.5	ft
Surface Area of Secondary Containment System Berm	35.0	ft2
Surface Area of Secondary Containment System Berm in yd2	3.9	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM BERM

Thickness	0.5	ft
Volume of Secondary Containment System Berm	0.6	yd3

SURFACE AREA OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Surface Area of Other Structures	0.0	ft2

Surface Area of Other Structures in yd2	0.0	yd2

VOLUME OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Volume of Other Structures	0.0	yd3

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft
Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Tank Systems Removal of Waste (TS_03-1)

Maximum volume of waste to be removed from the tank and ancillary piping	427.7	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$172.96	per Work Hour
Work rate required to remove waste from tank and ancillary piping	0.0003	Work hr per gal
Number of hours required to remove waste from tank and ancillary piping	0.1	Work hrs
TOTAL COST OF REMOVAL OF WASTE FROM TANK AND ANCILLARY PIPING	$17.30	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	2	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$1,369.68
Wipe Sample (SA-06)	$1,306.02
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$2,675.70

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES

Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$1,369.68	

Facility: Precious Metals Recovery LLC **Unit:** Decomposition Tank 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	2	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	1.0	Work hrs
Cost of Collection per Sampling Event	$85.82	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$1,306.02	

Facility: Precious Metals Recovery LLC **Unit:** Decomposition Tank 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Treatment and Disposal Summary (TD_01-1)

Treatment and Disposal of Wastes (TD-02)	$0.00
Treatment and Disposal of Decontamination Fluids (TD-03)	$0.00
Total Cost of Treatment and Disposal	$0.00

Treatment and Disposal of Waste (TD_02-1)

SOLID WASTE TREATMENT AND DISPOSAL

Solid Waste Type (Optional: Enter Name)	0	
Volume in yd3 of solid waste to be treated and disposed of	0.0	yd3
Treatment and disposal costs per yd3	$0.00	per yd3
Cost to Treat and Dispose of Solid Waste	$0.00	

LIQUID WASTE TREATMENT AND DISPOSAL

Liquid Waste Type (Optional: Enter Name)	0	
Volume in gallons of liquid waste to be treated and disposed of	0.0	gal
Treatment and disposal costs per gallon	$0.00	per Gallon
Cost to Treat and Dispose of Liquid Waste	$0.00	

DRUMMED WASTE TREATMENT AND DISPOSAL

Drummed Waste Type (Optional: Enter Name)	0	
Number of drums to be treated and disposed of	0	Drums
Treatment and disposal costs per drum	$0.00	per Drum
Cost to Treat and Dispose of Drummed Waste	$0.00	
TOTAL COST FOR TREATMENT AND DISPOSAL OF WASTE	$0.00	

Facility: Precious Metals Recovery LLC **Unit:** Waste Solution Collection Tank 03/05/2013

Tank Systems Summary (TS_02-1)

Removal of Waste (TS-03)	$0.00	
Tank System Purging (ignitable waste only) (TS-04)	$0.00	
Flushing the Tank and Piping (TS-05)	$0.00	
Excavation, Disassembly, and Loading (TS-06)	$313.17	
Demolition and Removal of Containment System (TS-07)	$0.00	
Removal of Soil (TS-08)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$2,675.70	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$2,988.87	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$209.22	
Certification of Closure (TS-09)	$4,047.99	
Subtotal	$7,246.08	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$1,449.22	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$8,695.30	

Tank Systems Inventory (TS_01-1)

UNIT DESCRIPTION AND MAXIMUM PERMITTED CAPACITY

Type of tank system	Aboveground	
Height or length of tank	6.0	ft
Diameter of tank	5.0	ft
Maximum permitted capacity of the tank	400.0	gal
Total length of ancillary piping	15.0	ft
Nominal diameter of ancillary piping	2.0	in
Maximum capacity of ancillary piping	2.4	gal
Maximum capacity of tank and ancillary piping	402.4	gal

SURFACE AREA OF TANK SYSTEM

Surface area of tank (interior and exterior)	227.8	ft2

VOLUME OF TANK SYSTEM TO BE REMOVED

Volume of Tank System to be Removed	53.8	ft3
Volume of Tank System to be Removed in yd3	2.0	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM PAD

Length	10.0	ft
Width	10.0	ft
Surface Area of Secondary Containment System Pad	100.0	ft2
Surface Area of Secondary Containment System Pad in yd2	11.1	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM PAD

Thickness	0.5	ft
Volume of Secondary Containment Pad	1.8	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM BERM

Total Length	40.0	ft
Height	0.5	ft
Surface Area of Secondary Containment System Berm	20.0	ft2
Surface Area of Secondary Containment System Berm in yd2	2.2	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM BERM

Thickness	0.5	ft
Volume of Secondary Containment System Berm	0.4	yd3

SURFACE AREA OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Surface Area of Other Structures	0.0	ft2

Surface Area of Other Structures in yd2	0.0	yd2

VOLUME OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Volume of Other Structures	0.0	yd3

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft
Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Tank Systems Excavation, Disassembly, and Loading (TS_06-1)

DISASSEMBLY OF ANCILLARY PIPING

Length of ancillary piping to be disassembled	15.0	ft
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$75.86	per Work Hour
Work rate required to disassemble one foot of pipe	0.1500	Work hr per Ft
Number of hours required to disassemble ancillary piping	2.2	Work hrs
Cost of Disassembly of Ancillary Piping	$166.89	

EXCAVATION AND LOADING (FOR IN-GROUND AND UNDERGROUND TANKS ONLY)

Capacity of Tank	0.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$532.15	per Work Hour
Work rate required to excavate and load tank per gallon capacity	0.000000	Work hr per gal
Number of hours required to excavate and load tank	0.0	Work hrs
Cost to Excavate and Load Tank	$0.00	

REMOVE TANK (FOR ON-GROUND AND ABOVEGROUND TANKS ONLY)

Capacity of Tank	400.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$182.85	per Work Hour
Work rate required to load tank per gallon capacity	0.002000	Work hr per gal
Number of hours required to load tank	0.8	Work hrs
Cost to Load Tank	$146.28	
TOTAL COST OF EXCAVATION, DISASSEMBLY, AND LOADING	$313.17	

Tank Systems Certification of Closure (TS_09-1)

Number of units requiring certification of closure	1	Units
Cost of certification of closure per unit	$4,047.99	
TOTAL COST OF CERTIFICATION OF CLOSURE	$4,047.99	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	2	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$1,369.68
Wipe Sample (SA-06)	$1,306.02
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$2,675.70

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES

Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$1,369.68	

Facility: Precious Metals Recovery LLC **Unit:** Waste Solution Collection Tank 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	2	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	1.0	Work hrs
Cost of Collection per Sampling Event	$85.82	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$1,306.02	

Facility: Precious Metals Recovery LLC **Unit:** Waste Solution Collection Tank 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Treatment and Disposal Summary (TD_01-1)

Treatment and Disposal of Wastes (TD-02)	$0.00
Treatment and Disposal of Decontamination Fluids (TD-03)	$0.00
Total Cost of Treatment and Disposal	$0.00

Tank Systems Summary (TS_02-1)

Removal of Waste (TS-03)	$0.00	
Tank System Purging (ignitable waste only) (TS-04)	$0.00	
Flushing the Tank and Piping (TS-05)	$0.00	
Excavation, Disassembly, and Loading (TS-06)	$2,402.73	
Demolition and Removal of Containment System (TS-07)	$0.00	
Removal of Soil (TS-08)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$2,065.60	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$4,468.33	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$312.78	
Certification of Closure (TS-09)	$0.00	
Subtotal	$4,781.11	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$956.22	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$5,737.33	

Tank Systems Inventory (TS_01-1)

UNIT DESCRIPTION AND MAXIMUM PERMITTED CAPACITY

Type of tank system	Aboveground	
Height or length of tank	11.0	ft
Diameter of tank	1.0	ft
Maximum permitted capacity of the tank	100.0	gal
Total length of ancillary piping	205.0	ft
Nominal diameter of ancillary piping	2.0	in
Maximum capacity of ancillary piping	33.5	gal
Maximum capacity of tank and ancillary piping	133.5	gal

SURFACE AREA OF TANK SYSTEM

Surface area of tank (interior and exterior)	70.7	ft2

VOLUME OF TANK SYSTEM TO BE REMOVED

Volume of Tank System to be Removed	17.8	ft3
Volume of Tank System to be Removed in yd3	0.7	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM PAD

Length	10.0	ft
Width	10.0	ft
Surface Area of Secondary Containment System Pad	100.0	ft2
Surface Area of Secondary Containment System Pad in yd2	11.1	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM PAD

Thickness	0.5	ft
Volume of Secondary Containment Pad	1.8	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM BERM

Total Length	40.0	ft
Height	0.5	ft
Surface Area of Secondary Containment System Berm	20.0	ft2
Surface Area of Secondary Containment System Berm in yd2	2.2	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM BERM

Thickness	0.5	ft
Volume of Secondary Containment System Berm	0.4	yd3

SURFACE AREA OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Surface Area of Other Structures	0.0	ft2

Surface Area of Other Structures in yd2	0.0	yd2

VOLUME OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Volume of Other Structures	0.0	yd3

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft
Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Tank Systems Excavation, Disassembly, and Loading (TS_06-1)

DISASSEMBLY OF ANCILLARY PIPING

Length of ancillary piping to be disassembled	205.0	ft
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$75.86	per Work Hour
Work rate required to disassemble one foot of pipe	0.1500	Work hr per Ft
Number of hours required to disassemble ancillary piping	30.8	Work hrs
Cost of Disassembly of Ancillary Piping	$2,336.49	

EXCAVATION AND LOADING (FOR IN-GROUND AND UNDERGROUND TANKS ONLY)

Capacity of Tank	0.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$532.15	per Work Hour
Work rate required to excavate and load tank per gallon capacity	0.000000	Work hr per gal
Number of hours required to excavate and load tank	0.0	Work hrs
Cost to Excavate and Load Tank	$0.00	

REMOVE TANK (FOR ON-GROUND AND ABOVEGROUND TANKS ONLY)

Capacity of Tank	100.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$132.48	per Work Hour
Work rate required to load tank per gallon capacity	0.005000	Work hr per gal
Number of hours required to load tank	0.5	Work hrs
Cost to Load Tank	$66.24	
TOTAL COST OF EXCAVATION, DISASSEMBLY, AND LOADING	$2,402.73	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	2	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$759.58
Wipe Sample (SA-06)	$1,306.02
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$2,065.60

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES

Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$610.10	per Event

SAMPLING EVENTS

Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$759.58	

Facility: Precious Metals Recovery LLC **Unit:** Packed Tower Scrubber 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	1	$1,220.20	0	$610.10

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	2	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	1.0	Work hrs
Cost of Collection per Sampling Event	$85.82	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$1,306.02	

Facility: Precious Metals Recovery LLC **Unit:** Packed Tower Scrubber 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Surface Water and Liquid Samples (SA_07-1)

COLLECTION OF SURFACE WATER AND LIQUID SAMPLES		
Number of sampling locations	0	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$90.32	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	0.0	Work hrs
Cost of Collection per Sampling Event	$0.00	per Event
ANALYSIS OF SURFACE WATER AND LIQUID SAMPLES		
Cost of Analysis per Sampling Event	$0.00	per Event
SAMPLING EVENTS		
Number of sampling events	0	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF SURFACE WATER AND LIQUID SAMPLES	$0.00	

Treatment and Disposal Summary (TD_01-1)

Treatment and Disposal of Wastes (TD-02)	$0.00
Treatment and Disposal of Decontamination Fluids (TD-03)	$0.00
Total Cost of Treatment and Disposal	$0.00

Treatment and Disposal of Waste (TD_02-1)

SOLID WASTE TREATMENT AND DISPOSAL		
Solid Waste Type (Optional: Enter Name)	0	
Volume in yd3 of solid waste to be treated and disposed of	0.0	yd3
Treatment and disposal costs per yd3	$0.00	per yd3
Cost to Treat and Dispose of Solid Waste	$0.00	
LIQUID WASTE TREATMENT AND DISPOSAL		
Liquid Waste Type (Optional: Enter Name)	0	
Volume in gallons of liquid waste to be treated and disposed of	0.0	gal
Treatment and disposal costs per gallon	$0.00	per Gallon
Cost to Treat and Dispose of Liquid Waste	$0.00	
DRUMMED WASTE TREATMENT AND DISPOSAL		
Drummed Waste Type (Optional: Enter Name)	0	
Number of drums to be treated and disposed of	0	Drums
Treatment and disposal costs per drum	$0.00	per Drum
Cost to Treat and Dispose of Drummed Waste	$0.00	
TOTAL COST FOR TREATMENT AND DISPOSAL OF WASTE	$0.00	

Tank Systems Summary (TS_02-1)

Removal of Waste (TS-03)	$0.00	
Tank System Purging (ignitable waste only) (TS-04)	$0.00	
Flushing the Tank and Piping (TS-05)	$0.00	
Excavation, Disassembly, and Loading (TS-06)	$358.74	
Demolition and Removal of Containment System (TS-07)	$0.00	
Removal of Soil (TS-08)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$2,675.70	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$3,034.44	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$212.41	
Certification of Closure (TS-09)	$0.00	
Subtotal	$3,246.85	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$649.37	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$3,896.22	

Tank Systems Inventory (TS_01-1)

UNIT DESCRIPTION AND MAXIMUM PERMITTED CAPACITY

Type of tank system	Aboveground	
Height or length of tank	7.0	ft
Diameter of tank	4.0	ft
Maximum permitted capacity of the tank	300.0	gal
Total length of ancillary piping	20.0	ft
Nominal diameter of ancillary piping	2.0	in
Maximum capacity of ancillary piping	3.3	gal
Maximum capacity of tank and ancillary piping	303.3	gal

SURFACE AREA OF TANK SYSTEM

Surface area of tank (interior and exterior)	201.1	ft2

VOLUME OF TANK SYSTEM TO BE REMOVED

Volume of Tank System to be Removed	40.5	ft3
Volume of Tank System to be Removed in yd3	1.5	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM PAD

Length	10.0	ft
Width	10.0	ft
Surface Area of Secondary Containment System Pad	100.0	ft2
Surface Area of Secondary Containment System Pad in yd2	11.1	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM PAD

Thickness	0.5	ft
Volume of Secondary Containment Pad	1.8	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM BERM

Total Length	40.0	ft
Height	0.5	ft
Surface Area of Secondary Containment System Berm	20.0	ft2
Surface Area of Secondary Containment System Berm in yd2	2.2	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM BERM

Thickness	0.5	ft
Volume of Secondary Containment System Berm	0.4	yd3

SURFACE AREA OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Surface Area of Other Structures	0.0	ft2

Surface Area of Other Structures in yd2	0.0	yd2

VOLUME OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Volume of Other Structures	0.0	yd3

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft
Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Tank Systems Excavation, Disassembly, and Loading (TS_06-1)

DISASSEMBLY OF ANCILLARY PIPING

Length of ancillary piping to be disassembled	20.0	ft
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$75.86	per Work Hour
Work rate required to disassemble one foot of pipe	0.1500	Work hr per Ft
Number of hours required to disassemble ancillary piping	3.0	Work hrs
Cost of Disassembly of Ancillary Piping	$227.58	

EXCAVATION AND LOADING (FOR IN-GROUND AND UNDERGROUND TANKS ONLY)

Capacity of Tank	0.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$532.15	per Work Hour
Work rate required to excavate and load tank per gallon capacity	0.000000	Work hr per gal
Number of hours required to excavate and load tank	0.0	Work hrs
Cost to Excavate and Load Tank	$0.00	

REMOVE TANK (FOR ON-GROUND AND ABOVEGROUND TANKS ONLY)

Capacity of Tank	300.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$132.48	per Work Hour
Work rate required to load tank per gallon capacity	0.003300	Work hr per gal
Number of hours required to load tank	0.99	Work hrs
Cost to Load Tank	$131.16	
TOTAL COST OF EXCAVATION, DISASSEMBLY, AND LOADING	$358.74	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	2	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$1,369.68
Wipe Sample (SA-06)	$1,306.02
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$2,675.70

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES

Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$1,369.68	

Facility: Precious Metals Recovery LLC **Unit:** Waste Solution Settling Tank 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	2	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	1.0	Work hrs
Cost of Collection per Sampling Event	$85.82	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$1,306.02	

Facility: Precious Metals Recovery LLC **Unit:** Waste Solution Settling Tank 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Tank Systems Summary (TS_02-1)

Removal of Waste (TS-03)	$0.00	
Tank System Purging (ignitable waste only) (TS-04)	$0.00	
Flushing the Tank and Piping (TS-05)	$0.00	
Excavation, Disassembly, and Loading (TS-06)	$1,439.08	
Demolition and Removal of Containment System (TS-07)	$0.00	
Removal of Soil (TS-08)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$2,675.70	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$4,114.78	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$288.03	
Certification of Closure (TS-09)	$0.00	
Subtotal	$4,402.81	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$880.56	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$5,283.37	

Tank Systems Inventory (TS_01-1)

UNIT DESCRIPTION AND MAXIMUM PERMITTED CAPACITY

Type of tank system	Aboveground	
Height or length of tank	12.0	ft
Diameter of tank	11.0	ft
Maximum permitted capacity of the tank	7,150.0	gal
Total length of ancillary piping	15.0	ft
Nominal diameter of ancillary piping	2.0	in
Maximum capacity of ancillary piping	2.4	gal
Maximum capacity of tank and ancillary piping	7,152.4	gal

SURFACE AREA OF TANK SYSTEM

Surface area of tank (interior and exterior)	1,019.4	ft2

VOLUME OF TANK SYSTEM TO BE REMOVED

Volume of Tank System to be Removed	956.1	ft3
Volume of Tank System to be Removed in yd3	35.4	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM PAD

Length	10.0	ft
Width	10.0	ft
Surface Area of Secondary Containment System Pad	100.0	ft2
Surface Area of Secondary Containment System Pad in yd2	11.1	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM PAD

Thickness	0.5	ft
Volume of Secondary Containment Pad	1.8	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM BERM

Total Length	40.0	ft
Height	0.5	ft
Surface Area of Secondary Containment System Berm	20.0	ft2
Surface Area of Secondary Containment System Berm in yd2	2.2	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM BERM

Thickness	0.5	ft
Volume of Secondary Containment System Berm	0.4	yd3

SURFACE AREA OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Surface Area of Other Structures	0.0	ft2

Surface Area of Other Structures in yd2	0.0	yd2

VOLUME OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Volume of Other Structures	0.0	yd3

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft
Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Tank Systems Excavation, Disassembly, and Loading (TS_06-1)

DISASSEMBLY OF ANCILLARY PIPING

Length of ancillary piping to be disassembled	15.0	ft
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$75.86	per Work Hour
Work rate required to disassemble one foot of pipe	0.1500	Work hr per Ft
Number of hours required to disassemble ancillary piping	2.2	Work hrs
Cost of Disassembly of Ancillary Piping	$166.89	

EXCAVATION AND LOADING (FOR IN-GROUND AND UNDERGROUND TANKS ONLY)

Capacity of Tank	0.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$532.15	per Work Hour
Work rate required to excavate and load tank per gallon capacity	0.000000	Work hr per gal
Number of hours required to excavate and load tank	0.0	Work hrs
Cost to Excavate and Load Tank	$0.00	

REMOVE TANK (FOR ON-GROUND AND ABOVEGROUND TANKS ONLY)

Capacity of Tank	7,150.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$222.41	per Work Hour
Work rate required to load tank per gallon capacity	0.000800	Work hr per gal
Number of hours required to load tank	5.72	Work hrs
Cost to Load Tank	$1,272.19	
TOTAL COST OF EXCAVATION, DISASSEMBLY, AND LOADING	$1,439.08	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	2	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$1,369.68
Wipe Sample (SA-06)	$1,306.02
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$2,675.70

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES

Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$1,369.68	

Facility: Precious Metals Recovery LLC **Unit:** Waste Solution Storage Tanks 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	2	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	1.0	Work hrs
Cost of Collection per Sampling Event	$85.82	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$1,306.02	

Facility: Precious Metals Recovery LLC **Unit:** Waste Solution Storage Tanks 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Treatment and Disposal Summary (TD_01-1)

Treatment and Disposal of Wastes (TD-02)	$0.00
Treatment and Disposal of Decontamination Fluids (TD-03)	$0.00
Total Cost of Treatment and Disposal	$0.00

Treatment and Disposal of Waste (TD_02-1)

SOLID WASTE TREATMENT AND DISPOSAL

Solid Waste Type (Optional: Enter Name)	0	
Volume in yd3 of solid waste to be treated and disposed of	0.0	yd3
Treatment and disposal costs per yd3	$0.00	per yd3
Cost to Treat and Dispose of Solid Waste	$0.00	

LIQUID WASTE TREATMENT AND DISPOSAL

Liquid Waste Type (Optional: Enter Name)	0	
Volume in gallons of liquid waste to be treated and disposed of	0.0	gal
Treatment and disposal costs per gallon	$0.00	per Gallon
Cost to Treat and Dispose of Liquid Waste	$0.00	

DRUMMED WASTE TREATMENT AND DISPOSAL

Drummed Waste Type (Optional: Enter Name)	0	
Number of drums to be treated and disposed of	0	Drums
Treatment and disposal costs per drum	$0.00	per Drum
Cost to Treat and Dispose of Drummed Waste	$0.00	
TOTAL COST FOR TREATMENT AND DISPOSAL OF WASTE	$0.00	

Facility: Precious Metals Recovery LLC **Unit:** Waste Solution Tank 03/05/2013

Tank Systems Summary (TS_02-1)

Removal of Waste (TS-03)	$0.00	
Tank System Purging (ignitable waste only) (TS-04)	$0.00	
Flushing the Tank and Piping (TS-05)	$0.00	
Excavation, Disassembly, and Loading (TS-06)	$260.07	
Demolition and Removal of Containment System (TS-07)	$0.00	
Removal of Soil (TS-08)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$2,675.70	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$2,935.77	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$205.50	
Certification of Closure (TS-09)	$0.00	
Subtotal	$3,141.27	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$628.25	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$3,769.52	

Tank Systems Inventory (TS_01-1)

UNIT DESCRIPTION AND MAXIMUM PERMITTED CAPACITY

Type of tank system	Aboveground	
Height or length of tank	6.0	ft
Diameter of tank	5.0	ft
Maximum permitted capacity of the tank	400.0	gal
Total length of ancillary piping	10.0	ft
Nominal diameter of ancillary piping	2.0	in
Maximum capacity of ancillary piping	1.6	gal
Maximum capacity of tank and ancillary piping	401.6	gal

SURFACE AREA OF TANK SYSTEM

Surface area of tank (interior and exterior)	227.8	ft2

VOLUME OF TANK SYSTEM TO BE REMOVED

Volume of Tank System to be Removed	53.7	ft3
Volume of Tank System to be Removed in yd3	2.0	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM PAD

Length	10.0	ft
Width	10.0	ft
Surface Area of Secondary Containment System Pad	100.0	ft2
Surface Area of Secondary Containment System Pad in yd2	11.1	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM PAD

Thickness	0.5	ft
Volume of Secondary Containment Pad	1.8	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM BERM

Total Length	40.0	ft
Height	0.5	ft
Surface Area of Secondary Containment System Berm	20.0	ft2
Surface Area of Secondary Containment System Berm in yd2	2.2	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM BERM

Thickness	0.5	ft
Volume of Secondary Containment System Berm	0.4	yd3

SURFACE AREA OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Surface Area of Other Structures	0.0	ft2

Surface Area of Other Structures in yd2	0.0	yd2

VOLUME OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Volume of Other Structures	0.0	yd3

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft
Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Tank Systems Excavation, Disassembly, and Loading (TS_06-1)

DISASSEMBLY OF ANCILLARY PIPING

Length of ancillary piping to be disassembled	10.0	ft
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$75.86	per Work Hour
Work rate required to disassemble one foot of pipe	0.1500	Work hr per Ft
Number of hours required to disassemble ancillary piping	1.5	Work hrs
Cost of Disassembly of Ancillary Piping	$113.79	

EXCAVATION AND LOADING (FOR IN-GROUND AND UNDERGROUND TANKS ONLY)

Capacity of Tank	0.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$532.15	per Work Hour
Work rate required to excavate and load tank per gallon capacity	0.000000	Work hr per gal
Number of hours required to excavate and load tank	0.0	Work hrs
Cost to Excavate and Load Tank	$0.00	

REMOVE TANK (FOR ON-GROUND AND ABOVEGROUND TANKS ONLY)

Capacity of Tank	400.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$182.85	per Work Hour
Work rate required to load tank per gallon capacity	0.002000	Work hr per gal
Number of hours required to load tank	0.8	Work hrs
Cost to Load Tank	$146.28	
TOTAL COST OF EXCAVATION, DISASSEMBLY, AND LOADING	$260.07	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	2	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$1,369.68
Wipe Sample (SA-06)	$1,306.02
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$2,675.70

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES

Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$1,369.68	

Facility: Precious Metals Recovery LLC **Unit:** Waste Solution Tank 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	2	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	1.0	Work hrs
Cost of Collection per Sampling Event	$85.82	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$1,306.02	

Facility: Precious Metals Recovery LLC **Unit:** Waste Solution Tank 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Facility: Precious Metals Recovery LLC **Unit:** Caustic Soda Storage Tank 03/05/2013

Tank Systems Summary (TS_02-1)

Removal of Waste (TS-03)	$0.00	
Tank System Purging (ignitable waste only) (TS-04)	$0.00	
Flushing the Tank and Piping (TS-05)	$0.00	
Excavation, Disassembly, and Loading (TS-06)	$2,208.70	
Demolition and Removal of Containment System (TS-07)	$0.00	
Removal of Soil (TS-08)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$2,675.70	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$4,884.40	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$341.91	
Certification of Closure (TS-09)	$0.00	
Subtotal	$5,226.31	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$1,045.26	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$6,271.57	

Tank Systems Inventory (TS_01-1)

UNIT DESCRIPTION AND MAXIMUM PERMITTED CAPACITY

Type of tank system	Aboveground	
Height or length of tank	8.0	ft
Diameter of tank	5.0	ft
Maximum permitted capacity of the tank	750.0	gal
Total length of ancillary piping	170.0	ft
Nominal diameter of ancillary piping	2.0	in
Maximum capacity of ancillary piping	27.7	gal
Maximum capacity of tank and ancillary piping	777.7	gal

SURFACE AREA OF TANK SYSTEM

Surface area of tank (interior and exterior)	290.6	ft2

VOLUME OF TANK SYSTEM TO BE REMOVED

Volume of Tank System to be Removed	104.0	ft3
Volume of Tank System to be Removed in yd3	3.9	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM PAD

Length	13.0	ft
Width	12.0	ft
Surface Area of Secondary Containment System Pad	156.0	ft2
Surface Area of Secondary Containment System Pad in yd2	17.3	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM PAD

Thickness	0.5	ft
Volume of Secondary Containment Pad	2.9	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM BERM

Total Length	50.0	ft
Height	0.5	ft
Surface Area of Secondary Containment System Berm	25.0	ft2
Surface Area of Secondary Containment System Berm in yd2	2.8	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM BERM

Thickness	0.5	ft
Volume of Secondary Containment System Berm	0.5	yd3

SURFACE AREA OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Surface Area of Other Structures	0.0	ft2

Surface Area of Other Structures in yd2	0.0	yd2

VOLUME OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Volume of Other Structures	0.0	yd3

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft
Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Tank Systems Excavation, Disassembly, and Loading (TS_06-1)

DISASSEMBLY OF ANCILLARY PIPING

Length of ancillary piping to be disassembled	170.0	ft
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$75.86	per Work Hour
Work rate required to disassemble one foot of pipe	0.1500	Work hr per Ft
Number of hours required to disassemble ancillary piping	25.5	Work hrs
Cost of Disassembly of Ancillary Piping	$1,934.43	

EXCAVATION AND LOADING (FOR IN-GROUND AND UNDERGROUND TANKS ONLY)

Capacity of Tank	0.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$532.15	per Work Hour
Work rate required to excavate and load tank per gallon capacity	0.000000	Work hr per gal
Number of hours required to excavate and load tank	0.0	Work hrs
Cost to Excavate and Load Tank	$0.00	

REMOVE TANK (FOR ON-GROUND AND ABOVEGROUND TANKS ONLY)

Capacity of Tank	750.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$182.85	per Work Hour
Work rate required to load tank per gallon capacity	0.002000	Work hr per gal
Number of hours required to load tank	1.5	Work hrs
Cost to Load Tank	$274.27	
TOTAL COST OF EXCAVATION, DISASSEMBLY, AND LOADING	$2,208.70	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	2	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$1,369.68
Wipe Sample (SA-06)	$1,306.02
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$2,675.70

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES

Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$1,369.68	

Facility: Precious Metals Recovery LLC **Unit:** Caustic Soda Storage Tank 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	2	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	1.0	Work hrs
Cost of Collection per Sampling Event	$85.82	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$1,306.02	

Facility: Precious Metals Recovery LLC **Unit:** Caustic Soda Storage Tank 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Tank Systems Summary (TS_02-1)

Removal of Waste (TS-03)	$0.00	
Tank System Purging (ignitable waste only) (TS-04)	$0.00	
Flushing the Tank and Piping (TS-05)	$0.00	
Excavation, Disassembly, and Loading (TS-06)	$2,000.67	
Demolition and Removal of Containment System (TS-07)	$0.00	
Removal of Soil (TS-08)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$2,675.70	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$4,676.37	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$327.35	
Certification of Closure (TS-09)	$0.00	
Subtotal	$5,003.72	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$1,000.74	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$6,004.46	

Tank Systems Inventory (TS_01-1)

UNIT DESCRIPTION AND MAXIMUM PERMITTED CAPACITY

Type of tank system	Aboveground	
Height or length of tank	5.0	ft
Diameter of tank	3.0	ft
Maximum permitted capacity of the tank	100.0	gal
Total length of ancillary piping	170.0	ft
Nominal diameter of ancillary piping	2.0	in
Maximum capacity of ancillary piping	27.7	gal
Maximum capacity of tank and ancillary piping	127.7	gal

SURFACE AREA OF TANK SYSTEM

Surface area of tank (interior and exterior)	108.4	ft2

VOLUME OF TANK SYSTEM TO BE REMOVED

Volume of Tank System to be Removed	17.1	ft3
Volume of Tank System to be Removed in yd3	0.6	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM PAD

Length	13.0	ft
Width	12.0	ft
Surface Area of Secondary Containment System Pad	156.0	ft2
Surface Area of Secondary Containment System Pad in yd2	17.3	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM PAD

Thickness	0.5	ft
Volume of Secondary Containment Pad	2.9	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM BERM

Total Length	50.0	ft
Height	0.5	ft
Surface Area of Secondary Containment System Berm	25.0	ft2
Surface Area of Secondary Containment System Berm in yd2	2.8	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM BERM

Thickness	0.0	ft
Volume of Secondary Containment System Berm	0.0	yd3

SURFACE AREA OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Surface Area of Other Structures	0.0	ft2

Surface Area of Other Structures in yd2	0.0	yd2

VOLUME OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Volume of Other Structures	0.0	yd3

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft
Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Tank Systems Excavation, Disassembly, and Loading (TS_06-1)

DISASSEMBLY OF ANCILLARY PIPING

Length of ancillary piping to be disassembled	170.0	ft
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$75.86	per Work Hour
Work rate required to disassemble one foot of pipe	0.1500	Work hr per Ft
Number of hours required to disassemble ancillary piping	25.5	Work hrs
Cost of Disassembly of Ancillary Piping	$1,934.43	

EXCAVATION AND LOADING (FOR IN-GROUND AND UNDERGROUND TANKS ONLY)

Capacity of Tank	0.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$532.15	per Work Hour
Work rate required to excavate and load tank per gallon capacity	0.000000	Work hr per gal
Number of hours required to excavate and load tank	0.0	Work hrs
Cost to Excavate and Load Tank	$0.00	

REMOVE TANK (FOR ON-GROUND AND ABOVEGROUND TANKS ONLY)

Capacity of Tank	100.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$132.48	per Work Hour
Work rate required to load tank per gallon capacity	0.005000	Work hr per gal
Number of hours required to load tank	0.5	Work hrs
Cost to Load Tank	$66.24	
TOTAL COST OF EXCAVATION, DISASSEMBLY, AND LOADING	$2,000.67	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	2	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$1,369.68
Wipe Sample (SA-06)	$1,306.02
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$2,675.70

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES

Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$1,369.68	

Facility: Precious Metals Recovery LLC **Unit:** HCl Storage Tank 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	2	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	1.0	Work hrs
Cost of Collection per Sampling Event	$85.82	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$1,220.20	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$1,306.02	

Facility: Precious Metals Recovery LLC **Unit:** HCl Storage Tank 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	2	$1,220.20	0	$1,220.20

Tank Systems Summary (TS_02-1)

Removal of Waste (TS-03)	$34.59	
Tank System Purging (ignitable waste only) (TS-04)	$29.61	
Flushing the Tank and Piping (TS-05)	$975.80	
Excavation, Disassembly, and Loading (TS-06)	$214.85	
Demolition and Removal of Containment System (TS-07)	$1,615.30	
Removal of Soil (TS-08)	$0.00	
Backfill and Grading (BF-01)	$0.00	
Decontamination (DC-01)	$0.00	
Sampling and Analysis (SA-02)	$1,455.50	
Monitoring Well Installation (MW-01)	$0.00	
Transportation (TR-01)	$0.00	
Treatment and Disposal (TD-01)	$0.00	
User Defined Cost (UD-01)	$0.00	
Subtotal of Closure Costs	$4,325.65	
Percentage of Engineering Expenses	7.0	%
Engineering Expenses	$302.80	
Certification of Closure (TS-09)	$0.00	
Subtotal	$4,628.45	
Percentage of Contingency Allowance	20.0	%
Contingency Allowance	$925.69	
Landfill Closure (Cover Installation) (CI-02)	$0.00	
TOTAL COST OF CLOSURE	$5,554.14	

Tank Systems Inventory (TS_01-1)

UNIT DESCRIPTION AND MAXIMUM PERMITTED CAPACITY

Type of tank system	Aboveground	
Height or length of tank	4.0	ft
Diameter of tank	5.0	ft
Maximum permitted capacity of the tank	587.5	gal
Total length of ancillary piping	0.0	ft
Nominal diameter of ancillary piping	0.0	in
Maximum capacity of ancillary piping	0.0	gal
Maximum capacity of tank and ancillary piping	587.5	gal

SURFACE AREA OF TANK SYSTEM

Surface area of tank (interior and exterior)	164.9	ft2

VOLUME OF TANK SYSTEM TO BE REMOVED

Volume of Tank System to be Removed	78.5	ft3
Volume of Tank System to be Removed in yd3	2.9	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM PAD

Length	10.0	ft
Width	10.0	ft
Surface Area of Secondary Containment System Pad	100.0	ft2
Surface Area of Secondary Containment System Pad in yd2	11.1	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM PAD

Thickness	0.5	ft
Volume of Secondary Containment Pad	1.8	yd3

SURFACE AREA OF SECONDARY CONTAINMENT SYSTEM BERM

Total Length	40.0	ft
Height	0.5	ft
Surface Area of Secondary Containment System Berm	20.0	ft2
Surface Area of Secondary Containment System Berm in yd2	2.2	yd2

VOLUME OF SECONDARY CONTAINMENT SYSTEM BERM

Thickness	0.5	ft
Volume of Secondary Containment System Berm	0.4	yd3

SURFACE AREA OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Surface Area of Other Structures	0.0	ft2

Surface Area of Other Structures in yd2	0.0	yd2

VOLUME OF OTHER STRUCTURES IN SECONDARY CONTAINMENT SYSTEM

Volume of Other Structures	0.0	yd3

VOLUME OF CONTAMINATED SOIL TO BE REMOVED

Length	0.0	ft
Width	0.0	ft
Depth	0.0	ft
Volume of Contaminated Soil to be Removed	0.0	ft3
Volume of Contaminated Soil to be Removed in yd3	0.0	yd3

Tank Systems Removal of Waste (TS_03-1)

Maximum volume of waste to be removed from the tank and ancillary piping	587.5	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$172.96	per Work Hour
Work rate required to remove waste from tank and ancillary piping	0.0003	Work hr per gal
Number of hours required to remove waste from tank and ancillary piping	0.2	Work hrs
TOTAL COST OF REMOVAL OF WASTE FROM TANK AND ANCILLARY PIPING	$34.59	

Tank Systems Purging (TS_04-1)

Maximum capacity of the tank system	587.5	gal
Amount of solid carbon dioxide (dry ice) needed per gal capacity	1.5	lb per 100 gal
Amount of dry ice needed to purge tank system	8.8	lb
Cost of dry ice	$2.60	per Pound
Cost of dry ice needed to purge tank system	$22.88	
Choose the appropriate level of PPE	Protection Level D	
Labor cost per work hour	$67.29	per Work Hour
Work rate required to purge tank	0.0002	Work hr per gal
Number of hours required to purge tank	0.1	Work hrs
Labor Cost to Purge Tank System	$6.73	
TOTAL COST OF TANK SYSTEM PURGING	$29.61	

Flushing the Tank and Piping (TS_05-1)

Maximum capacity of the tank and ancillary piping	587.5	gal
Number of times tank and ancillary piping are flushed	1	
Total volume of flushing solution	587.5	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$172.96	per Work Hour
Work rate required to flush tank and ancillary piping	0.0006	Work hr per gal
Number of hours required to flush tank and ancillary piping	0.4	Work hrs
Subtotal of labor and equipment cost to flush tank and ancillary piping	$69.18	
Flushing solution is contained in:	Drums	
Number of drums required to contain flushing solution	11	Drums
Cost of one drum	$82.42	
Cost of drums needed to contain flushing solution	$906.62	
TOTAL COST TO FLUSH TANK AND ANCILLARY PIPING	$975.80	

Tank Systems Excavation, Disassembly, and Loading (TS_06-1)

DISASSEMBLY OF ANCILLARY PIPING

Length of ancillary piping to be disassembled	0.0	ft
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$75.86	per Work Hour
Work rate required to disassemble one foot of pipe	0.1500	Work hr per Ft
Number of hours required to disassemble ancillary piping	0.0	Work hrs
Cost of Disassembly of Ancillary Piping	$0.00	

EXCAVATION AND LOADING (FOR IN-GROUND AND UNDERGROUND TANKS ONLY)

Capacity of Tank	0.0	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$532.15	per Work Hour
Work rate required to excavate and load tank per gallon capacity	0.000000	Work hr per gal
Number of hours required to excavate and load tank	0.0	Work hrs
Cost to Excavate and Load Tank	$0.00	

REMOVE TANK (FOR ON-GROUND AND ABOVEGROUND TANKS ONLY)

Capacity of Tank	587.5	gal
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$182.85	per Work Hour
Work rate required to load tank per gallon capacity	0.002000	Work hr per gal
Number of hours required to load tank	1.175	Work hrs
Cost to Load Tank	$214.85	
TOTAL COST OF EXCAVATION, DISASSEMBLY, AND LOADING	$214.85	

Demolition and Removal of Containment System (TS_07-1)

DEMOLITION OF CONTAINMENT SYSTEM

Area of containment system	120.0	ft2
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$65.61	per Work Hour
Work rate required to demolish one ft2 of containment system	0.0300	Work hr per ft2
Number of hours required to demolish the containment system	3.6	
Cost to Demolish the Containment System	$236.20	

REMOVAL AND LOADING OF CONTAINMENT SYTEM

Volume of containment system	2.2	yd3
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$82.65	per Work Hour
Work rate required to remove and load one yd3	0.2670	Work hr per yd3
Number of hours required to remove and load the containment system	0.6	Work hrs
Subtotal of labor and equipment cost to remove and load the containment system	$49.59	
Number of debris box containers needed to hold containment system	1	Containers
Cost of one 20-yd3 -capacity debris box container (rent per week)	$838.01	per Container
Cost of containers	$838.01	
Cost of mobilization and demobilization (flat rate)	$491.50	
Cost to Remove and Load Containment System	$1,379.10	
TOTAL COST OF DEMOLITION AND REMOVAL OF CONTAINMENT SYSTEM	$1,615.30	

Sampling and Analysis Inventory (SA_01-1)

Number of Drilling and Subsurface Soil Samples (2.5-inch boring)	0	Samples
Number of Drilling and Subsurface Soil Samples (4-inch boring)	0	Samples
Number of Concrete Core Samples	2	Samples
Number of Wipe Sample Locations	2	Sample Location
Number of Surface Water and Liquid Sample Locations	0	Sample Location
Number of Soil, Sludge, and Sediment Soil Samples	0	Sample Location
Number of Groundwater Sample Locations	0	Sample Location
Number of Lysimeters to be Sampled	0	Lysimeters

Sampling and Analysis Summary (SA_02-1)

Drilling and Subsurface Soil Sample - 2.5-Inch-Diameter-Holes (SA-03)	$0.00
Drilling and Subsurface Soil Sample - 4-Inch-Diameter-Holes (SA-04)	$0.00
Concrete Core Sample (SA-05)	$759.58
Wipe Sample (SA-06)	$695.92
Surface Water and Liquid Sample (SA-07)	$0.00
Soil, Sludge, and Sediment Sample (SA-08)	$0.00
Groundwater Sample (SA-09)	$0.00
Soil-Pore Liquid Sample (SA-10)	$0.00
Analysis of Subsurface Soil Sample (SA-11)	$0.00
TOTAL SAMPLING AND ANALYSIS COST	$1,455.50

Concrete Core Samples (SA_05-1)

COLLECTION OF CORE SAMPLES

Number of corings to be drilled	2	Coring Samples
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$74.74	per Work Hour
Work rate to drill each core sample to a 6-inch depth	1.0000	Work hrs per Sample
Number of hours required to drill 3-inch-diameter boring	2.0	Work hrs
Cost of Collection per Sampling Event	$149.48	per Event

ANALYSIS OF DRILLING SAMPLE

Cost of Analysis per Sampling Event	$610.10	per Event

SAMPLING EVENTS

Number of sampling events	1	Events per yr
TOTAL COST OF SAMPLING AND ANALYSIS OF CORE SAMPLES	$759.58	

Facility: Precious Metals Recovery LLC **Unit:** Filter Press 03/05/2013

Concrete Core Samples (SA_05)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	1	$1,220.20	0	$610.10

Wipe Samples (SA_06-1)

COLLECTION OF WIPE SAMPLES

Number of sampling locations	2	Sample Location
Choose the appropriate level of PPE	Protection Level D	
Labor and equipment cost per work hour	$85.82	per Work Hour
Work rate required to collect samples from one sampling location	0.5000	Work hrs per Sample
Number of hours required to collect all samples	1.0	Work hrs
Cost of Collection per Sampling Event	$85.82	per Event

ANALYSIS OF WIPE SAMPLE

Cost of Analysis per Sampling Event	$610.10	per Event

SAMPLING EVENTS

Number of sampling events	1	Events
TOTAL COST OF SAMPLING AND ANALYSIS OF WIPE SAMPLES	$695.92	

Facility: Precious Metals Recovery LLC **Unit:** Filter Press 03/05/2013

Wipe Samples (SA_06)
Cost of Analysis per Sampling Event

Method		Standard	Qty	Quick	Qty	Total
Targeted TCLP (metals, volatiles, semivolatiles only)	Both	$610.10	1	$1,220.20	0	$610.10

APPENDIX 20-A

Groundwater Characterization Field Study Plan

Precious Metals Recovery LLC

Groundwater Characterization Field Study Plan

Prepared for:
Precious Metals Recovery LLC

Prepared by:
JBR Environmental Consultants, Inc.
8484 Crater Lake Highway
White City, Oregon 97503

Project Number: B.A10424.00

September 13, 2012

USE OF THIS REPORT

The material and data in this technical report were prepared under the supervision and direction of the undersigned. This report has been prepared by JBR Environmental Consultants, Inc. (JBR) for the exclusive use of Precious Metals Recovery LLC (PMR). JBR has recommended services in accordance with generally accepted engineering and consulting standards for environmental work in effect at the time and locality services were performed. The reuse of information, conclusions, and recommendations provided herein by JBR or others in connection with any other site and without JBR's written permission shall be at their sole risk and without liability to JBR.

This document was prepared under the supervision and direction of the following key staff.

JBR ENVIRONMENTAL CONSULTANTS, INC.

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1 INTRODUCTION

This Groundwater Characterization Field Study Plan (Plan) provides the rationale and procedures for a groundwater characterization to be conducted at the site. The site is situated in the Crescent Valley, Dry Hills and Cortez Mountain Range of Eureka and Lander Counties, Nevada. The site is within the central portion of the Battle Mountain Gold Belt approximately 22 miles northeast of the Cortez gold mine.

This characterization is being conducted in order to evaluate the current (i.e., baseline) aquifer characteristics of the uppermost aquifer beneath the site. Groundwater data collected for this baseline study will be used to meet the following specific data quality objectives (DQOs):

- Develop preliminary data for the hydrogeologic conceptual site model (CSM), including aquifer definition, groundwater elevations, groundwater flow directions and gradients, groundwater flow velocities, and aquifer parameters.
- Characterize pre-development and operational groundwater elevations and flow direction.
- Characterize groundwater chemistry and quality.

2 OBJECTIVES

The objective of this Plan is to provide field methods for the required tasks to meet the DQOs indicated in Section 1 and to fulfill the groundwater protection permit application requirements of Resource Conservation and Recovery Act (RCRA), Sections 3004 and 3005; 40 CFR Part 264, Subpart F; and 40 CFR Part 270. Consistent with the aforementioned federal codes, the purpose of the monitoring wells prescribed by this Plan is solely to complete the DQOs; while these monitoring wells may be used for a future groundwater monitoring program, their use after the DQOs have been achieved is beyond the scope of this Plan.

This Plan contains the required elements to generate sufficient site-specific hydrogeologic data for JBR to install a groundwater monitoring network that defines and yields representative groundwater level data and quality samples from the uppermost aquifer beneath the facility. The groundwater monitoring network will also be capable of determining the facility's impact (if any) on the quality of the ground water in the uppermost aquifer underlying the facility.

To achieve this, the groundwater monitoring system network will consist of a sufficient number of properly located and constructed wells that are capable of detecting if the facility has caused a statistically significant impact to the water quality of the uppermost aquifer.

Field personnel will thoroughly review this document prior to conducting field activities and will have a copy of the Plan available on site at all times for reference. Procedures in this Plan adhere to the recommended sampling and handling procedures outlined in the "RCRA Groundwater Monitoring Draft Technical Guidance Document" (USAPA, 1992) and recommendations listed in SW-846 (USEPA, 1986).

3 GEOLOGIC SETTING AND SITE HYDROGEOLOGY

3.1 Geologic Setting

The Project (see Figure 1) site is located in the Crescent Valley which is between the Shoshone and Cortez Mountains, a basin in the traditional Basin and Range setting of Nevada. Precious metal mineralization came during Jurassic-Miocene periods. The Pipeline complex lies within 600 feet (183 m) of silty limestone in what is called the Silurian Roberts Mountain Formation. Above this is Devonian Wenban Limestone, which acts as the host rock ofthe Cortez Hills deposit. Above the Devonian Limestone is Quaternary alluvium.[1]

Topography within Eureka County is comprised of north-south-trending mountain ranges typically 5-15 miles wide and intervening broad, alluvium-filled valleys or basins from 10 to 20 miles wide. The highest point in the county is Summit Mountain at 10,400 feet in the southern portion of the county, while the lowest point in the county is on the Humboldt River in the northwestern portion of the county. The Humboldt River drains the northern portion of the county and the southern portion drains into Diamond Valley.

Crescent Valley is topographically semi-closed. The Shoshone Range borders the valley on the west; the Cortez Mountains on the east; Toiyabe Range separates the southern end of Crescent Valley from Grass Valley; and The Humboldt River marks the northern extent of the Crescent Valley hydrographic area. In the northeastern part of the valley, a small bedrock ridge extends to the west-southwest from the northern end of the main Cortez Mountains. This ridge forms the Dry Hills, which give the floor of Crescent Valley its overall "Y" shape. The Project site is located on the eastern flank of the Dry Hills in the northeastern part of Crescent Valley.

The major mountain ranges within the county are Sulfur Spring, Roberts, and Cortez. Other major mountain ranges that are partly within the county are Tuscarora, Shoshone, Diamond, Simpson Park, Antelope, Monitor, and Fish Creek. These are generally north-to-northeast trending ranges with faults on either side of each range.

(1) Walker, S. (2009). Cortez Hills – the latest chapter. *Mining Magazine* 200 (Jan / Feb): 10 – 15.

3.2 Regional Geology and Hydrogeologic Setting

The following sections briefly describe the regional geologic framework and the site-specific hydrogeologic setting.

3.2.1 Regional Geology

The geology of Eureka County represents a complex history of Paleozoic marine and Mesozoic marine and non-marine sedimentary deposition in marginal continental accretionary, offshore marine basin settings. The deposition of these sediments was interspersed with periods of folding and thrust faulting as well as contemporaneous intrusive and extrusive activity. This was followed by Cenozoic and Tertiary crustal extension and the formation of horst and graben structures and large tilted fault-blocks that characterize the Basin and Range Physiographic Province. This period of crustal extension was also accompanied by magmatic and volcanic activity. In late Cenozoic time, the basins formed by the grabens of the Basin and Range Provincee filled with continental deposits and minor, predominantly basaltic, lava flows.

Thick sequences of sediments eroded from the block faulted mountains accumulated in these basins, which were intermittently inundated by lakes. Volcanoes formed throughout northern Nevada and frequently erupted flows of volcanic ash and lava. Today, much of the northeastern part of the state is covered with these volcanic rocks (Price, 2004). Quaternary deposits are present in many of the basin fill areas of Eureka County and consist predominantly of poorly consolidated to unconsolidated alluvial and lacustrine sediments.

3.2.2 Hydrogeologic Setting

Basin-fill deposits contain the primary aquifer in Crescent Valley. These deposits typically have higher permeability and water storage capacity than other geologic units in the region. Basin-fill deposits in Crescent Valley are estimated to be at least several thousand feet thick (Plume and Ponce, 1999). The total thickness of all basin-fill deposits in the deepest part of the Crescent Valley structural basin is estimated (Gilluly and Masursky, 1965) at 10,000 feet. The following description of the general hydrogeological setting of Crescent Valley is from Johnny Zhan (2012).

> *Groundwater flow in the upper parts of basin-fill deposits is typically unconfined and controlled by the elevation of the water table and by permeability contrasts within the deposits.*
>
> *Clay lenses are frequently encountered during well installations and siting of infiltration basins in Crescent Valley (Geomega, 2004). Beneath laterally extensive clay lenses, and at depth, groundwater may be confined.*

The degree to which basement rocks can transmit water depends on how extensively the rocks have been fractured or altered thermally or by dissolution. Although localized fracturing has been observed, especially in mineralized areas, it is unlikely that significant flow occurs in bedrock on a regional scale. Bedrock units have generally low primary permeability and fracture networks are usually local and limited within major fault blocks, as is typical of the Basin and Range province (Plume, 1996).

The climate in Crescent Valley is arid with high evapotranspiration (ET) rates. Precipitation rates increase with elevation, with the surrounding mountain blocks receiving the most precipitation and the valley floor the least. Precipitation occurs mainly as snowfall in the mountains during winter months and the highest precipitation occurs in the months of March through May.

Recharge to the groundwater flow system is generated primarily from rainfall and snowmelt on the mountains. A small portion of the precipitation which does not immediately evaporate infiltrates directly into the mountain-blocks bedrock, primarily through fractures. The major component is conveyed as stream-channel runoff to lower elevations where the water percolates into the alluvial fans along the mountain fronts. Stream flow reaches the valley floor only in the snowmelt season (March and April) or during prolonged periods of exceptionally intense rainfall.

Annual precipitation in Crescent Valley is similar to that throughout north-central Nevada, ranging from approximately 6 inches on the valley floor to greater than 20 inches in the mountains (Oregon State University, 2002). Recharge to groundwater is also dependent on elevation. The percentage of precipitation that reaches groundwater varies from near zero on the valley floor to 16 to 25 percent for mountainous areas (Berger, 2000; Maxey and Eakin, 1949).

Discharge from the groundwater flow system in the valley occurs primarily by ET from phreatophytes and evaporation from bare soil. ET occurs primarily on the valley floor, where the water table is closest to the surface. In northern and central Nevada, the depth at which ET by phreatophytes ceases is typically about 20 feet below ground surface (Prudic et al., 1995; Thomas et al., 1989). Evaporation from bare soils is generally limited to areas where water levels are within 10 feet of ground surface. Maximum evaporative losses occur from the playa, where the water table is at ground surface and ET rates can approach potential evaporation rates.

Within and at close proximity of the proposed facility, three bore holes, BH-1, BH-4, and BH-8, were drilled directly under the footprint of the proposed facility as part of a

geotechnical investigation. These were plugged when they were completed. Additionally, there are three wells on site, OW-1, DH-2 and MW-1 (see Figure 2).

- BH-1, BH-4, and BH-8 were all drilled in July 2012 to a total depth of 150 feet, and all three were dry.
- OW-1 was drilled in March 2012 to a total depth of 150 feet. It has remained dry since it was drilled.
- DH-2 is a pre-existing water well and its drill log is unavailable. The depth to water (DTW) measured in recent months is about 157.5 feet.
- MW-1 was drilled to a total depth of 160 feet in February 2012. When drilling operation stopped at 150 feet, the criteria depth specified in NAC, the hole was dry. After a pause, drilling operations continued and groundwater was first encountered at a depth of about 157.5 feet. The water level inside this well casing subsequently rose to about 143.5 feet indicating a confined condition caused by a low- permeability zone at 157.5 feet. MW-1 would be a dry hole if drilling had stopped at a depth of 150 feet. According to the definition of DTW, since groundwater was first encountered at 157.5 feet, and since a confining lens exists in the vicinity of the drill hole, DTW at the MW-1 area is 157.5 feet.

There are no surrounding wells near or close to the Project site with long time-series of water level data to demonstrate the potential seasonal fluctuation. All the nearby wells only have few recent measurements. However, in the south portion of the valley and outside of mining impact zones (pivots and rapid infiltration basins), seasonal fluctuations of shallow wells have been found in a range of 2-3 feet. It is expected that seasonal fluctuation of groundwater levels beneath the footprint of the proposed facility is small, if not negligible.

The direction of groundwater flow in the Great Basin is typically from areas of recharge in the mountain ranges toward areas of discharge. Shallow groundwater flow under natural conditions is typically from the higher topography in the mountains to the valley floors where groundwater is lost due to ET. Groundwater movement in the uppermost aquifer under the Project site is toward the south (see Figure 3).

4 EXISTING WELLS AND PROPOSED GROUNDWATER MONITORING NETWORK

The project will entail the drilling and installation of three new ground water monitoring wells; one located up gradient (north) of the facility and two located downgradient (south). The rationale for these wells is described in the subsequent sections. Proposed well locations are shown on Figure 2.

4.1 Upgradient Background Well

One upgradient well will be drilled to serve as a background well. During drilling, it will also provide subsurface lithology data and determine the depth to the uppermost aquifer beneath the subject site. This well will also help to define the presence and lithologic characteristics of a potential confining or semi-confining layer under the facility site (see Figure 2).

4.2 Downgradient Detection/Compliance Well

The two down gradient wells will be drilled to provide subsurface lithology data and determine the depth to the uppermost aquifer beneath the subject site. These wells could also be used later as compliance points during groundwater monitoring and as groundwater level monitoring points and as observation wells during pump tests. They will also help define the presence and lithologic characteristics of the potential confining or semi-confining layer under the facility. One of the downgradient wells will be constructed as a pumping well for aquifer testing (see Figure 2).

5 DRILLING AND SAMPLING PROCEDURES, WELL CONSTRUCTION AND DEVELOPMENT

The objective of the subsurface boring program is to begin to refine the broad, conceptual model derived during the preliminary investigation to better reflect the true site-specific hydrogeologic conditions.

5.1 Drilling and Continuous Core Sampling

To obtain relatively in situ samples of the subsurface materials, the wells will be drilled using Roto-sonic drilling methods. This method employs the use of high-frequency, resonant energy to advance a core barrel or casing into subsurface formations. During drilling, the resonant energy is transferred down the drill string to the bit face at various sonic frequencies simultaneously rotating the drill string and evenly distributing the energy and impact at the bit face.

When the resonant sonic energy coincides with the natural frequency of the drill string, resonance occurs. This results in the maximum amount of energy being delivered to the face. At the same time, friction of the soil immediately adjacent to the entire drill string is substantially minimized, resulting in very fast penetration.

Roto-sonic drilling advances a temporary outer casing as the borehole is drilled and provides a continuous, relatively undisturbed core sample and provides minimal disturbance to the surrounding borehole wall. Excellent (relatively undisturbed) depth- specific samples that are representative of the subsurface materials are obtained during drilling. Borehole samples will be classified according to their lithology by an experienced geologist. Samples of every geologic unit, especially any confining layers, will be collected and described, and the nature of all stratigraphic contacts will be determined. Undisturbed samples of the materials will be submitted to a geotechnical laboratory for determination of bulk density, particle size determination, and hydraulic conductivity. Color photographs will be taken (with scale) of representative samples from the borings.

During the subsurface investigation, continuous core samples will be collected for lithologic classifications so that the lithology, stratigraphy, and water bearing characteristics of the subsurface materials can be studied in detail. The continuous core samples will provide accurate depth-relative (in situ) subsurface lithologic information and accurate depths of lithologic contacts (especially any confining layers) beneath the site.

5.2 Onsite Supervision and Documentation

Installation of the monitoring wells will be supervised in the field by an experienced geologist or engineer under the supervision of a licensed hydrogeologist or engineer. The field geologist or engineer will work closely via phone communications with the licensed hydrogeologist or engineer in making final monitoring well depths, screened intervals, and other pertinent monitoring well construction decisions to communicate the contract drilling firm.

BORING LOG DESCRIPTIONS

The Uniform Soil Classification System (USCS) will be used to identify the sample material. It is important to include information on the, shape, size, grading (sorting), and color of lithologies drilled, the presence and orientation of bedding planes, joints and/or fractures, the degree of weathering, and any oxidation coatings or mineralization along joints, fractures, bedding planes, or other characteristics which may indicate water movement. Also, the presence of thin clay layers or sand stringers may be important and would be documented. Subtle changes in subsurface conditions may be indicative of features that could significantly influence groundwater flow. Geologists will retain all core samples for future review. A boring log form is provided as Appendix A.

FIELD NOTES

During the drilling of a borehole to be subsequently completed as a monitoring well, the trained geologist or engineer will record the following information in their field notes: geologist's or engineer's name, borehole number and location, drilling company and driller's name, date drilling started and finished, drilling equipment and method, drill bit type and size, borehole construction materials (e.g. diameter of casing, length of casing, volumes of sealant used, etc.), total borehole depth, geologic conditions with depth (lithology, texture, structure, bedding, color, alteration, mineralization, etc. referencing the United Soil Classification System), hydrogeologic conditions with depth (e.g. water producing zones, flow rates, depth to water, lost circulation zones, etc.), and other pertinent drilling conditions (e.g. casing advancement rates, types and volumes of fluids used during drilling).

5.3 Well Construction

The field geologist will consult with the licensed hydrogeologist or engineer to reach a consensus on the interval to be screened. Screen sections will be 20 feet in length. The total depth of the pumping well (MW-2A, Figure 2) will be determined on-site based on the hole influx observation and slug test results. However, it is expected that in order to stress the groundwater system enough in the proposed pumping test, its depth will be greater than the depth of the observation wells (TD = 180 ft) and its screen interval will be long enough to make it a fully penetrated well.

During construction of the monitoring wells, the geologist or engineer will record the methods and materials (i.e. length and type of casing and screen, volume of sand, volume of chips, volume of cement, etc.) used in construction. All casing installed will be in new or like new condition, being free of pits or breaks, and will be cleaned of foreign materials and contaminants prior to installation, unless removed from the manufacturer's packaging on site.

5.3.1 Well Construction Materials

The following materials will be used for each monitoring well installation:

1. PVC, threaded, flush-joint, 4-inch diameter, schedule 40 well casing.

2. PVC, (2) 10-foot lengths, threaded, flush-joint, continuous-slot and either 0.020" factory slot for finer grained units (silty-sand to sand) or 0.040" for coarser grained units (coarse sand to gravel).

3. 10-20 silica sand (for use with 0.020" slot screen) or 8-16 silica sand (for use with 0.040" slot screen) sufficient for filling the borehole hole annular space from the bottom of the hole to a point 2 feet above the top of the screen.

4. Medium bentonite chips sufficient to fill the borehole annulus from 2 feet above the screen to 20 feet below ground surface (bgs).

5. Neat cement (Type 1 Portland) sufficient to fill the annulus from 20 feet bgs to the surface.

6. 8-inch steel surface casing (with locking surface cap) sufficient in length to extend 5 feet below and 3 feet above the 4-inch thick surface pad.

Screen and filter pack types will be determined by the following criteria:

- If the shallow aquifer encountered in the downgradient well (to be used as the pumping well during the aquifer test) is a coarse grained unit (coarse sand or gravel

with few fines), it will be constructed with a 0.040" factory slot screen and a filter pack of 8-16 silica sand. 0.020" factory slot screens and 10-20 silica sand will be sufficient in the construction of the other wells.

- If the shallow aquifer has negligible fines and coarse sand to gravel, 0.040" factory slot screen and a filter pack of 8-16 silica sand can be used for all wells.
- If abundant fines are encountered in the shallow aquifer, 0.020" factory slot screens and 10-20 silica sand will be used in the construction of all wells.

5.3.2 Well Construction Methods

The following methods will be used for each monitoring well installation (see Figure 4):

- The Roto-sonic drill rig will advance the core barrel into the undisturbed formation. No air, drilling mud or water is used in the coring process.
- Using Roto-sonic drilling methods, override a larger diameter casing over the core barrel.
- Return the core barrel to the surface for sample extraction.
- Complete coring and overriding casing to desired total well depth.

1. Integral to the construction of each well will be the isolation of any shallower confining units, including alluvial or colluvial deposits, encountered above the uppermost aquifer that is to be monitored. Any alluvial and colluvial materials present at the well location will be isolated, photo-documented and (if warranted) sampled for potential further study and evaluation.

2. When groundwater is encountered, an electric water level sounder will be lowered into the hole to measure the depth to the water table. Recheck this measurement every 10 minutes for 1 hour until the change in water table elevation is less than 0.3 feet from the last measurement. If the water table elevation has stabilized in this time period, proceed to the next step, if not; continue to measure the water level every 15 minutes until the water level stabilizes (0.3 feet difference from the last measurement). After the water level stabilizes, proceed to the next step.

3. It will be of the upmost importance to document the lithology of the cored materials immediately above where the uppermost aquifer is encountered and the top of the aquifer itself. Photo-documentation and sampling for laboratory testing is warranted along with a detailed geologic description by an experienced field hydrogeologist.

4. Following the completion of the 8-inch (nominal) well boring to its total depth, the drillers will remove the drill string leaving the outer drill casing in place.

5. Assemble sections of the 4-inch PVC monitoring well casing and screen for well construction. Stainless steel centralizers will be attached at the top and bottom of the well screen.

6. Lower the PVC screen and riser pipe to the bottom of the boring at the depth determined in the field during drilling by the rig geologist. Securely cap the top of the well casing.

7. Place sand pack material into the hole to a point 2 feet above the top of the screen, while pulling up the temporary casing. Be careful the well casing is not pulled up with the temporary casing. DURING SAND PLACEMENT, THE DRILLER MUST "SOUND" THE TOP OF THE SAND PACK TO ENSURE BRIDGING DOES NOT OCCUR AND TO MEASURE THE EXACT DEPTH TO TOP OF SAND PACK IN ORDER TO DEMONSTRATE THE WELL IS COMPLETED AS DESIGNED.

8. Set the bentonite chip seal above the sand pack (2 feet of bentonite chips). The bentonite used for the filter pack seal will be adequately hydrated. HAVE THE DRILLER "SOUND" TO CONFIRM ACCURATE THICKNESS.

9. After the bentonite seal has set, the annular space between the borehole and the well casing will be filled with medium bentonite chips from top of the bentonite seal to 20 feet bgs.

10. The annular space from 20 feet bgs to the surface will be filled with a neat cement grout slurry consisting of Type 1 Portland cement; NO ACCELERATORS WILL BE USED TO INCREASE SET TIME.

11. The wells will be completed above the ground surface with an 8-inch steel security casing set into the cement grout. The security casing will extend 5 feet below and 3 feet above the surface pad. The top of the steel casing will have a locking lid. The well will be clearly marked as a monitoring well.

12. A 2-feet by 2-feet concrete pad, 4-inches thick will be placed around the wellhead. The surface pad will be sloped away from the wellhead. The well will be surrounded by four steel posts, each 3 feet above ground and set 1-2 feet into the ground to protect the well head from vehicular damage.

5.4 Monitoring Well Development

Monitoring well development will accomplish the following:

- Remove any water or drilling fluid introduced into the well during drilling;
- Stabilize the filter pack and formation materials opposite the well screen;
- Minimize the amount of fine-grained sediment entering the well; and
- Maximize well efficiency.

The wells will be developed by purging and then pumping. The wells will be considered developed when the field parameters (pH, conductivity, temperature, turbidity, dissolved oxygen (DO), and oxygen-reduction potential (ORP)) stabilize within 10 percent of the previous reading and the turbidity decreases. It is assumed that water generated during well development will be clean and can be discharged to the ground.

As appropriate, development procedures are provided below.

1. A minimum of 24 hours shall elapse after well construction and before well development. The development program will be implemented without the use of dispersing agents, acids, etc. Development will consist primarily of a combination of air lifting (we are using sonic so airlifting is not applicable we can us a pump) and pumping. If groundwater yield from the well is sufficient, over pumping will be used to optimize development. Surging with a surge block and bailing may also be performed, if necessary and practical. The development method will ultimately be selected by the field personnel and will depend on specific conditions encountered during drilling or well installation.

2. Temperature, pH, conductivity, turbidity, DO, and OPR will be monitored during development. Development will continue until the groundwater removed from the well is reasonably clear and free of sediments and the well produces water with stable field parameter readings (i.e., temperature, pH, conductivity).

3. During development pumping, groundwater levels and pumping rate will be monitored frequently. This information can be used to assess the bulk hydraulic properties on the saturated portion of the screen interval, assess the productivity of the well, and assist in the final selection of a pump for aquifer test or future sampling purposes.

5.5 Monitoring Well Survey

The locations and elevations of all monitoring wells will be surveyed using conventional land surveying methods. The horizontal locations of the wells/gauges will be surveyed to the nearest 0.1 foot referencing the North American Datum of 1983 (NAD83). Well elevations will be surveyed to the nearest 0.01 foot. Well elevations will be surveyed at both the ground surface and at a marked location (measuring point reference elevation) on the north side of the PVC casing referencing the North American Vertical Datum of 1988 (NAVD88). This reference point will be used for all future DTW measurements in each well.

6 AQUIFER TESTING

The objective of aquifer testing is to develop hydrogeologic parameter estimates for the aquifer, including permeability (i.e., transmissivity or hydraulic conductivity) and storativity. These parameters are necessary to refine the groundwater conceptual site model for the Site. The effects of recharge and discharge boundaries on groundwater levels during pumping will also be evaluated. Selected monitoring wells located farthest away from the pumping well will be slug tested via both rising head and falling head tests. The pump test well(s) will be evaluated with step-discharge and constant discharge tests, which involve maximizing the hydraulic stress (i.e., pumping) at the pumping well, in conjunction with monitoring drawdown at the pumping well, and nearby monitoring wells.

Aquifer testing will consist of the following elements: 1) baseline monitoring, 2) slug or bail tests at selected monitoring wells, 3) step-drawdown test at the pump test well(s), and 4) 72-hour constant discharge and recovery tests at the pump test well(s) while concurrently monitoring drawdown and recovery at the other monitoring wells. Baseline monitoring will be conducted under nonpumping conditions so that any external influences (e.g., precipitation, surface water influence, barometric pressure, seasonal variability, etc.) can be recorded. Slug or bail tests will be conducted to provide a preliminary estimate of aquifer parameters in low-yielding wells or in areas where the pumping influence is expected to be minimal. Data from the step-drawdown tests will be evaluated to estimate specific capacity, and drawdown in the pumping well(s) will be used to estimate sustainable pumping rates in the pumping well(s) during the constant discharge tests. Data from the constant discharge and recovery tests will be evaluated to estimate hydraulic conductivity, bulk transmissivity, and storage coefficients of the aquifer.

Step-drawdown tests will be conducted in the well located centrally within the well network (pumping well) before the pump tests to determine the sustainable pumping rate for the pumping test (see Figure 2). The monitoring wells located adjacent to the pumping well will be used as observation wells for the pump tests. The observation wells will be monitored during the pump tests to evaluate the potential hydraulic connection within the hydrostratigraphic unit screened. A slug test will be performed at two wells: the well located upgradient of the facility and the well located just west of the pumping well. The discharge from the constant discharge pumping test will be conveyed via pipe or hose downhill from the pumping well to ensure the discharge water will not impact the test.

Procedures for conducting the baseline monitoring and aquifer tests are provided in the following sections.

6.1 Baseline Monitoring

Baseline monitoring will include continuous monitoring of water levels in selected observation and pumping wells before and after the aquifer testing is conducted. Baseline monitoring will be conducted for a period of one week before the pumping starts and will continue for at least 1 week after recovery is complete.

Baseline monitoring will be conducted by installing vented pressure transducers coupled with dataloggers into the pumping well and the observation wells. The vented pressure transducers are designed to automatically compensate for changes in barometric pressure. Daily precipitation data will be collected during the same time period from the nearest weather station.

6.2 Step-Drawdown Tests

After completion of baseline monitoring, step-drawdown tests will be conducted at the pumping well(s). The test pump will be a submersible electric pump capable of pumping the volume of water required for the aquifer tests. Discharge rate will be controlled with a variable speed pump motor or a valve on the discharge line. The well(s) will be pumped at a minimum of three incrementally increasing discharge rates, or steps, for approximately one hour each, or until water levels stabilize in the pumped well. Each step should be of equal duration, with the duration of the initial step determining the duration of the subsequent steps. Water levels will be monitored continuously using vented pressure transducers and dataloggers during pumping and recovery. The pumping discharge rates will be monitored with a totalizing flow meter which will calibrated before the tests begin. Once the tests are started, pumping rates will be recorded as often as possible during the first 10 minutes of each step, and less frequently thereafter based on the time required for stabilization of the water levels to occur. The goal is to obtain at least 20 readings within each log cycle (i.e., 1-10 minutes, 10-100 minutes, etc.). The data from the step-drawdown tests will be used to determine sustainable pumping rates for the constant discharge tests and to estimate aquifer parameters.

6.3 Constant Discharge and Recovery Tests

Constant discharge and recovery tests will be performed at the pumping well after water levels have recovered from the step-drawdown test. It is currently anticipated that the test duration will be 72 hours. The duration of the pumping test will be adjusted based on the hydraulic conductivity estimates derived from the step tests and the literature, storage coefficients derived from the literature, and plugging these data into a Jacob-Cooper approximation to the Theis analysis given distances between the wells. Vented pressure transducers coupled with dataloggers will be used to collect groundwater level information in the pumping well and observation wells.

Based on the information collected from the step-drawdown test, the sustainable pumping rate for the constant discharge test will be determined. The pumping discharge rate will be monitored with a totalizing flow meter that is calibrated before the test begins.

Prior to the beginning of the pumping test, a comprehensive round of manual groundwater levels and surface water levels will be collected at the pumping well and the observation wells to record static conditions and for calibration of the tranducers, as necessary. Also, the totalizing flow meter reading will be noted, and the dataloggers programmed at the appropriate data collection time intervals.

Once the test is started, the goal will be to maintain flow at as constant a rate, as possible. Pumping rates will be recorded as often as possible during the first 20 minutes, and less frequently thereafter based on the degree of fluctuation observed in the first readings.

Before the end of the pumping test, another comprehensive round of manual groundwater levels will be taken from the pumping well and observation wells to ensure that the calibration in the transducers has not drifted. The pump will then be turned off, and recovery data will be recorded at time intervals similar to that for the start of the test and at the same observation wells. Measurements will continue until the aquifer has recovered to within approximately 90 percent of static conditions.

6.4 Data Processing and Analysis

Following completion of each aquifer test, the collected data will be transferred into a spreadsheet program for evaluation. The data will be adjusted from real time to pumping/recovery time and groundwater levels will be converted to drawdown. After being corrected, the data will be evaluated using aquifer test software. The analysis type will depend on the aquifer conditions encountered (e.g., unconfined or confined aquifer, presence of boundary conditions, groundwater controlled by independent fractures, etc.), and drawdown and recovery results from the pumping test. Specific capacity values derived from the step-drawdown and constant discharge test will also be evaluated to develop horizontal hydraulic conductivity estimates.

7 BASELINE GROUNDWATER MONITORING

Following development of the monitoring wells, baseline groundwater monitoring will be continued at each well. The groundwater monitoring events will include measurement of groundwater levels, and groundwater quality sampling, as described below. Groundwater Level Measuring sheets are included in Appendix B. Groundwater Quality Monitoring sheets are included in Appendix C.

7.1 Groundwater Levels

For the first year following installation and development of all the monitoring wells, depths to groundwater will be collected monthly from each well. Eight rounds will be completed independently, while the remaining four rounds of groundwater and surface water elevation monitoring will be conducted in conjunction with the quarterly groundwater sampling. Groundwater level measurements will be performed before groundwater is removed from the wells by purging or sampling. If the well has a water- level transducer installed, the data will be downloaded to a portable computer to view the data and determine the water level. The transducer and cable will be removed from the casing prior to sampling and placed on a clean plastic sheet. When the transducer has been removed from the casing, a manual water level will be measured as described below.

7.1.1 Materials and Equipment

Materials and equipment that will be necessary to perform manual groundwater level measurements include:

- Records of well construction details and previous measurements
- An electronic water-level meter with accuracy of 0.01 feet
- Groundwater Sampling Field Log
- Steel tape measuring to the nearest 0.1 foot

7.1.2 Measuring Point

A measuring point from which groundwater level measurements will be made will be established at each monitoring well. Generally, the measuring point will be permanently marked at each monitoring well at the top of the north side of the inner casing using an indelible marker or a notch cut into the casing. All groundwater level measurements will be recorded to the nearest 0.01 foot. When the top-of-casing elevation of a monitoring

well is surveyed, the surveyor will measure the elevation of the measuring point and reference this measurement to the local datum for location and elevation.

7.1.3 Water Level Measurements

Manual groundwater level measurements will be made with an electric water level indicator and meter. An electronic water level indicator consists of a contact electrode attached to the end of an insulated electrical cable marked with length indicators, and a reel which houses an ammeter, a buzzer, or other closed circuit indicator. The indicator shows a closed circuit and flow of current when the electrode touches the water surface. The dedicated electronic probe used will be calibrated periodically by comparing the depth-to-water readings between the electronic probe and a steel surveyors' tape.

The procedure for measuring water levels with an electric probe is as follows:

1. Switch on meter and test the battery charge.
2. Lower the probe into the well until the ammeter or buzzer indicates a closed circuit. Raise and lower the probe slightly until the shortest length of cable that gives the maximum response on the indicator is found.
3. With the cable in this fixed position, note the depth to water from the measuring point.
4. Repeat as necessary until at least two identical duplicate measurements are obtained.

The date of each water level measurement will be recorded on the Groundwater Level Measuring Form (Appendix B) and the Groundwater Quality Monitoring Form (Appendix C). Groundwater level data will be recorded in the field to the nearest 0.01 foot below the measuring point. Groundwater level elevations will then be calculated using the surveyed elevation of the measuring point at each well or surface water gauge location.

7.1.4 Total Well Depth Measurements

The total depth of a well casing will be measured immediately after construction by sounding with a weighted measuring tape. The electronic water-level probe may also be used as a measuring device. To do this, lower the weighted tape or probe into the well until the tape becomes slack or there is a noticeable decrease in weight, which indicates the bottom of the well. Care should be taken to lower the tape slowly to avoid damage to the bottom of the well by the weight. Raise the tape slowly until it just becomes taut, and with the tape in this fixed position, note the tape reading opposite the measuring point to the nearest 0.1 foot.

7.2 Groundwater Quality Sample Collection

Following measurement of the groundwater levels, monitoring wells will be sampled with low flow sample collection procedures using either bladder pumps or pneumatic positive displacement pumps, in accordance with the United States Environmental Protection Agency (USEPA) standard *Low-Flow Groundwater Monitoring Procedure.* Pumping requirements will be evaluated during well completion and development and are greatly influenced by the productivity of the well and the depth to water in the well.

7.2.1 Low Flow Well Purging

The following procedures will be used for low flow well purging:

1. Calibrate equipment used to measure field parameters according to manufacturer's instructions prior to any measurements being taken. Calibration checks will be performed at least daily for instruments used in the field and the results will be documented in the field notebook for each sampling station.

2. Measure and record the depth to water to nearest 0.01 feet as described in Section 7.1.3.

3. Prior to collecting samples from a well, place a clean plastic sheet adjacent to or around the well to prevent equipment and sample containers from coming into contact with surface materials. Alternatively, a clean field table may be set up near the well.

4. Clean the exterior of the previously decontaminated pump and discharge tubing on the reel by pouring distilled water over it before installing it in the casing. Slowly lower the pump and discharge tubing down into the well until the location of the pump intake is set to the approximate midpoint of the screened interval. Either a bladder pump (preferred) or pneumatic positive displacement pumps will be used for purging and sampling. The pump and associated tubing used will be constructed of inert materials and compatible with the parameters to be collected.

5. Using the specific details of well construction and current water-level measurement, determine the pump set depth (the mid-point or within the upper half of the saturated well screen).

6. Attach tubing and supporting rope to the pump and very slowly lower the unit until the pump intake depth is reached. Measure the length of supporting rope required, taking into account the pump length, to attain the required depth. Care should be taken to minimize disturbance to the water column during insertion of the pump. Record the depth- to-the-pump intake in the field logbook.

7. Connect the discharge line from the pump to a flow-through cell. A "T" connection is needed prior to the flow-through cell to allow for the collection of water for turbidity measurements, if not part of the multi-parameter probe in the flow-through cell. The discharge line from the flow-through cell must be directed to a container to hold the purge water during the purging and sampling of the well.

8. After allowing five minutes for the water level to equilibrate, slowly lower the electronic water-level probe into the well until the probe contacts the groundwater. Record the water level in the field logbook. Begin purging the well at the minimum pumping rate of 0.1 liter per minute (L/min) (EPA, July 1996). Slowly increase the pumping rate to a level that does not cause the well to drawdown more than about 10 cm or 0.3 feet, if possible. Never increase the pumping rate to a level in excess of 500 mL/min (approximately 0.13 gallon per minute [gpm]). Record the stabilized flow rate, drawdown, and time on the field sampling data sheets (Appendix C).

9. For wells screened below the static water level, if the drawdown does not stabilize at a pumping rate of 0.1 L/min (0.026 gpm), continue pumping until the drawdown reaches a depth of two feet above the top of the well screen. If this occurs, stop pumping and collect a groundwater sample once the well has recovered sufficiently to collect the appropriate volume. Document the details of purging, including the purge start time, rate, and drawdown in the field logbook.

10. For wells screened across the static water level, if the drawdown does not stabilize at 0.1 L/min (0.026 gpm), continue pumping. However, in general, do not draw down the water level more than 25% of the distance between the static water level and pump intake depth (American Society for Testing and Materials [ASTM], 2002). If the recharge rate of the well is lower than the

    minimum pumping rate, then collect samples at this point even though indicator field parameters have not stabilized (EPA, July 1996).

11. Commence sampling as soon as the water level has recovered sufficiently to collect the required sample volumes. Allow the pump to remain undisturbed in the well during this recovery period to minimize the turbidity of the water samples. Fully document the pump settings, pumping rate, drawdown, and field parameter readings in the field logbook.

12. Once an acceptable drawdown has been established and maintained, begin monitoring designated indicator field parameters. During purging, remove a minimum of one tubing volume (the volume of water in the pump, discharge tubing and flow-cell) prior to recording the field parameters. Then monitor and record the field parameters every three to five minutes.

13. Field parameters at all monitoring wells will include pH (s.u.), temperature (°C/F), dissolved oxygen (DO mg/l), specific conductance (µs/cm), and turbidity. The sample will be collected only after field parameters are relatively consistent after three successive readings (approx. ±10 percent for temperature, specific conductance, turbidity, DO, and ORP and ±0.5 pH units).

14. The target for monitoring turbidity is readings less than or equal to five nephelometric turbidity units (NTUs), but this value is not mandatory (EPA, July 1996). In some instances, turbidity levels may exceed the desired turbidity level due to natural aquifer conditions—natural turbidity values may exceed 10 NTUs (EPA, April 1996).

15. If turbidity readings are slightly above five NTUs, but trending downward, purging and monitoring shall continue. If turbidity readings are greater than five NTUs and have stabilized, sampling can commence. If after four hours of purging, critical indicator field parameters have not stabilized, discontinue purging and collect samples. Fully document efforts used to stabilize the parameters (such as modified pumping rates).

7.2.2 Low Flow Sample Collection

The following procedure shall be followed for the collection of low-flow groundwater samples.

1. Record the final pump settings in the field logbook immediately prior to sample collection.

2. Measure and record the indicator parameter readings immediately prior to sample collection on both the stabilization form and in the field logbook.

3. Record comments pertinent to the color and obvious odors (such as sulfur odor or petroleum hydrocarbons odor) associated with the water.

4. Arrange and label necessary sample bottles and ensure that preservatives are added, as required. Include a unique sample number, time and date of sampling, the initials of the sampler, and the requested analysis on the label. Additionally, provide information pertinent to the preservation materials or chemicals used in the sample.

5. Ensure that the sampling tubing remains completely filled during sampling and that the water does not descend back into the well. Minimize turbulence when filling sample containers by allowing the liquid to run gently down the inside of the bottle.

6. Immediately seal each sample and place the sample on ice in a cooler to maintain sample temperature preservation requirements.

7. Note the sample identification and sample collection time in field sampling data sheets and in the field logbook.

8. Once sampling is complete, remove the pump from the well taking care that the tubing does not contact the ground while being removed. Tubing will be designated for each well; it will be double bagged in a polyethylene bag, and labeled as to the well it is designated for.

9. Record groundwater sampling activity for each sampling event in the Groundwater Quality Monitoring Form (Appendix C).

10. Close and secure the well. Clean up and remove debris left from the sampling event. Be sure that investigation-derived wastes are properly containerized and labeled. Review sampling records for completeness. Add additional notes as necessary.

7.2.3 Sample Filtration

Groundwater samples collected for dissolved parameters will be field-filtered using a disposable, in-line, 0.45 micron filter. The water sample will be pumped through the filter attached directly to the discharge tubing of the groundwater pumping system (low flow procedures) or a peristaltic pump and a section of Tygon (polyvinylchloride) tubing or other appropriate method may be used if the sample is first collected in a clean container (volume based sampling). The filter cartridge will be rinsed with an aliquot of sample prior

to collection of sample in the containers or as per the filter manufacturer's recommendations. A new filter and tubing will be used for each sample.

7.2.4 Laboratory Analyses

All samples will be submitted to a Nevada certified laboratory for analyses of NDEP Profile I constituents. Both total and dissolved metals will be analyzed. Isotope samples will be analyzed by the Brigham Young University isotope lab.

7.2.5 Sample Containers and Volumes

The sample containers will be appropriate to the analytical method and will be obtained from the analytical laboratory performing the analyses. The sampling staff will confirm with the laboratory performing the analyses that appropriate containers and preservatives are provided for use in the sampling event. It is anticipated that each sample will consist of the following containers:

- One unfiltered 500-mL plastic bottle for general water chemistry analysis, unpreserved
- One unfiltered 500-mL glass bottle for Nitrogen (N) and Phosphorous (P) analysis, preserved with H2SO4
- One unfiltered 500-mL plastic bottle for total metals analysis, preserved with HNO3
- One filtered 500-mL plastic bottle for dissolved metals analysis, preserved with HNO3
- Two unfiltered, unpreserved 1000-mL brown plastic bottles for stable isotopes, tritium, and carbon-14 analyses, unpreserved

7.2.6 Sample Labeling

Sample containers will be labeled with self-adhesive tags. Each sample will be labeled with the following information using waterproof ink.

1. Project identification
2. Sample identification
3. Date and time samples were obtained
4. Requested analyses and method
5. Treatment (preservative added, filtered, etc.)

6. Initials of sample collector(s)

7.2.7 Sample Preservation and Storage

If required by the analytical method, water samples submitted for chemical analysis will be stored at 4^0C in ice-cooled, insulated containers immediately after collection.

7.2.8 Sample Custody

Samples shall be handled and transported according to the sample custody procedures. The sample collector shall document each sample on the COC and Request for Analysis form.

7.3 Quality Assurance/Quality Control

The following quality assurance/quality control (QA/QC) procedures will be used during groundwater sampling.

7.3.1 Equipment Decontamination/Cleaning

Pumps, steel surveyors' tapes, electric water level indicators, and other measuring tapes will be cleaned prior to use and after measurements in each well are completed. Cleaning shall be accomplished by washing visible contamination off with a laboratory-grade detergent/water solution and rinsing with clean, potable, municipal water, then rinsing with distilled or deionized water. After cleaning, equipment will be handled to minimize contact with contaminants. Sample bottles and bottle caps will be cleaned and prepared by the analytical laboratory or their supplier using standard USEPA-approved protocols. Sample bottles and bottle caps will be protected from contamination between time of receipt by the sampler(s) and time of actual usage at the sampling site.

Sampling equipment that will be used at multiple wells or sampling locations will be cleaned after sampling at each location is completed or dedicated equipment will be used. Equipment such as submersible pumps and tubing, which cannot be disassembled for cleaning, will be cleaned on the exterior as described above, followed by rinsing the interior with water from the sample location during purging and before collecting the sample from that location. Equipment cleaning methods will be recorded in the field sampling records.

7.3.2 QA/QC Samples

Both field and laboratory quality assurance parameters will be evaluated to ensure sample integrity and the generation of data of known quality. The data validation process will identify quality control problems and potential limitations on the use of the data, if any. Sample results that fail the laboratory or field quality assurance will be marked with qualifiers (flags). The quality assurance checks will include the following parameters:

- Laboratory data completeness;
- Laboratory sample integrity and holding times;
- Laboratory blank samples (method and equipment);
- Laboratory accuracy;
- Laboratory precision;
- Field sampling and analysis precision;
- Field comparability (similar site conditions, collection techniques, measurement procedures, and methods and reporting); and,
- If the sample was representative (compliance with this Plan).

Two types of field quality control samples will be collected to evaluate the precision, accuracy, and reproducibility of field sampling methods:

Blind Field Duplicates - Groundwater field duplicate samples are collected at a sampling point using the same procedures as the original sample, and are used to evaluate whether sample collection methods are reproducible. Blind field duplicate samples are collected at the same location and time as the original sample, but are placed in different bottles and labeled such that the laboratory cannot determine the sample station number. Filling of sample containers will be alternated between the original and duplicate sample. In general, one field duplicate sample will be collected for every sampling event

Field Blanks - A field blank sample set is prepared in the field to evaluate the presence of contamination originating from sources not associated with sample collection procedures. Each blank bottle is filled with deionized or distilled water in the field, preserved as required, and returned to the laboratory for analysis along with the other samples. The bottles for the blank are labeled such that the laboratory cannot determine the samples are blanks. In general, one blank sample will be collected for every sampling event.

The precision and accuracy of analytical results are also evaluated based on the results of internal laboratory QA/QC procedures. Acceptance of laboratory data with respect to precision and accuracy are evaluated using the following: laboratory method blanks, laboratory matrix spike and matrix spike duplicates, laboratory duplicates, and laboratory standard samples. Individual laboratories set the requirements for control limits for each type of QA/QC sample, but are at least as stringent as those set by the USEPA for each analysis type.

8 DATA EVALUATION AND REPORTING

Data collected during implementation of this Plan will be evaluated and presented within the Baseline Groundwater Survey Report. Interim data submittals will be provided to PMR as the data are collected.

The report will include descriptions of the following field activities: monitoring welldrilling and installation, aquifer testing, groundwater elevation monitoring, and groundwater monitoring results for each quarterly event. The report will include well logs, piezometric surface maps, geologic/hydrogeologic, aquifer parameters (transmissivity, storativity and hydraulic conductivity) as determined from aquifer testing, groundwater quality results, and development and discussion of the hydrogeologic CSM for the site. It is anticipated that analytical groundwater data will be stored in a database for presentation of analytical data tables and figures showing groundwater monitoring results.

8.1 Interpreting Site Hydrogeologic Data

Once the site characterization data have been collected, the following tasks will be undertaken to support and develop the interpretation of site hydrogeologic data:

- Review borehole and well logs to identify major rock, unconsolidated material, and establish their horizontal and vertical extent and distribution;
- Identify zones of suspected high hydraulic conductivity, or structures likely to influence any contaminant migration through the unsaturated and saturated zones;
- Compare findings with other studies and information collected during the preliminary investigation to verify the collected information; and
- Determine whether subsurface lithologic field data corroborate pump test data and are sufficient to define hydraulic conductivity, lateral and vertical stratigraphic relationships, and groundwater flow directions and rates.

A potentiometric surface map or water table map will be prepared for the uppermost aquifer. Potentiometric surface and water table maps will show both the direction and rate of groundwater flow and the locations of all wells on which they are based. The water level measurements for all on which the potentiometric surface map or water table map is based will be shown on the potentiometric surface or water table map.

8.2 Final Conceptual Site Model

A preliminary conceptual model was formulated early in the site investigation process using data obtained during the preliminary investigation to establish the hydrogeologic setting. The model will be gradually refined by building an understanding of the site-specific information obtained during the reconnaissance boring program and the well drilling, construction and aquifer testing programs.

The conceptual site model is the product of the review and interpretation of the data presentation/reduction outputs described in the previous sections. An accurate conceptual model of the site should be the final output of the site characterization program. The conceptual site model should incorporate all essential features of the hydrogeologic system and waste type under study.

The final conceptual site model is the integrated picture of the hydrogeologic system and the waste management setting. The conceptual model will provide inputs to the existing basin-fill numerical model currently developed by another consulting firm (ITASCA). The conceptual model will be expressed both narratively and graphically. The final conceptual model will be a site-specific description of the hydrogeology of the vadose zone, the uppermost aquifer, and its confining units (if any); it will take into account the characteristics of the wastes to be managed at the facility; and it will contain all of the information necessary to assure the groundwater information in the RCRA permit application is adequate. The development of the conceptual model is an ongoing process that should continue throughout the entire site characterization program.

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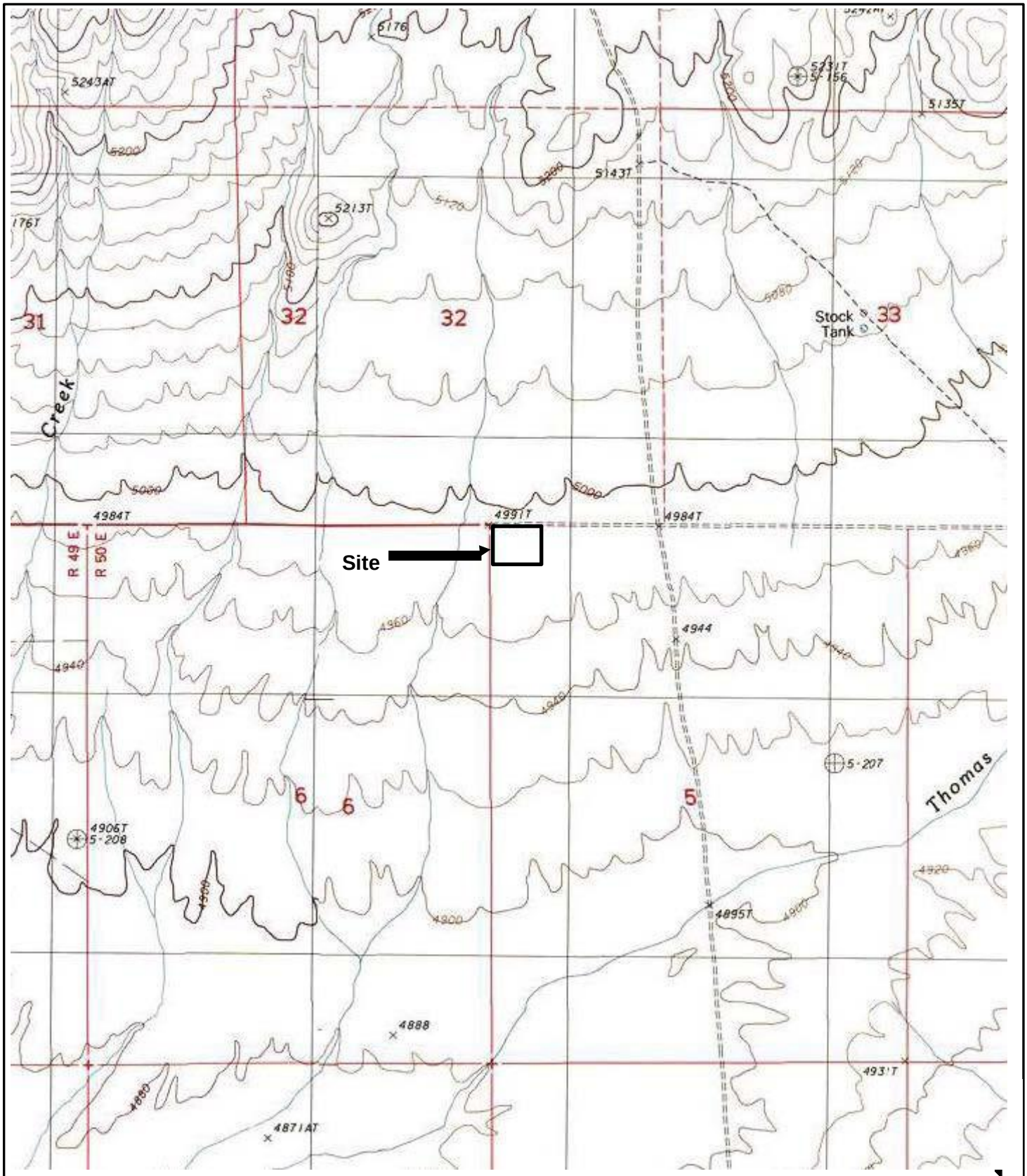
FIGURES

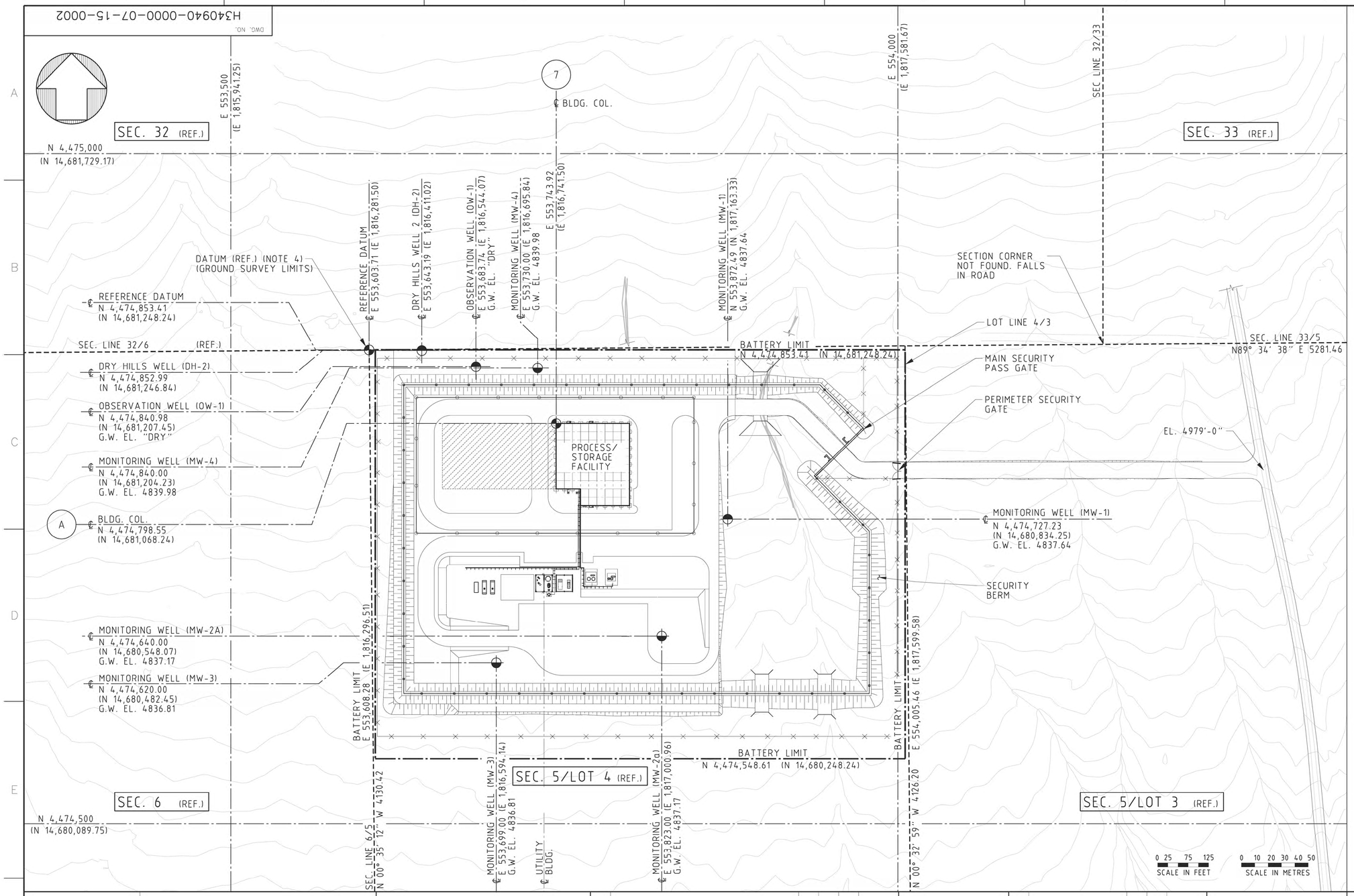


PRECIOUS METALS RECOVERY LLC
EUREKA COUNTY, NEVADA

Figure 1 – Project Location Map

Design by	Drawn by	Scale	Last Revision Date

DWG. NO. H340940-0000-07-15-0002



GENERAL NOTES:

1. ALL COORDINATES SHOWN ARE IN METERS (BRACKETED COORDINATES ARE IN U.S. SURVEY FEET).
2. ALL ELEVATIONS ARE IN FEET UNLESS NOTED OTHERWISE.
3. GRID COORDINATES SHOWN ARE BASED ON THE NORTH AMERICAN DATUM OF 1983, (UTM ZONE 11).
4. SURVEY COORDINATES AND ELEVATIONS SHOWN ARE AS RECORDED BY SUMMIT ENGINEERING (RYAN COOK - 08/24/2012).
5. WELL COORDINATES FOR MW-2A, MW-3 AND MW-4 AS PROVIDED BY JBR (09/26/2012).
6. ALL WELL ELEVATIONS ARE GROUND WATER ELEVATIONS IN FEET AS PROVIDED BY JBR (11/09/2012).

LEGEND:

- FACILITY FENCE
- PERIMETER FENCE LINE
- BERM FENCE
- BATTERY LIMIT
- SECTION\LOT LINE
- GRID COORDINATES
- DATUM POINT
- WELL (SURVEY 08/24/2012)
- WELL (JBR 09/26/2012)
- FUTURE EXPANSION

FOR INFORMATION
NOT FOR CONSTRUCTION

DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE

REVISIONS

REV.	ISSUE FOR	AUTH. BY	DATE
C	PERMIT INFORMATION	R.F.	S.S.	2012-11-19
B	PERMIT INFORMATION	R.F.	S.S.	2012-11-15
A	PERMIT INFORMATION	R.F.	S.S.	2012-11-12

ISSUE AUTHORIZATION

HATCH™

DESIGNED BY J. CHALMERS DATE 2012-11-12	DRAWN BY E. CRAWFORD DATE 2012-11-12
CHECKED BY J. CHALMERS DATE 2012-11-12	DISCIP. ENGR. R. FUKUZAWA DATE 2012-11-12
PROJ. DES. COORD. J. CHALMERS DATE 2012-11-12	PROJ. ENGR. S. SENNIK DATE 2012-11-12
PROJ. MGR. M. SUCHARDA DATE 2012-11-12	

BARRICK

BARRICK GOLDSTRIKE MINES
PRECIOUS METALS RECOVERY PROJECT

FIGURE 2
MONITORING WELL LOCATIONS

SCALE 1:1500 OR AS NOTED

DWG. NO. H340940-0000-07-15-0002

REV. C

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19/11/2012 11:52:21 AM
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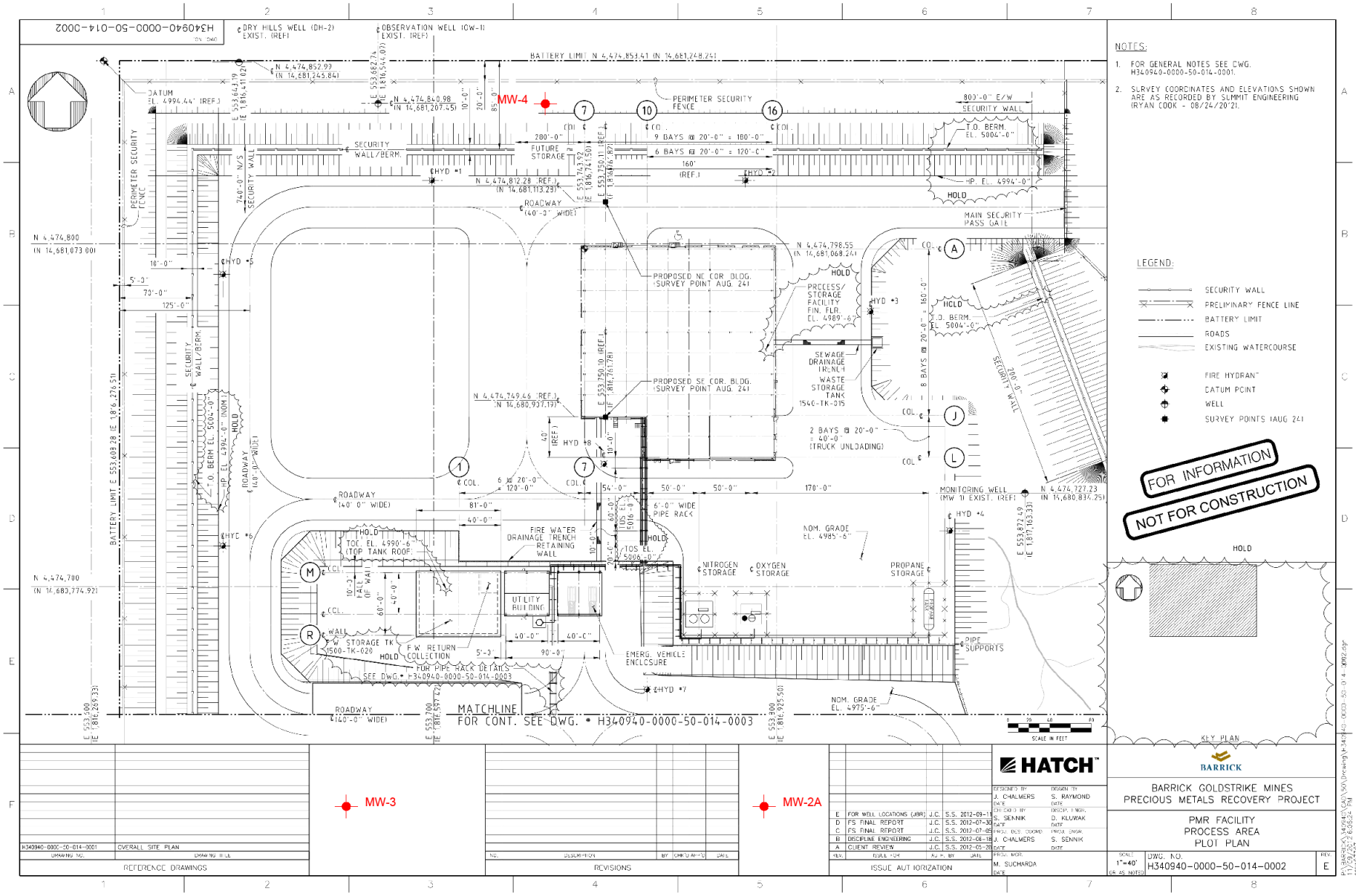


Figure 2 – Baseline Monitoring Well Locations Map

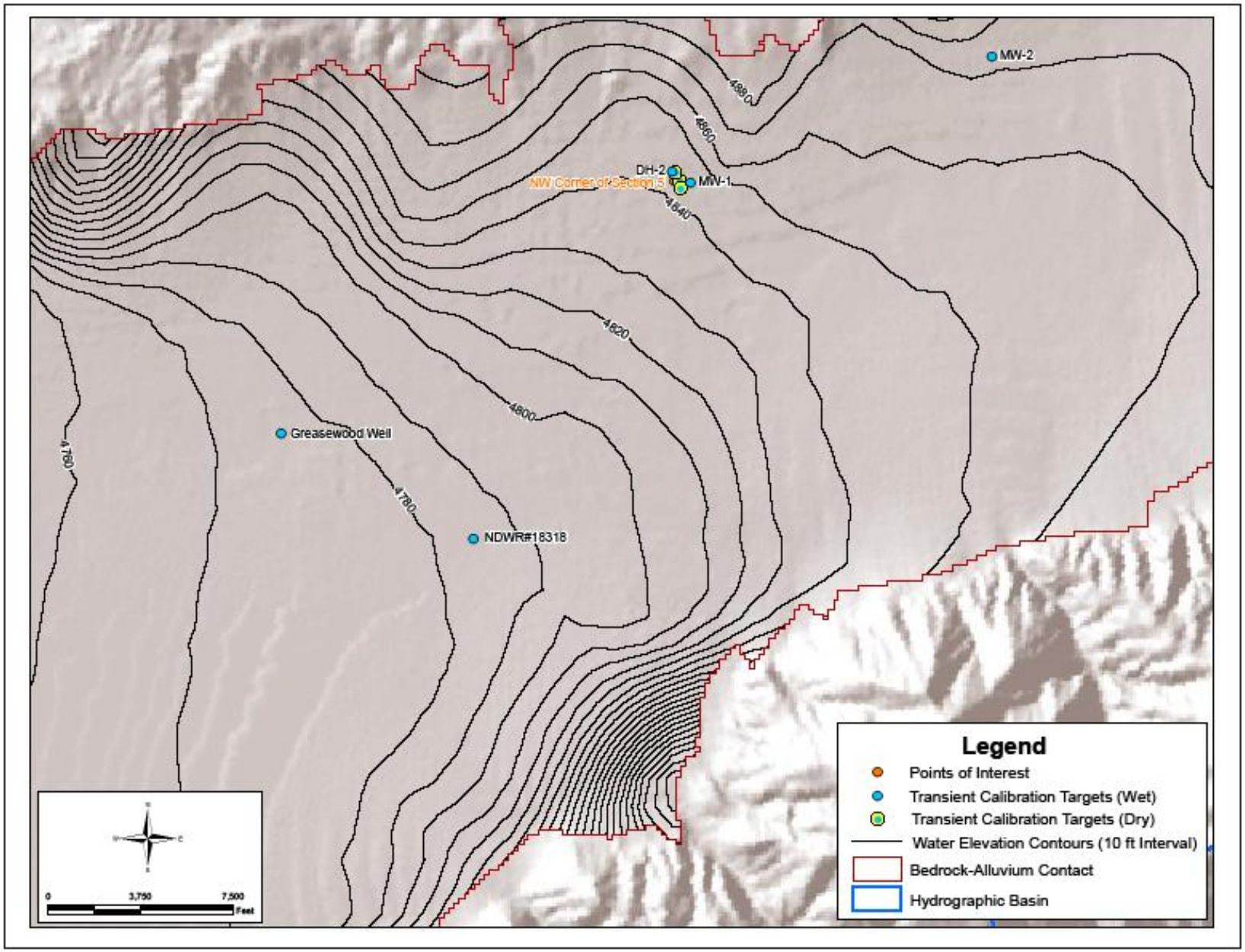
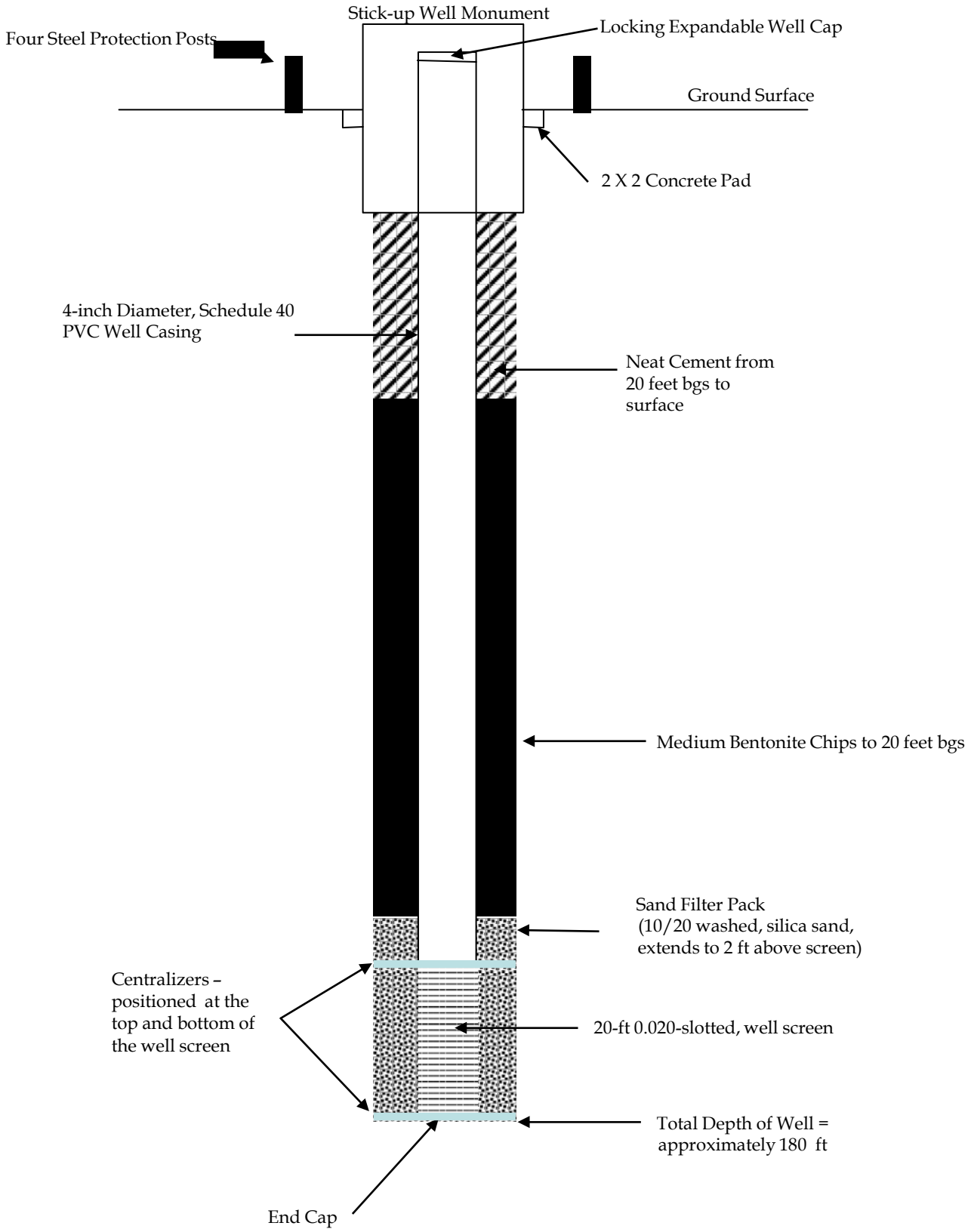


Figure 3 – Water Level Elevations in the Crescent Valley



PRECIOUS METALS RECOVERY LLC
EUREKA COUNTY, NEVADA

Figure 4 – Monitoring Well Construction Schematic

Design by	Drawn by	Scale	Date Drawn
			Last Revision Date

APPENDIX A

Boring Log

Page:_______

LOG OF EXPLORATORY BORING

JBR ENVIRONMENTAL CONSULTANTS, INC.

Client/Project Name: Dean Ranch Project: B.A10424.00

Geologist/Engineer: ____ Boring #: ________________________

Drilling Contractor & Method: ____

Date Began: _________ Date Completed: ___________ Total Depth: ______________ Hole Dia.: __________

Field Location of Boring:____

Ground Elevation:________________________________ Datum: ____________________________________

Date/time	Well or Piezometer Details	Sampling Data				Depth in Feet	Soil Group Symbol (USGS)	Water Level Data				
		Sampling Method	Sample Number	Blows / 6"	Depth Sampled			DEPTH TIME DATE BORING DEPTH				
								LITHOLOGIC DECRIPTION				

Page:_______

Project #: B.A10424.00

Boring #: ________________________

Water Level Data

DEPTH				
TIME				
DATE				
BORING DEPTH				

Date/time	Well or Piezometer Details	Sampling Data				Depth in Feet	Soil Group Symbol (USGS)	LITHOLOGIC DECRIPTION
		Sampling Method	Sample Number	Blows / 6"	Depth Sampled			

APPENDIX B

Groundwater Level Measuring Form

FIELD GROUNDWATER LEVEL DATA SHEET

PROJECT NAME: _____WELL ID:_____

SITE ADDRESS:_____

Wind From	N	NE	E	SE	S	SW	W	NW	Light	Medium	Heavy
Weather	Sunny		Cloudy		Rain		_____?		Temperature:	_____ºF	_____ºC

WELL DATA

Date	Time	Casing Diameter	DT-Water

Notes:_____

_____

_____

_____

Measured By: _____ Signature:_____

APPENDIX C

Groundwater Quality Monitoring Form

GROUNDWATER QUALITY MONITORING FORM

PROJECT NAME: _____WELL ID:_____

SITE ADDRESS:_____ LABEL CODE: _____

DUPLICATE ID:_____

Wind From	N	NE	E	SE	S	SW	W	NW	Light	Medium	Heavy
Weather	Sunny		Cloudy		Rain		_____?		Temperature:	_____ºF	_____ºC

WELL DATA

Date	Time	Casing Diameter	DT-Product	DT-Water	Product Thickness

PUMP DEPTH (ft btoc):_____

WATER QUALITY DATA

Time	**DTW**	**Liters**	**PH**	**Temp**	**DO**	**Spec. Cond.**	**Redox**	**Turb**

GROUNDWATER SAMPLE DATA

Sample Date:_____

Sample Time:_____

Bottle Type	√	Amount & Volume		Preservative	Filter	
VOA Glass			40ml	HCL	No	
Amber Glass			1 L	HCL	No	
Amber Glass			1 L	None	No	
Poly			250ml	HNO3	Yes/No	
Total Bottles						

Notes:_____

_____

_____

_____

Sampled By: _____ Signature:_____

APPENDIX 20-B

Groundwater Characterization Report

Precious Metals Recovery
Groundwater Characterization Report
Eureka County, Nevada USA

Prepared for:
Precious Metals Recovery LLC
Eureka County, Nevada USA
Contact: Contact: Rich Haddock, Vice President and General Counsel
Ph: 801.990.3773

Prepared by:
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Medford, Oregon 97504
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Ph: 541.770.7019

December 6, 2012

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1.0 INTRODUCTION

This Groundwater Characterization Field Study Report (Report) is intended to document the field procedures and communicate the results of the groundwater characterization conducted at the Precious Metals Recovery LLC site (Site) from September 10 through October 2, 2012. The Site is situated in the Crescent Valley, Dry Hills, and Cortez Mountain Range of Eureka and County, Nevada. The Site is within the central portion of the Battle Mountain Gold Belt northeast of the Cortez gold mine (see Figure 1).

1.1 Purpose and Objectives

The data quality objectives (DQOs) of the field activity are to:

1. Develop preliminary data for the hydrogeologic conceptual site model (CSM), including aquifer definition, groundwater elevations, groundwater flow directions and gradients, groundwater flow velocities, and aquifer parameters;

2. Characterize pre-development and pre-operational groundwater elevations and flow direction; and

3. Characterize pre-development and pre-operational baseline groundwater chemistry and quality.

This report documents the field methods for the required tasks to meet the DQOs. Field procedures were conducted pursuant to the field methods described in *Groundwater Characterization Field Study Plan (Study Plan)*; JBR, September 2012. Procedures in the Study Plan adhered to (unless noted) the recommended sampling and handling procedures outlined in the *RCRA Groundwater Monitoring Draft Technical Guidance Document* (USEPA, 1992) and recommendations listed in *Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW846) (USEPA, 1986)*.

The purpose of the monitoring wells described in this Report is solely to complete the DQOs. While these monitoring wells may be used in a future groundwater monitoring program, their use after the DQOs have been achieved is beyond the scope of this Report.

2.0 MONITORING WELL NETWORK RATIONALE

This section provides background information that was used to fulfill the groundwater protection permit requirements of the Resource Conservation and Recovery Act (RCRA), Section 3004; 40 CFR Part 264, Subpart F; and 40 CFR Part 270.

2.1 Baseline Groundwater Monitoring Wells

The groundwater monitoring system consists of a sufficient number of properly located and constructed wells that are capable of detecting any statistically significant impact to the water quality of the uppermost aquifer. These requirements specify a minimum of one background well and two down-gradient wells be installed on a site.

Prior to the characterization work described in this Report, two wells were drilled and constructed. DH-2 is a pre-existing water well drilled prior to the work described herein. Well MW-1 was drilled and constructed in February 2012.

In September 2012, three additional groundwater monitoring wells were drilled and constructed by JBR; one well is located up-gradient (north) of the Site and two wells are located hydraulically down-gradient (south). Well locations are shown on Figure 2. Boring logs for monitoring wells installed during the groundwater characterization work described herein are included and discussed in Section 4 of this Report. Well construction diagrams are included as Appendix A.

2.2 Up-gradient Background Well

The hydraulically up-gradient well, (MW-4), was drilled in September 2012 to serve as a background well. During drilling, it also provided subsurface lithology data and helped identify the depth to the uppermost aquifer beneath the subject site. This well also helped to define the presence and lithologic characteristics of a potential confining or semi-confining unit under the Site.

2.3 Down-gradient Detection Wells

Well MW-1 was drilled and constructed in February 2012; it is hydraulically down-gradient of the background well (MW-4). Two additional hydraulically down-gradient wells (MW-2A and MW-3) were drilled in September 2012 to provide subsurface lithology data and to define the depth to the uppermost aquifer beneath the subject site. These wells also can be used later for down-gradient detection wells during groundwater monitoring. These wells were also drilled to help define the presence and lithologic characteristics of the potential confining or semi-confining layer under the Site. One of these down-gradient wells, MW-2A, was constructed as a pumping well for aquifer testing (see Figure 2).

3.0 SITE BASELINE HYDROGEOLOGY

3.1 Hydrogeologic Setting

The Site is located in the Crescent Valley which is topographically semi-closed. The direction of groundwater flow in the Great Basin is typically from areas of recharge in the mountain ranges toward areas of discharge. Shallow groundwater flow under natural conditions is typically from the higher topography in the mountains to the valley floors where groundwater is lost due to evapotranspiration.

Basin-fill deposits contain the primary aquifer in the Crescent Valley. These deposits typically have higher permeability and water storage capacity than other geologic units in the region. Groundwater flow in the upper parts of basin-fill deposits is typically unconfined and controlled by the elevation of the water table and by permeability contrasts within the deposits. Clay lenses are frequently encountered during well installations and siting of infiltration basins in the Crescent Valley (Geomega, 2004). Beneath these laterally extensive clay lenses, and at depth, groundwater is potentially present in confined or semi-confined conditions.

3.1.1 Potential for Seasonal Fluctuation

There are no wells proximal to the Site with a long time-series of water level data to demonstrate the potential seasonal fluctuations. All of the nearby wells have few (and only recent) measurements. However, in the south portion of the valley and outside of mining impact zones (pivots and rapid infiltration basins), seasonal fluctuations of shallow wells have been found in the range of 2 to 3 feet. It is expected that the seasonal fluctuation of groundwater levels beneath the footprint of the Site will also be in the 2 to 3 feet range, at the most.

3.2 Groundwater Characterization Study

All drill holes and monitoring wells that provide hydrogeologic characteristics of the Site are described in this section.

3.2.1 Existing Wells/Borings

Drill hole DH-2 is a pre-existing water well installed prior to PMR becoming involved with this Site and its drill log is unavailable. The depth to water (DTW) measured in recent months is approximately 157.5 feet.

Observation well OW-1 was drilled and installed in March 2012 to a total depth (TD) of 150 feet below ground surface (bgs). Based on 5 measurements collected between March and September 2012, it has remained dry since it was drilled.

Boreholes BH-1, BH-4, and BH-8 were all drilled in July 2012 to a TD of 150 feet bgs, and all three were dry.

Well MW-1 was drilled to a TD of 160 feet bgs in February 2012. During drilling, operations were stopped at 150 feet bgs (the siting criteria depth specified in the NAC rules) and the hole was dry. After the borehole was allowed to set for approximately one hour, drilling operations continued and groundwater was first observed at a drilling depth of approximately 157.5 feet bgs.

The water level inside the well casing at MW-1 subsequently rose to approximately 143.5 feet bgs suggesting a semi-confined or confined condition exists, caused by the low-permeability zone above 157.5 feet bgs, immediately above the aquifer. MW-1 demonstrated that in this area of the site, the aquifer is immediately overlain by a fine-grained layer (i.e., clay). In MW-1, below this fine-grained layer, the water is confined under pressure from the impermeable layer that will not allow water to rise to its potentiometric surface.

3.2.2 Groundwater Characterization Wells

This section presents detailed descriptions of the subsurface lithology encountered during the groundwater characterization work, including details of groundwater occurrence while drilling, well construction, and well locations.

Also included is a summary description of the subsurface lithology from the boring logs for each well drilled beneath the Site. Well locations are shown on Figure 2. Well Construction Diagrams are included as Appendix A.

MW-2A and MW-3 are located hydraulically down-gradient (south) of the proposed Treatment and Storage Facility (TSF) and MW-4 is located hydraulically up-gradient (north) of the proposed TSF. MW-1 is located down-gradient of background well MW-4 (see Figure 3). The DTWs measured while drilling in September 2012 in wells MW-2A, MW-3, and MW-4 were 150, 143 and 162 feet, respectively. It is worth noting that MW-3 is located hydraulically down-gradient, approximately 270 feet from the southern boundary of the proposed TSF.

3.2.2.1 Lithology Encountered While Drilling

MW-1

A fine grained unit was encountered at 157.5 feet, immediately above the aquifer. MW-1 was drilled to a TD of 160 feet in February 2012. When drilling operation stopped at 150 feet, the criteria depth specified in NAC, the hole was dry. After a pause, drilling operations continued and groundwater was first encountered at a depth of about 157.5 feet. The water level inside this well casing subsequently rose to about 143.5 feet indicating a confined condition caused by a

low- permeability zone at 157.5 feet. MW-1 demonstrated that in this area of the site, the aquifer was immediately overlain by a fine-grained layer (i.e., clay). Below this fine-grained layer, the water is confined under pressure from the impermeable layer that will not allow water to rise to its potentiometric surface. MW-2A has a static water level of 4837.64 feet above mean sea level (amsl).

MW-2A

A saturated fine-grained sand unit was encountered in this well at 150 to 153 feet bgs during drilling., A slightly moist clay unit was encountered from 120 feet to 145 feet bgs; a moist fine grained sand with clay matrix was at 145 to 150 feet bgs (immediately above the alluvial aquifer). The depth to water was measured at 138.10 bgs after well construction.

MW-2A has a static water level of 4837.17 feet amsl. This well has a TD of 185 feet bgs, where it encountered bedrock. The well is screened from 145 to 185 feet bgs. It fully penetrates the alluvial aquifer and was used as the pumping well during the 72-hour aquifer test.

INTERVAL (feet bgs)	MW-2A SAMPLE DESCRIPTION
0-60	Brown to Light Brown silty CLAY with fine grained sands and pebbles present, Dry
60-75	Brown to Light Brown clayey SILT with few pebbles present, Dry
75-115	SAA within increase content of pebbles
115-120	Brown to Light Brown fine to medium grained SANDS pebbles also present, Dry
120-135	Brown to Light Brown silty CLAY pebbles present, Dry
135-145	Brown to Light Brown CLAY with pebbles present, Slightly Moist
145-150	Brown to Light Brown fine grained SAND with a CLAY matrix, Very Moist
150-153	Brown to Light Brown fine grained SAND, Saturated
153-157	Brown to Light Brown silty CLAY, Saturated
157-162	Brown to Light Brown CLAY with fine grained SANDS present, Saturated
162-166	Brown to Light Brown fine to medium grained SAND with a CLAY matrix, Saturated
166-170	Brown to Light Brown CLAY with fine grained SANDS and pebbles present, Saturated
170-174	Brown to Light Brown fine to medium grained SAND with a CLAY matrix, Saturated
174-178	Brown to Light Brown CLAY with fine grained SANDS and pebbles present, Saturated
178-180	Brown to Light Brown CLAY with fine grained SANDS and pebbles to gravels present, Saturated
180-185	Brown to Light Brown fine to medium grained SANDS and pebbles to gravels present, Saturated
185	Bedrock
Notes: TD = 185 feet bgs, Screened from 145 to 185 feet, Sand 143 to 185, Bentonite 143 to 20 feet, Neat Cement 0-20 feet. First Encounter Water = 150 feet bgs DTW = 138.10 bgs after construction	

MW-3

MW-3 is hydraulically down-gradient of the site. MW-3 has a static water level of 4836.81 feet amsl. A saturated fine-grained sand unit was encountered in this well at approximately 143 to 145 feet bgs during drilling. Immediately above the aquifer, alternating layers of dry clay from 1 to 2 feet in thickness and moist fine grained sands and silts (3 to 4 inch in thickness) were encountered. This well has a TD of 167.0 feet bgs, where it encountered bedrock. The well is screened from 147 to 167 feet bgs.

The water level rose in this well from approximately 143 to 139.50 bgs over 2 days after its construction, indicating confined to semi-confined conditions.

INTERVAL (feet bgs)	MW-3 SAMPLE DESCRIPTION
0-85	Brown to Light Brown Silty CLAY with fine grained sands and pebbles present, Dry
85-95	Brown to Light Brown fine grained SAND with a CLAY matrix and pebbles present, Dry
95-137	Brown to Light Brown fine grained SAND with a SILTY matrix and pebbles present, Dry
137-143	Alternating layers of Brown to Light Brown CLAY with few pebbles present from 1 to 2 feet in thickness and a fine grained SANDS and SILTY layers also with pebbles present from 3 to 4 inch in thickness, Clay layers Dry, fine grained SANDS Slight Moist
143-145	Brown to Light Brown fine grained SAND with a SILTY matrix and pebbles present, Saturated
145-167	Brown to Light Brown CLAY with pebbles present, Slightly Moist
Notes: TD = 167 feet bgs, Screened from 147 to 167 feet, Sand 145 to 167, Bentonite 145 to 20 feet, Neat Cement 0-20 feet. First Encounter Water = 143 feet bgs DTW = 139.50 bgs after construction	

MW-4

A saturated fine-grained sand unit was encountered in this well at 162 feet bgs during drilling. Immediately above the aquifer, a clay unit was encountered from 155 feet to 160 feet bgs. Immediately below the aquifer, a 10 feet thick clay unit was encountered at 170 feet; this unit was dry at 175 feet bgs. The water level rose in this well to approximately 153.3 bgs, indicating confined to semi-confined conditions. This well has a TD of 185 feet bgs. It is screened from 160 to 180 feet bgs. Bedrock was not encountered during drilling. MW-4 is a hydraulically up-gradient well. It has the highest water level on the Site at 4839.98 feet amsl.

INTERVAL (feet bgs)	MW-4 SAMPLE DESCRIPTION
0-13	Brown to Light Brown Silty CLAY with fine grained SANDS and pebbles present, Dry
13-35	Brown to Light Brown Silty CLAY with fine grained SANDS and caleachie present, Dry
35-102	Brown to Light Brown Silty fine grained SAND and pebbles present, Dry
102-110	Brown to Light Brown fine grained SAND with a CLAY matrix and pebbles present, Dry
110-155	Brown to Light Brown fine grained SAND with a SILTY matrix and pebbles present, 148 -155 Slightly Moist
155-160	Brown to Light Brown CLAY with pebbles present, Slightly Moist
160-170	Brown to Light Brown fine grained SAND with a SILTY matrix with very few pebbles present, Saturated
170-180	Brown to Light Brown CLAY, Slightly Moist, Dry at 175
NOTES: TD = 185 feet bgs, Screened from 160 to 180 feet, Sand 158.5 to 185, Bentonite 158.5 to 20 feet, Neat Cement 0-20 feet. First Encounter Water = 162 feet bgs. DTW = 153.29 bgs after construction	

3.2.3 Subsurface Lithology Summary

The alluvial deposit encountered while drilling is a heterogenous unit. It is comprised of sands, silts, gravels and clays. Clay layers, 6 to 20 feet thick, were encountered in all wells drilled. This finding indicates, the existence of a clay layer underlying the footprint of the proposed TSF, the lateral extent of which is unknown.

Below is a summary description of the subsurface lithology from the boring logs for each well drilled beneath the Site. Well locations are shown on Figure 2. Well Construction Diagrams are included as Appendix A.

3.2.4 Water Level Data and Inferred Groundwater Flow Direction

Site data indicates the up-gradient and northernmost well, MW-4, has the highest potentiometric surface elevation at 4839.98 feet amsl, while the hydraulically down-gradient well, MW-3, (the southwestern most well on the Site) has the lowest potentiometric surface elevation at 4836.81 feet amsl. This infers a general groundwater flow direction from the northeast to southwest. Water level elevations beneath the Site are shown on Figure 3. Measured water levels in Site monitoring wells on October 4, 2012 are listed in Table 1, below.

Table 1. Measured Water Levels in Monitoring Wells

WELL NAME	GROUND ELEVATION	TOC ELEVATION	STATIC WATER LEVELS
MW-1	4980.94	4983.66	4837.73
DH-2	4994.56	4996.96	4837.06
MW-2A	4975.27	4977.26	4837.45
MW-3	4976.31	4978.26	4836.82
MW-4	4993.27	4995.16	4837.45

Note: TOC= Top of Casing. Water levels in feet above mean sea level (AMSL)

4.0 GROUNDWATER ANALYSIS

4.1 Groundwater Analytical Results

Groundwater samples were collected from the monitoring wells and submitted for laboratory analyses for the NDEP Profile II Parameters. Sampling and analytical procedures were followed, pursuant to those contained in the *Study Plan*; JBR, September 2012. A State of Nevada certified laboratory was used for analytical testing, using EPA SW-846 methods. Groundwater sample analytical results have established the background groundwater quality for the Site. Monitoring wells MW-1, MW-2A, MW-3, and MW-4 were tested for the analytes listed on Table 2, below. Laboratory analytical reports are included in Appendix C.

Manganese values exceeded the NDEP Profile II value of 0.1 milligram per liter (mg/L) for all wells tested. Values ranged from 0.11 in MW-3 to 0.49 in MW-1. No other analytes exceeded NDEP Profile II criteria.

Table 2. Summary - Groundwater Analytical Results

	MW-1	MW-2A	DUP-1 (MW-2A)	MW-3	MW-4	EQUIPMENT BLANK	NDEP PROFILE II
Date	9/26/2012	9/26/2012	--	9/26/2012	9/27/2012	--	12/30/2009
pH (standard units)	7.56	7.65	7.67	7.74	7.85	5.98 Q	6.5-8.5
Alkalinity, Bicarbonate (as CaCOr)	190	240	240	210	190	<1	NE
Alkalinity, Total (as CaCOr)	160	200	200	170	150	<1	NE
Aluminum	<0.045	<0.045	<0.45	<0.045	<0.045	<0.045	0.2
Antimony	<0.0025	<0.0025	<0.025	<0.0025	<0.0025	<0.0025	0.006
Arsenic	<0.005	0.0062	0.0059	<0.005	<0.005	<0.005	0.01
Barium	0.085	0.081	0.078	0.078	0.11	<0.01	2.0
Beryllium	<0.0010	<0.001	<0.001	<0.001	<0.001	<0.001	0.004
Bismuth	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NE
Boron	0.24	0.29	0.27	0.27	0.24	<0.1	NE
Cadmium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.005
Calcium	35	44	42	37	35	<0.5	NE
Chloride	34	32	31	32	38	<1	400
Chromium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.1
Cobalt	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	NE
Copper	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	1
Fluoride	0.66	0.75	0.73	0.74	0.79	<0.1	4
Gallium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NE
Iron	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	0.6
Lead	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	<0.0025	0.015
Lithium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NE
Magnesium	9.8	12	12	11	12	<0.5	150
Manganese	**0.49**	**0.11**	**0.10**	**0.11**	**0.47**	**<0.005**	**0.1**
Mercury	<0.0001	<0.00011	<0.0001	<0.0001	<0.0005	<0.0001	0.002
Molybdenum	<0.10	<0.01	<0.01	<0.01	0.035	<0.01	NE
Nickel	<0.01	<0.01	<0.01	<0.01	<0.01	<0.1	0.1

	MW-1	MW-2A	DUP-1 (MW-2A)	MW-3	MW-4	EQUIPMENT BLANK	NDEP PROFILE II
Nitrate + Njeldahl, Total (as N)	1.4	<0.1	<0.1	<0.01	0.19	<0.1	10
Nitrogen, Total (as N)	2.6	1.4	1.4	1.5	1.5	<1.1	10
Phosphorus , Total	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	NE
Potassium	4.8	6.6	6.2	5.7	6.1	<0.5	NE
Scandium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NE
Selenium	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	0.05
Silver	<0.005	<0.005	<0.005	<0.005	<0.005	0.005	0.1
Sodium	53	57	54	53	52	<0.5	NE
Strontium	0.28	0.39	0.37	<0.33	0.031	<0.1	NE
Sulfate	47	45	<0.1	45	50	<1	500
Thallium	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	0.002
Tin	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NE
Titanium	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NE
Total Dissolved Solids	350	380	390	380	380	<10 HT	1000
Vanadium	0.013	0.0.14	0.014	0.014	<0.01	<0.01	NE
WAD Cyanide	<0.01	<0.01	<0.1	<0.01	<0.01	<0.01	0.2
Zinc	0.04	0.023	0.22	<0.01	<0.1	<0.01	5.0

G.R. VOCs = gas range Volatile Organic Hydrocarbons
PAHs= polynuclear aromatic hydrocarbons
"--" = Not analyzed
ND - Not Detected
HT = Sample held beyond holding time
NE = Not Established
ug/l = micrograms per liter (ppb)
Q = estimated value
Values in **"Bold"** exceeded NDEP Profile II criteria

5.0 AQUIFER TESTING

Aquifer testing was conducted to develop hydrogeologic parameter estimates. Detailed procedures for conducting the tests are included in the *Study Plan*; JBR, September 2012.

5.1 Slug Testing

Aquifer testing included slug tests via both rising head and falling head methods. Pneumatic slug testing was performed in MW-4. A summary of estimated horizontal hydraulic conductivity values derived from slug testing is indicated on Table 3 below.

Table 3. Estimated Horizontal Hydraulic Conductivity Values from Slug Testing

HORIZONTAL HYDRAULIC CONDUCTIVITIES (feet/day)			
Piezometer/ Monitoring Well ID	**Aquifer Test Methods, Notes**	**Bouwer And Rice, Unconfined**	**Hvorsley, Unconfined**
MW-1 (1)	Classic Slug Test, Rising Head, Screen Completely Saturated	9.47	14.01
MW-1 (2)	Classic Slug Test, Rising Head, Screen Completely Saturated	9.97	14.75
MW-2A (1)	Pneumatic Slug Test, Screen Completely Saturated	21.64	36.45
MW-2A (2)	Pneumatic Slug Test, Screen Completely Saturated	23.65	39.84
MW-3 (1)	Classic Slug Test, Rising Head, Screen Completely Saturated	10.24	15.14
MW-3 (2)	Classic Slug Test, Rising Head, Screen Completely Saturated	11.68	17.29
MW-4 (1)	Pneumatic Slug Test, Screen Completely Saturated	0.70	1.04
Geometric Mean of Wells Screened in the Shallow Aquifer		8.8	13.5

Note: Slug test evaluation assume aquifer thickness equals saturated sandpack thickness.

5.2 Constant Discharge Test

A 72-hour constant discharge test was conducted using MW-2A as the pumping well and two observation wells (MW-1 and MW-3). Baseline water level monitoring was conducted by installing vented pressure transducers coupled with data loggers into the pumping well and the observation wells.

The pump test well was evaluated with a step-discharge and constant discharge test to estimate sustainable pumping rates in the pumping well during the constant discharge test.

The step-drawdown test was conducted in the pumping well (MW-2A) before the constant discharge test to determine the sustainable pumping rate. The observation wells were monitored during the pump tests to evaluate the potential hydraulic connection within the hydrostratigraphic unit screened. The discharge from the constant discharge pumping test was conveyed away from MW-2A via hose and pipe, and allowed to flow downhill and away from the area of the pumping well to ensure the discharge water would not impact the test.

Based on the information collected from the step-drawdown test, the sustainable pumping rate for the constant discharge test was established. During the constant discharge test, the pump was inadvertently stopped and restarted on four occasions due to equipment complications associated with the pumping contractor's generator and the pump. Constant discharge test hydrographs are included as Figure 4 and in Appendix D.

5.3 Data Evaluation

Following completion of each aquifer test, the collected data were transferred into a spreadsheet program for evaluation. The data were adjusted from real time to pumping/recovery time and groundwater levels were converted to drawdown. After being corrected, the data were evaluated using aquifer test software.

5.3.1 Slug Tests

Slug test data indicate that the hydraulic conductivity values ranged from 9.5 feet per day (ft/day) in MW-1 (Bower and Rice Method) to approximately 40 ft/day in MW-2A (Hvorslev Method). Pneumatic slug testing at MW-4, indicated hydraulic conductivity values ranging from 0.7 ft/day (Bower and Rice Method) to 1 ft/day (Hvorslev Method) (Table 3).

5.3.2 Constant Rate Discharge Test

Data from the constant discharge test indicate 0.03 feet of drawdown were observed in observation well MW-1, which is 370 feet from the pumping well. Total drawdown in observation well MW-3, which is 375 feet from the pumping well, was 0.05 feet. These data

indicate there is no conclusive hydraulic connection apparent between the pumping well (MW-2A) and the two observation wells (MW-1 and MW-3) based on distances of the wells from one another and a pumping rate of 10 to 11 gallon per minute (gpm) over a 3-day duration.

The spatial variation of hydraulic properties from well to well is caused by the high degree of heterogeneity in the alluvial deposit across the site (as evidenced by the boring logs). It should be noted from the slug test data that the hydraulic conductivity in MW-2A is considerably higher than the wells used as observation wells during the pumping test. A sustained pumping rate of 10 to 11 gallons per minute could most likely not be sustained in the observation wells, due to their relatively lower K values.

Hydraulic conductivity was estimated used the method specified in Appendix 16.D of Driscoll (1986). This method assumes that specific capacity of the test well is known. Specific capacity of a well, pumping rate divided by water-level drawdown, is water yield per unit of drawdown. Based on the drawdown and recovery data observed during the constant pumping test (see Figure 4) it was found that even though the pump was inadvertently stopped and restarted on four occasions, the measured specific capacity always approached a constant value. The derived hydraulic conductivity is about 1.6 ft/day.

$$K = 200\ (Q/S_w)/H = 1.6 \text{ ft/day}$$

Where K is the hydraulic conductivity (ft/day), Q is the average pumping rate of the well (~10 gpm), S_w is the drawdown (~ 32 ft), H is the screen interval of the well (40 ft).

It was found that the results of the constant pumping test could be very well reproduced by a Theis solution with an aquifer transmissivity of 90 ft^2/day, or hydraulic conductivity of 2.3 ft/day. Figures 4 and 5 show the observed and Theis-modeled drawdown/recovery responses for the period of September 28 – 29, 2012.

The hydraulic conductivity yielded from the constant rate discharge test is 1.6 ft/day, which is lower than that yielded from the slug tests but within an order of magnitude of the mean slug test results. This is considered acceptable in fine grained, heterogeneous sediments. Aquifer parameters obtained in constant rate discharge tests are generally considered to be more representative of aquifer characteristics than those predicted by slug tests.

5.3.3 Average Linear Velocity

To estimate average linear groundwater velocity, estimates of the following hydrogeologic parameters are required: horizontal hydraulic conductivity, horizontal hydraulic gradient, and effective porosity. Average linear groundwater velocity is calculated using the following equation:

$$\bar{v} = \frac{KI}{n_{eff}}$$

Where:

v = average linear groundwater velocity (ft/day)

K = horizontal hydraulic conductivity (ft/day)

I = horizontal hydraulic gradient (dimensionless)

n_{eff} = effective porosity (dimensionless)

As discussed previously, site-specific K estimates have been developed using different methods. On the basis of the constant rate discharge test data, the hydraulic conductivity value for the shallow aquifer is estimated to be 1.6 ft/day. No site-specific effective porosity data are available. However, based on the nature of the aquifer matrix and calibrated regional groundwater flow model results, an effective porosity of 0.20 is estimated. The horizontal hydraulic gradient under the facility is 0.0016 toward the southwest.

Referencing the hydraulic conductivity value derived from the constant discharge testing of 1.6 ft/day, and assuming an effective porosity of 0.20, and a horizontal hydraulic gradient of 0.0016, the average linear groundwater velocity in the shallow aquifer at the site is approximately 0.013 ft/day or about 4.7 feet per year.

FIGURES

Project Location Topographic Map

Monitoring Well Locations

Groundwater Elevation Contour Map

Observed Hydrographs – Constant Rate Pumping Test

Observed and Theis-modeled Drawdown in MW-2A

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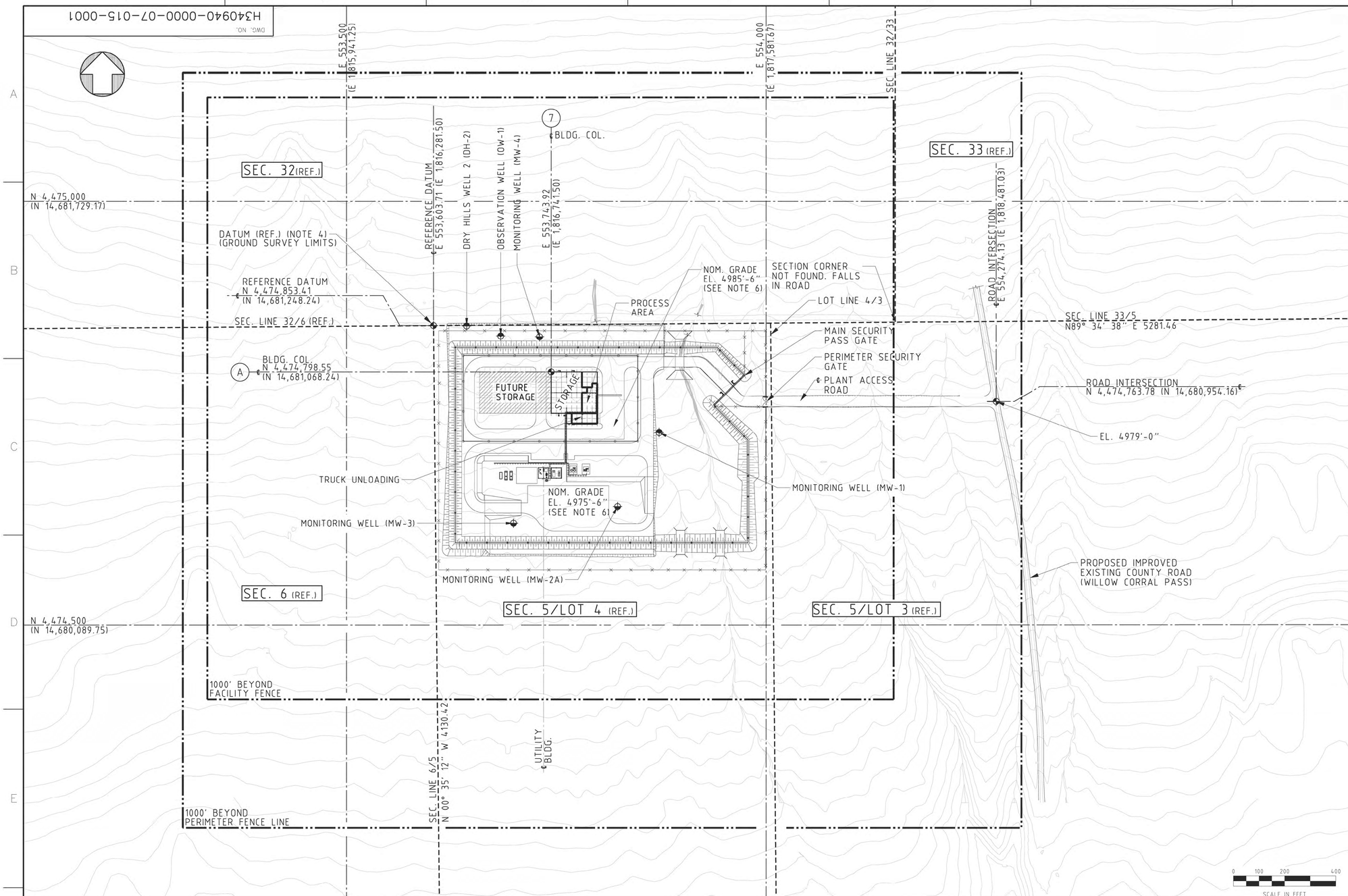
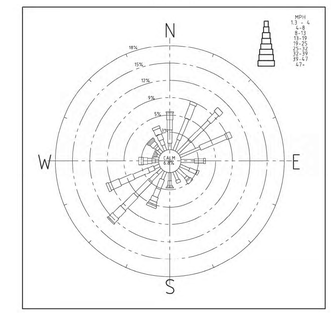


GENERAL NOTES:

1. ALL COORDINATES SHOWN ARE IN METERS (BRACKETED COORDINATES ARE IN U.S. SURVEY FEET).
2. ALL ELEVATIONS ARE IN FEET UNLESS NOTED OTHERWISE.
3. GRID COORDINATES SHOWN ARE BASED ON THE NORTH AMERICAN DATUM OF 1983, (UTM ZONE 11).
4. SURVEY COORDINATES AND ELEVATIONS SHOWN ARE AS RECORDED BY SUMMIT ENGINEERING (RYAN COOK - 08/24/2012).
5. WELL COORDINATES FOR MW-2A, MW-3 AND MW-4 AS PROVIDED BY JBR (09/26/2012).
6. NATURAL GRADE TOPOGRAPHIC INFORMATION (SUMMIT ENGINEERING SURVEY 08/24/2012) OVERLAYED ON THE ENGINEERED GRADE (NOM. GRADE EL. 4975'-6" & EL. 4985'-6")

WIND ROSE
STATION - CRESCENT VALLEY DEAN RANCH, NEVADA.



LEGEND:

- FACILITY FENCE
- PERIMETER FENCE LINE
- BERM FENCE
- BATTERY LIMIT
- SECTION\LOT LINE
- GRID COORDINATES
- TOPOGRAPHIC MAP BOUNDARY
- EXISTING WATER COURSE
- DATUM POINT
- GROUND SURVEY LIMITS
- WELL (SURVEY 08/24/2012)
- WELL (JBR 09/26/2012)
- FUTURE EXPANSION

FOR INFORMATION
NOT FOR CONSTRUCTION

FIGURE 1

DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE

REVISIONS

REV.	ISSUE FOR	AUTH.	BY	DATE
B	INFORMATION	EC	SS	14-11-2012
A	INFORMATION	EC	SS	25-10-2012

ISSUE AUTHORIZATION

HATCH™

DESIGNED BY J. CHALMERS DATE 25-10-2012	DRAWN BY E. CRAWFORD DATE 25-10-2012
CHECKED BY S. SENNIK DATE 25-10-2012	DISCIP. ENGR. R. FUKUZAWA DATE 25-10-2012
PROJ. DES. COORD. J. CHALMERS DATE 25-10-2012	PROJ. ENGR. S. SENNIK DATE 25-10-2012
PROJ. MGR. M. SUCHARDA DATE 25-10-2012	

BARRICK

BARRICK GOLDSTRIKE MINES
PRECIOUS METALS RECOVERY PROJECT

PMR FACILITY
TOPOGRAPHIC MAP
(RCRA PERMIT APPLICATION)

SCALE 1"=200' OR AS NOTED | DWG. NO. H340940-0000-07-015-0001 | REV. B

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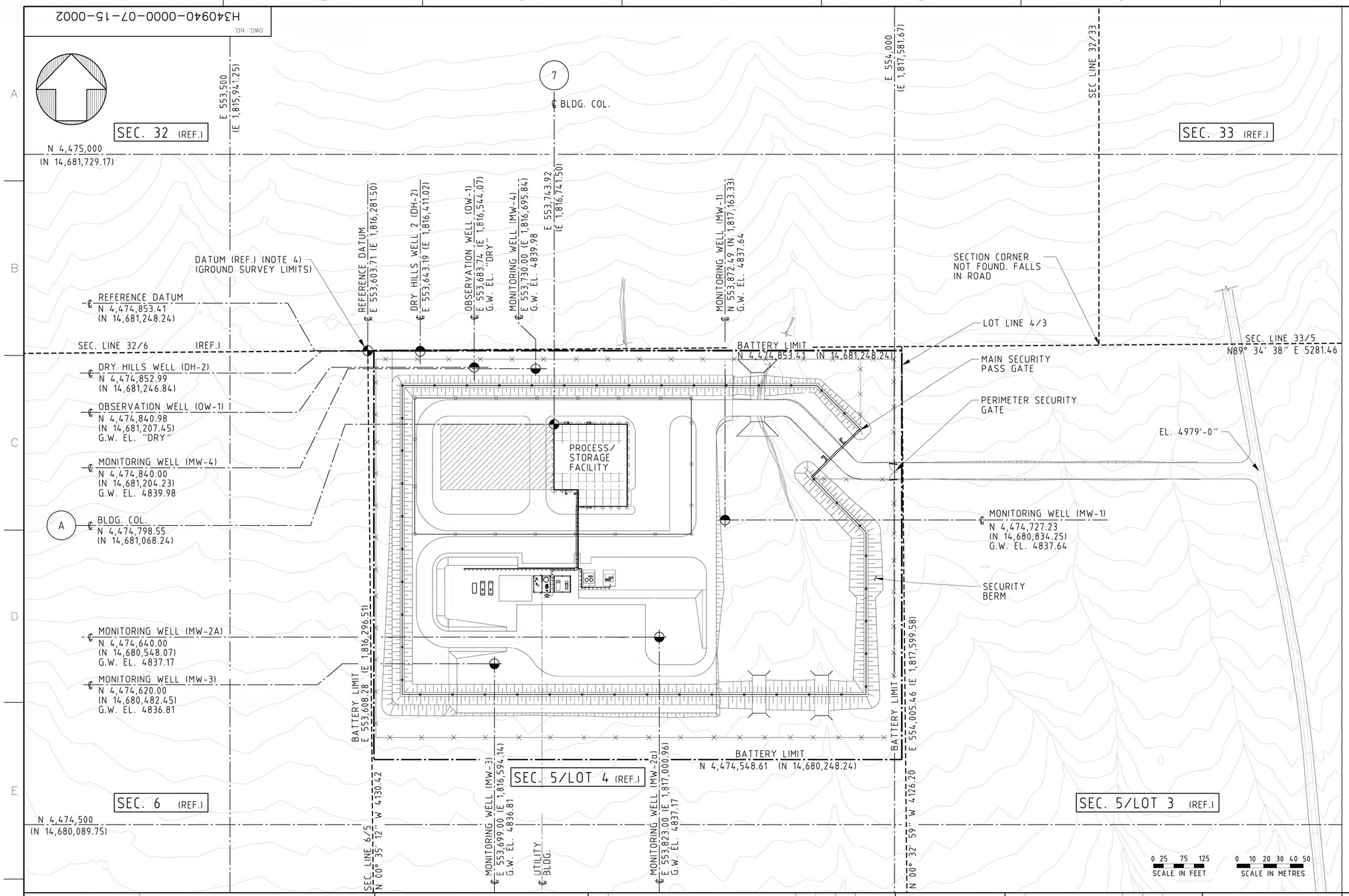

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4. SURVEY COORDINATES AND ELEVATIONS SHOWN ARE AS RECORDED BY SUMMIT ENGINEERING (RYAN COOK - 08/24/2012).
5. WELL COORDINATES FOR MW-2A, MW-3 AND MW-4 AS PROVIDED BY JBR (09/26/2012).
6. ALL WELL ELEVATIONS ARE GROUND WATER ELEVATIONS IN FEET AS PROVIDED BY JBR (11/09/2012).

LEGEND:

- FACILITY FENCE
- PERIMETER FENCE LINE
- BERM FENCE
- BATTERY LIMIT
- SECTION\LOT LINE
- GRID COORDINATES
- DATUM POINT
- WELL (SURVEY 08/24/2012)
- WELL (JBR 09/26/2012)
- FUTURE EXPANSION

FOR INFORMATION
NOT FOR CONSTRUCTION

DRAWING NO.	DRAWING TITLE

REFERENCE DRAWINGS

NO.	DESCRIPTION	BY	CHK'D	APP'D	DATE

REVISIONS

REV.	ISSUE FOR	AUTH. BY	DATE
C	PERMIT INFORMATION	R.F.	S.S.	2012-11-19
B	PERMIT INFORMATION	R.F.	S.S.	2012-11-15
A	PERMIT INFORMATION	R.F.	S.S.	2012-11-12

ISSUE AUTHORIZATION

HATCH™

DESIGNED BY J. CHALMERS DATE 2012-11-12	DRAWN BY E. CRAWFORD DATE 2012-11-12
CHECKED BY J. CHALMERS DATE 2012-11-12	DISCIP. ENGR. R. FUKUZAWA DATE 2012-11-12
PROJ. DES. COORD. J. CHALMERS DATE 2012-11-12	PROJ. ENGR. S. SENNIK DATE 2012-11-12
PROJ. MGR. M. SUCHARDA DATE 2012-11-12	

BARRICK

BARRICK GOLDSTRIKE MINES
PRECIOUS METALS RECOVERY PROJECT

FIGURE 2
MONITORING WELL LOCATIONS

SCALE 1:1500 OR AS NOTED

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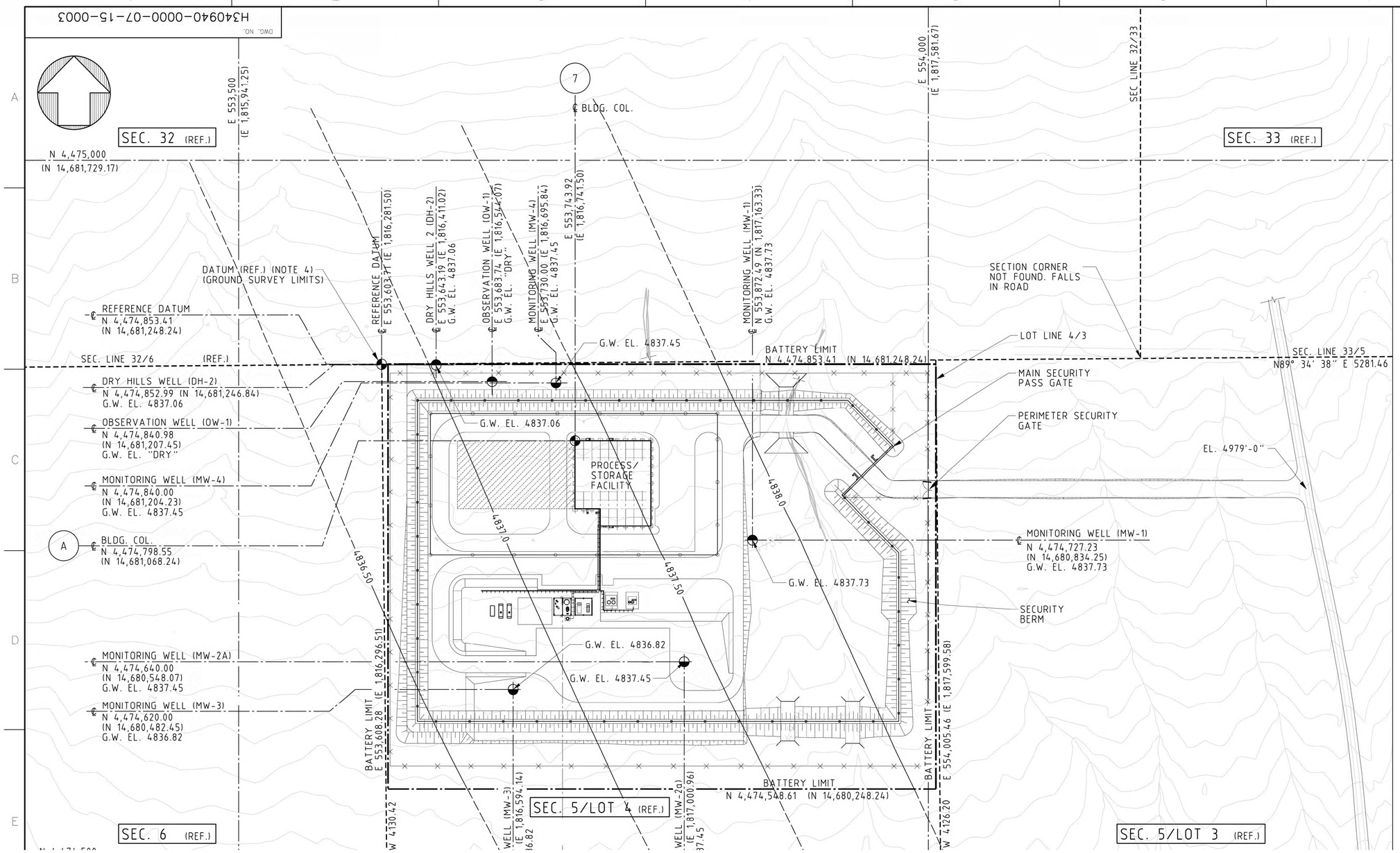

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5. WELL COORDINATES FOR MW-2A, MW-3 AND MW-4 AS PROVIDED BY JBR (09/26/2012).
6. ALL WELL ELEVATIONS ARE GROUND WATER ELEVATIONS IN FEET AMSL AS PROVIDED BY JBR (11/29/2012).

LEGEND:

- FACILITY FENCE
- PERIMETER FENCE LINE
- BERM FENCE
- BATTERY LIMIT
- SECTION\LOT LINE
- GRID COORDINATES
- DATUM POINT
- WELL (SURVEY 08/24/2012)
- WELL (JBR 09/26/2012)
- FUTURE EXPANSION

FOR INFORMATION

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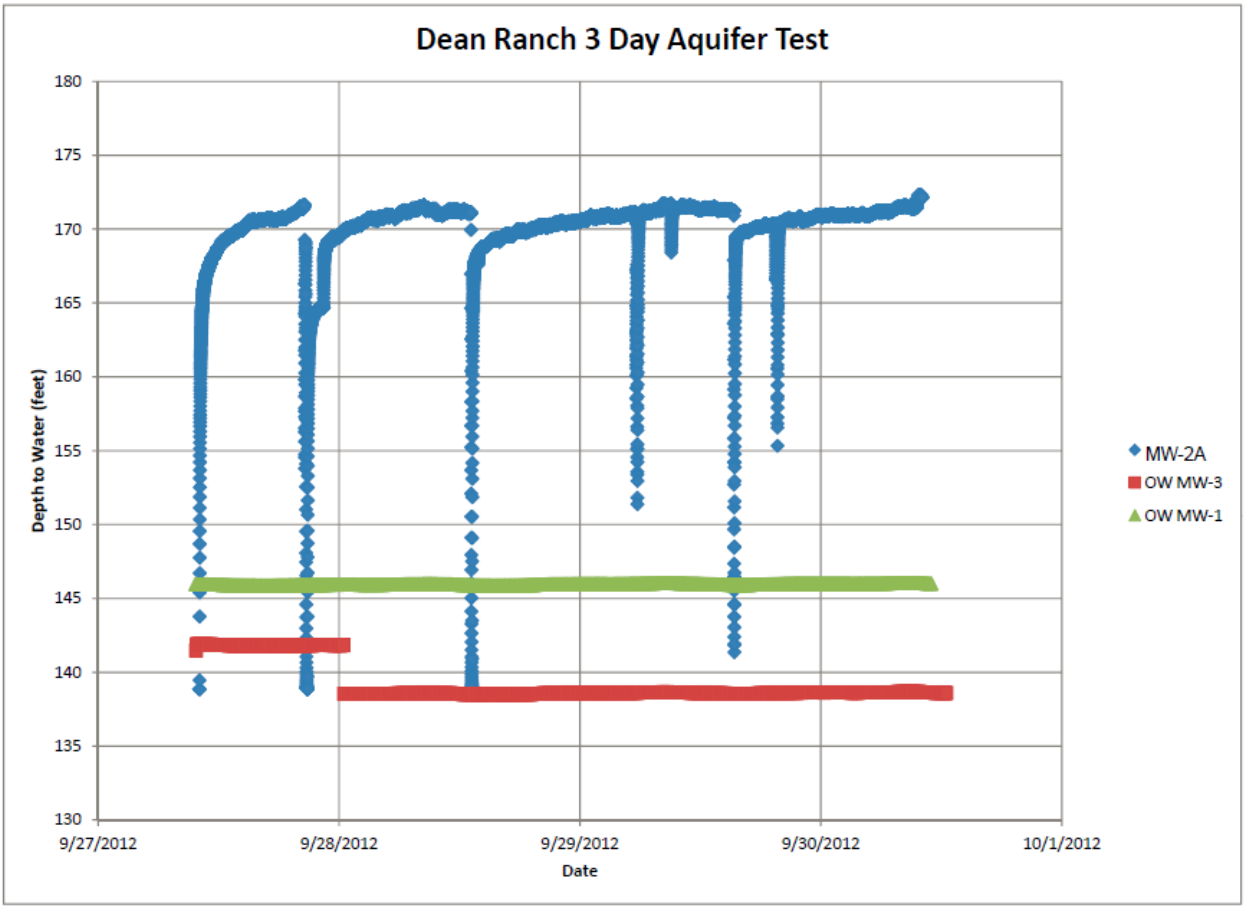


Figure 4 Observed Hydrographs – Constant Rate Pumping Test

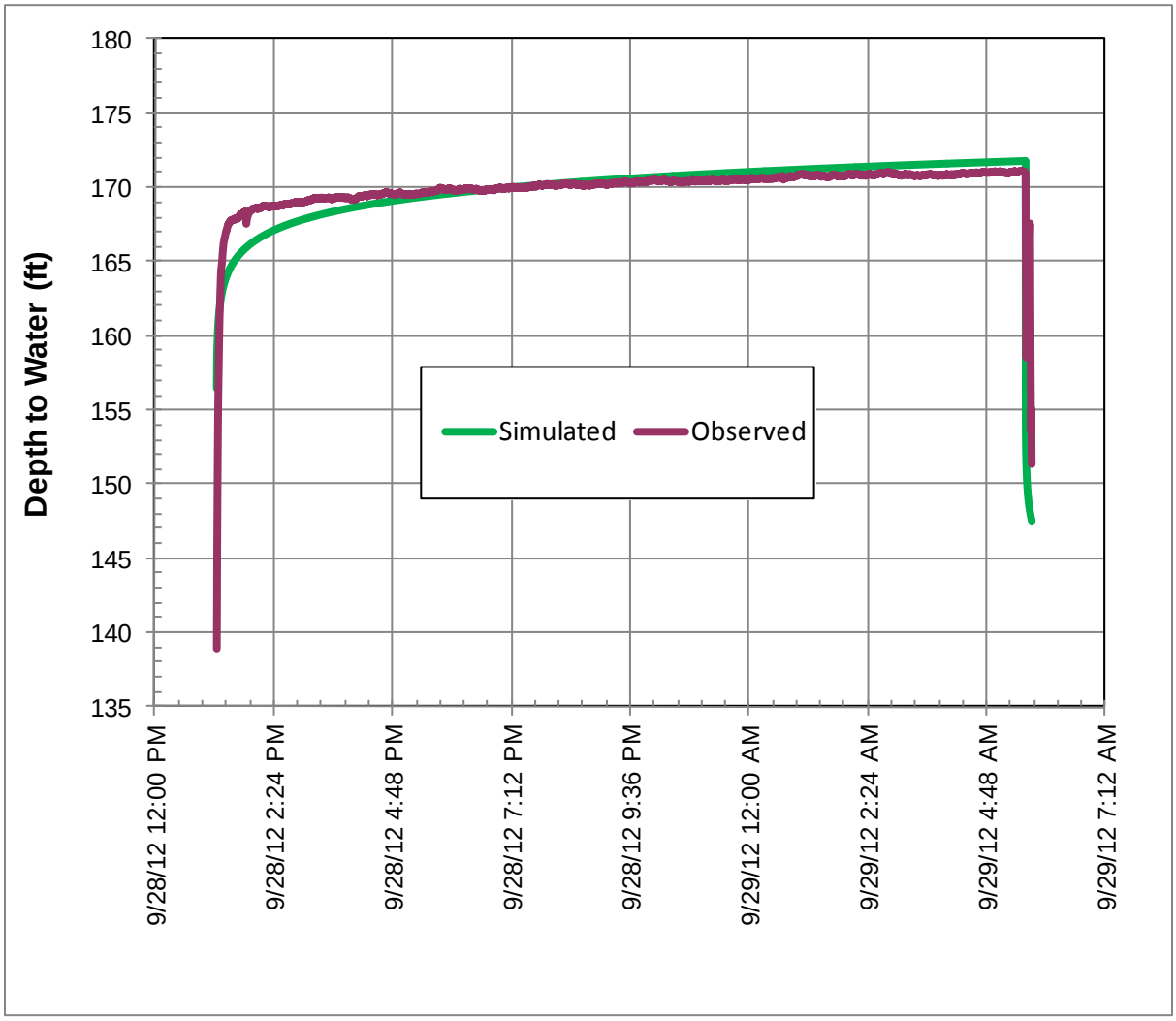
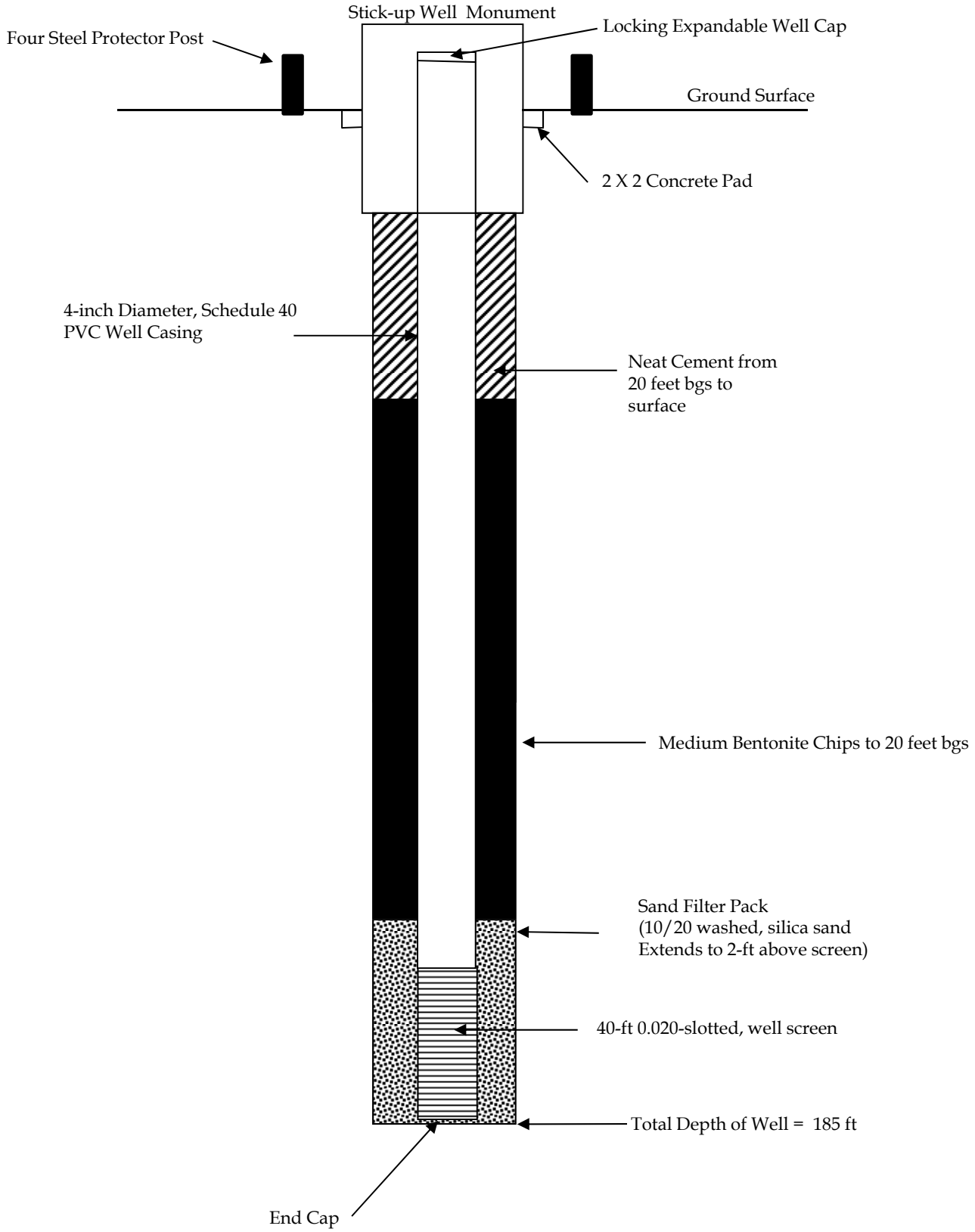


Figure 5 Observed and Theis-modeled Drawdown of MW-2A (Sep 28 – 29, 2012)

APPENDIX A

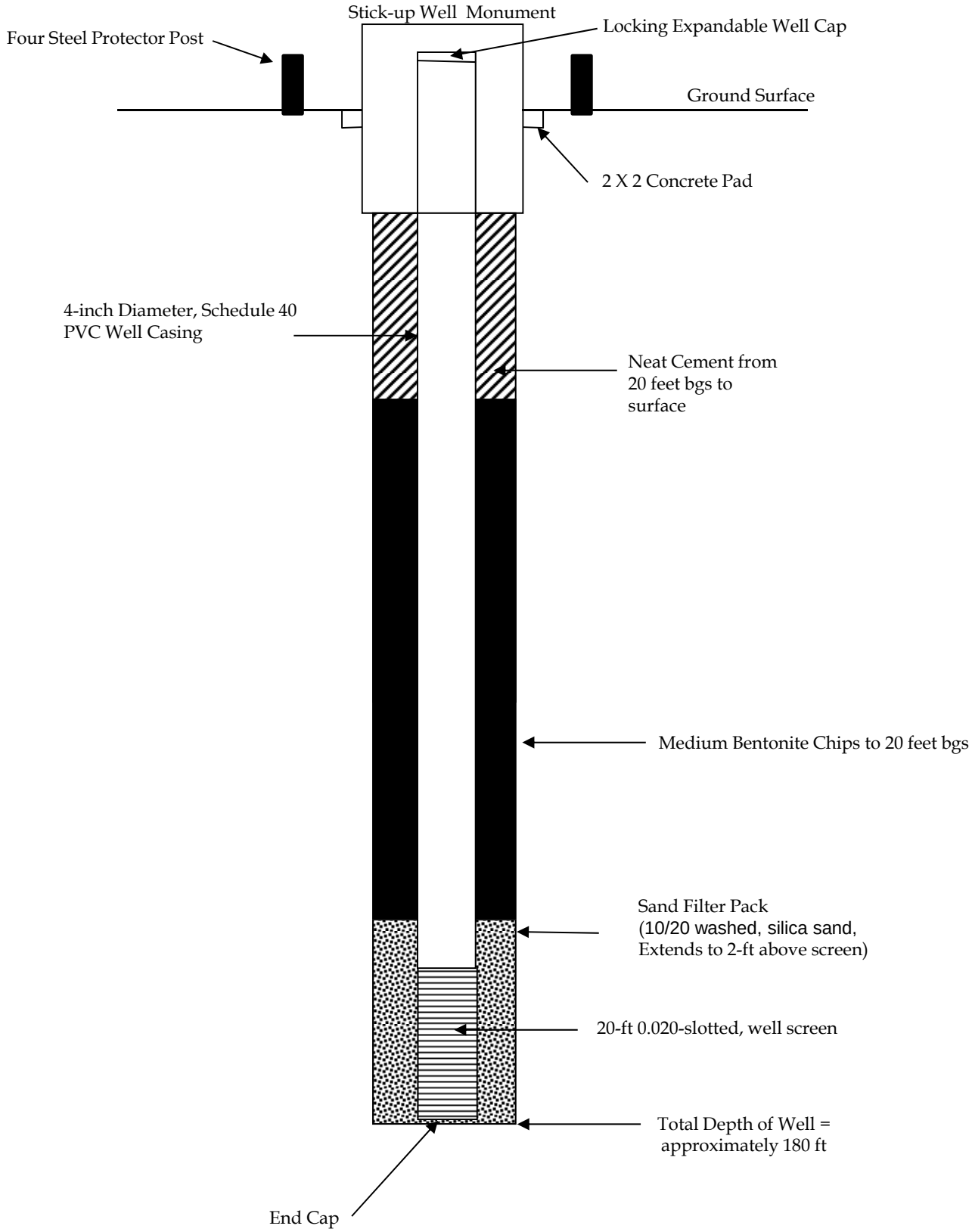
Well Construction Diagrams



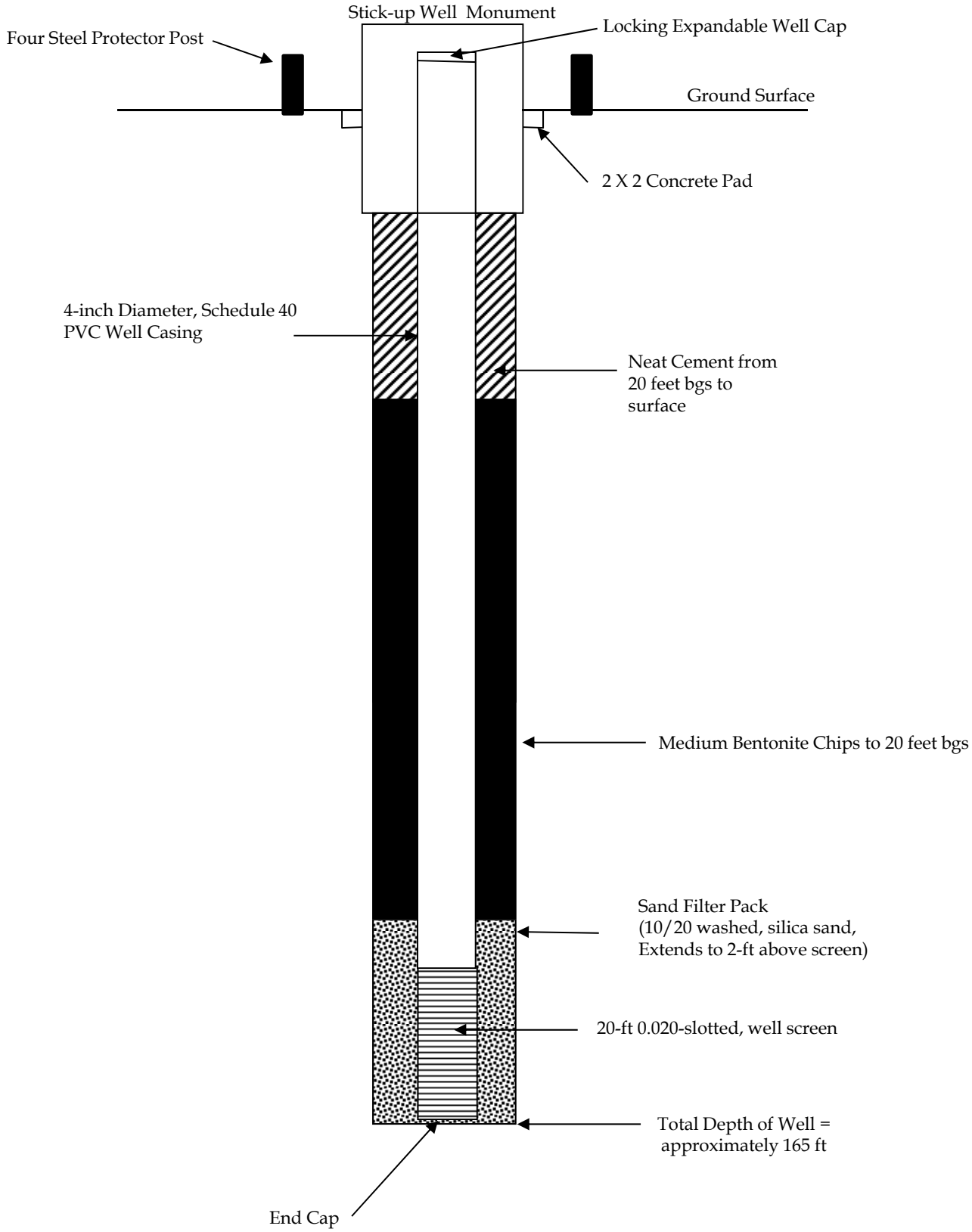
PRECIOUS METALS RECOVERY LLC
EUREKA COUNTY, NEVADA

MW-2A Well Construction Schematic

			Date Drawn: 10/10/12
Design by: U. Cooley	Drawn by: T. Hedrick	Scale: None	Last Revision Date: 11/15/12



JBR™	PRECIOUS METALS RECOVERY LLC EUREKA COUNTY, NEVADA			
	MW-4 Well Construction Schematic			
				Date Drawn
	Design by	Drawn by	Scale	Last Revision Date



PRECIOUS METALS RECOVERY LLC
EUREKA COUNTY, NEVADA

MW-3 Well Construction Schematic

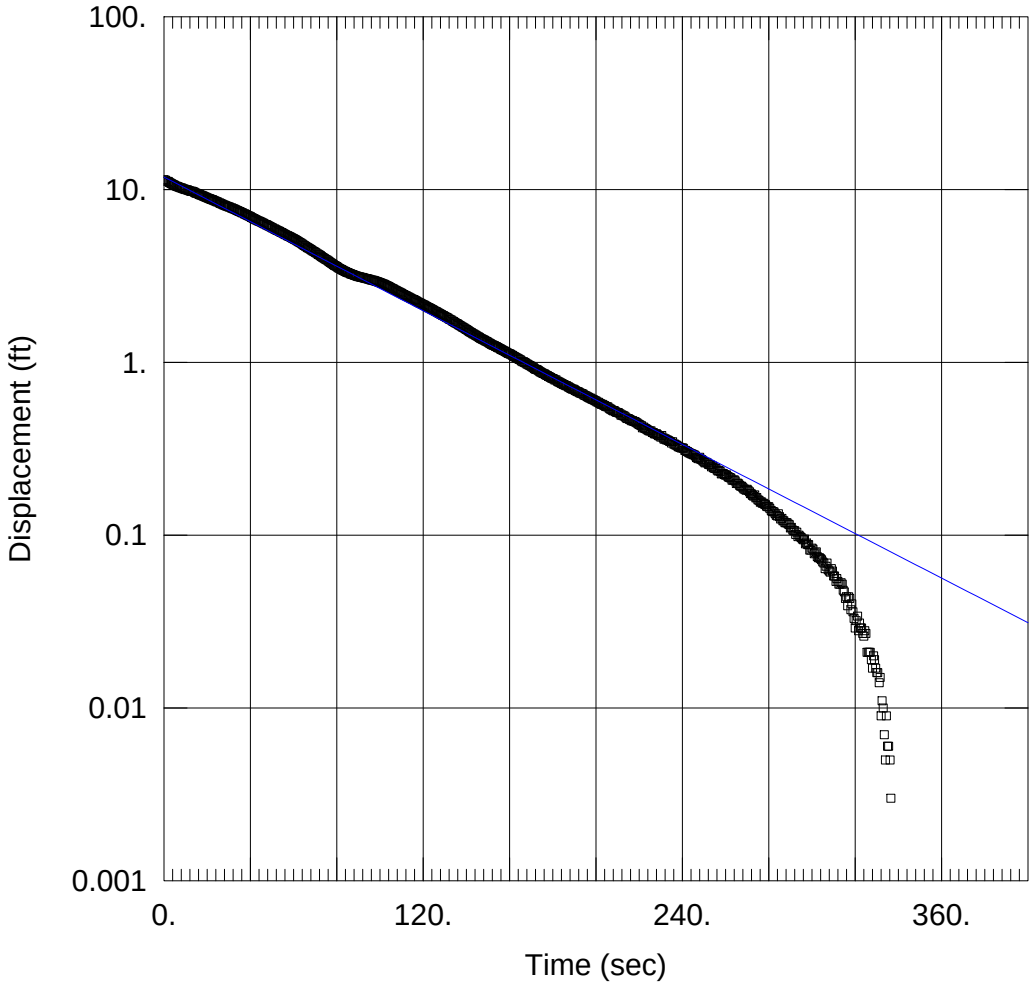
			Date Drawn: 10/10/12
Design by: U. Cooley	Drawn by: T. Hedrick	Scale: None	Last Revision Date: 10/15/12

APPENDIX B

Slug Test Results

MW-1 (slug test 1)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

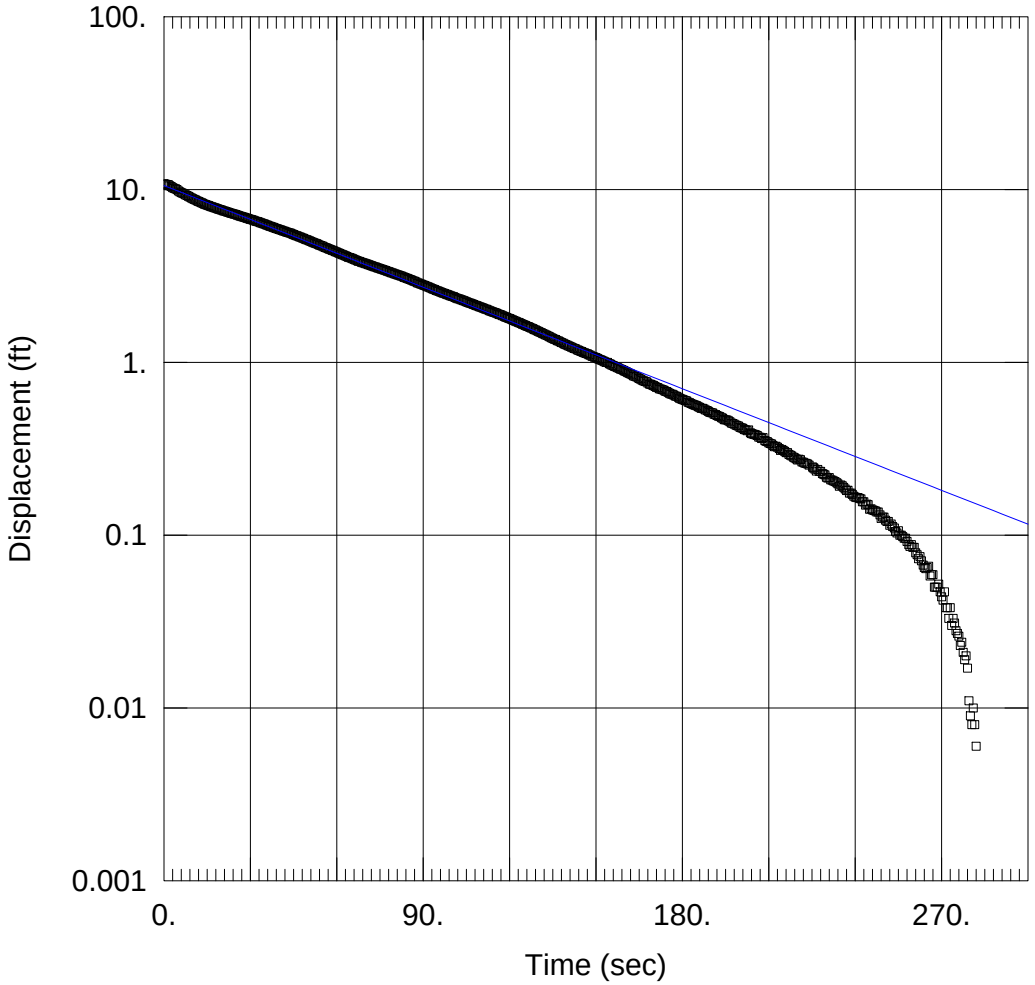
K = 9.842 ft/day y0 = 11.81 ft

WELL DATA (MW-1)

Initial Displacement: 11.37 ft
Static Water Column Height: 27.5 ft
Total Well Penetration Depth: 27.5 ft
Screen Length: 20. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-1 (slug test 2)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

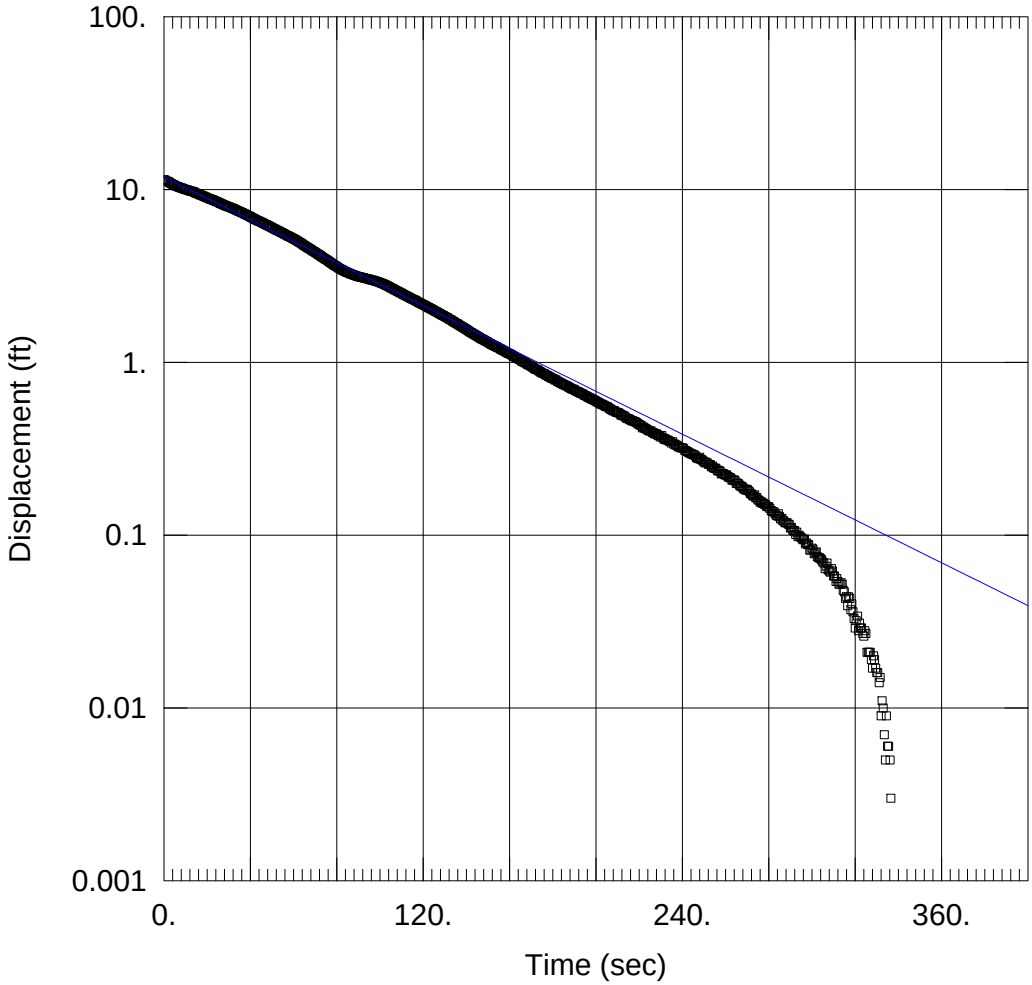
K = 9.972 ft/day y0 = 10.54 ft

WELL DATA (MW-1)

Initial Displacement: 10.79 ft
Static Water Column Height: 27.5 ft
Total Well Penetration Depth: 27.5 ft
Screen Length: 20. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-1 (slug test 1)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

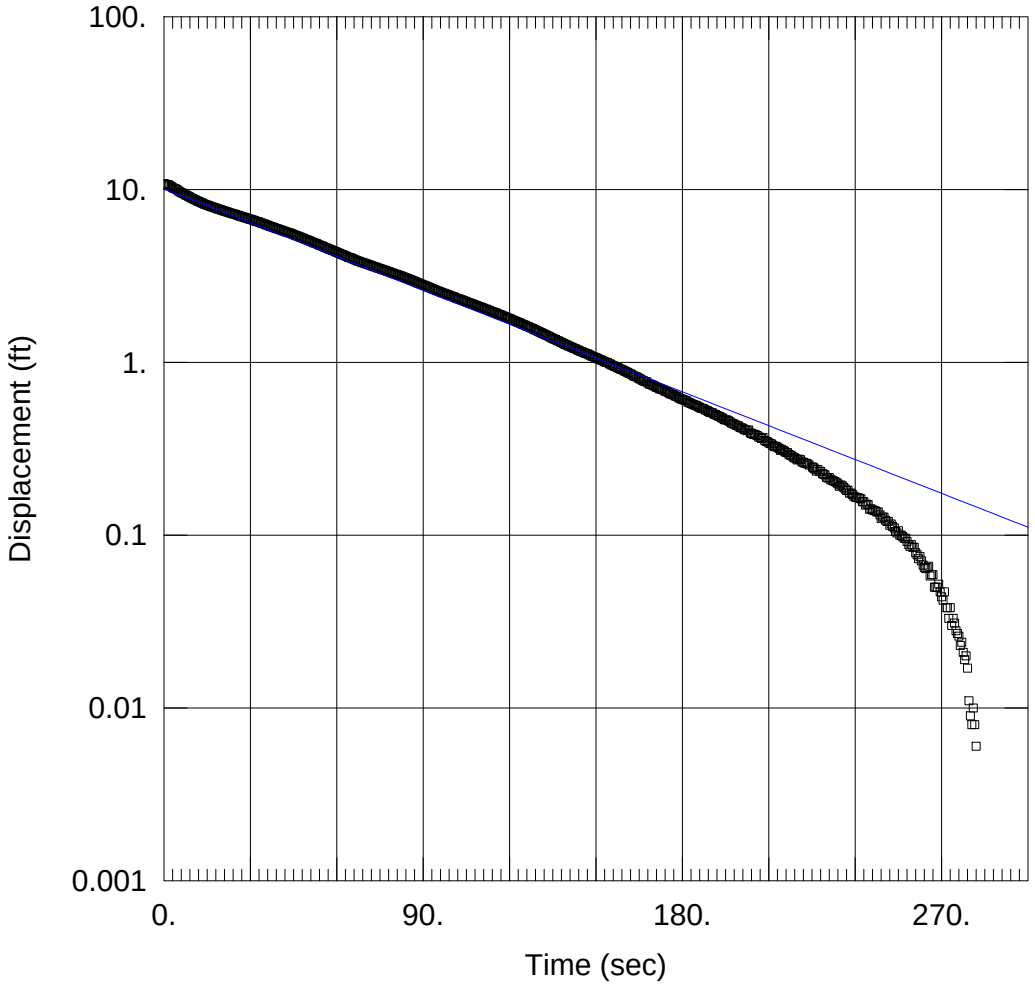
K = 14.01 ft/day y0 = 11.82 ft

WELL DATA (MW-1)

Initial Displacement: 11.37 ft
Static Water Column Height: 27.5 ft
Total Well Penetration Depth: 27.5 ft
Screen Length: 20. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-1 (slug test 2)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

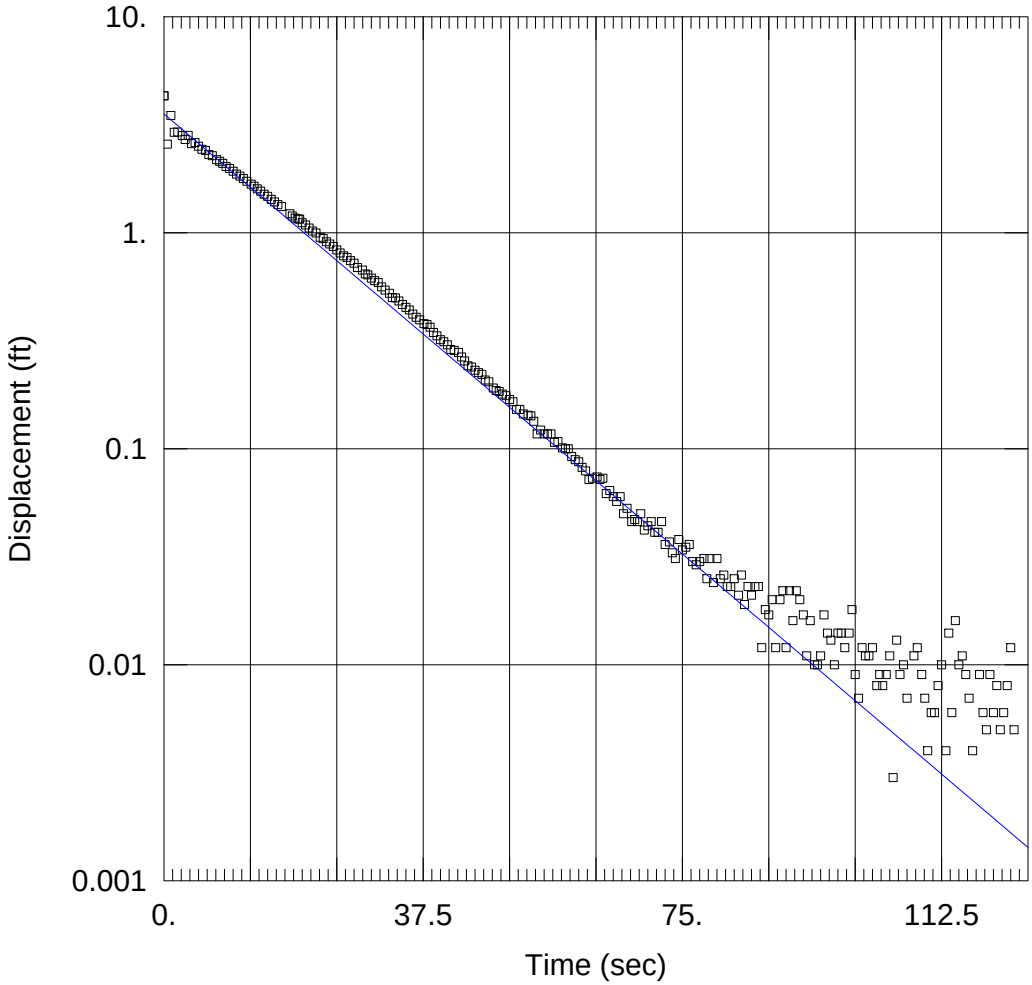
K = 14.75 ft/day y0 = 10.1 ft

WELL DATA (MW-1)

Initial Displacement: 10.79 ft
Static Water Column Height: 27.5 ft
Total Well Penetration Depth: 27.5 ft
Screen Length: 20. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-2A (slug test 1)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

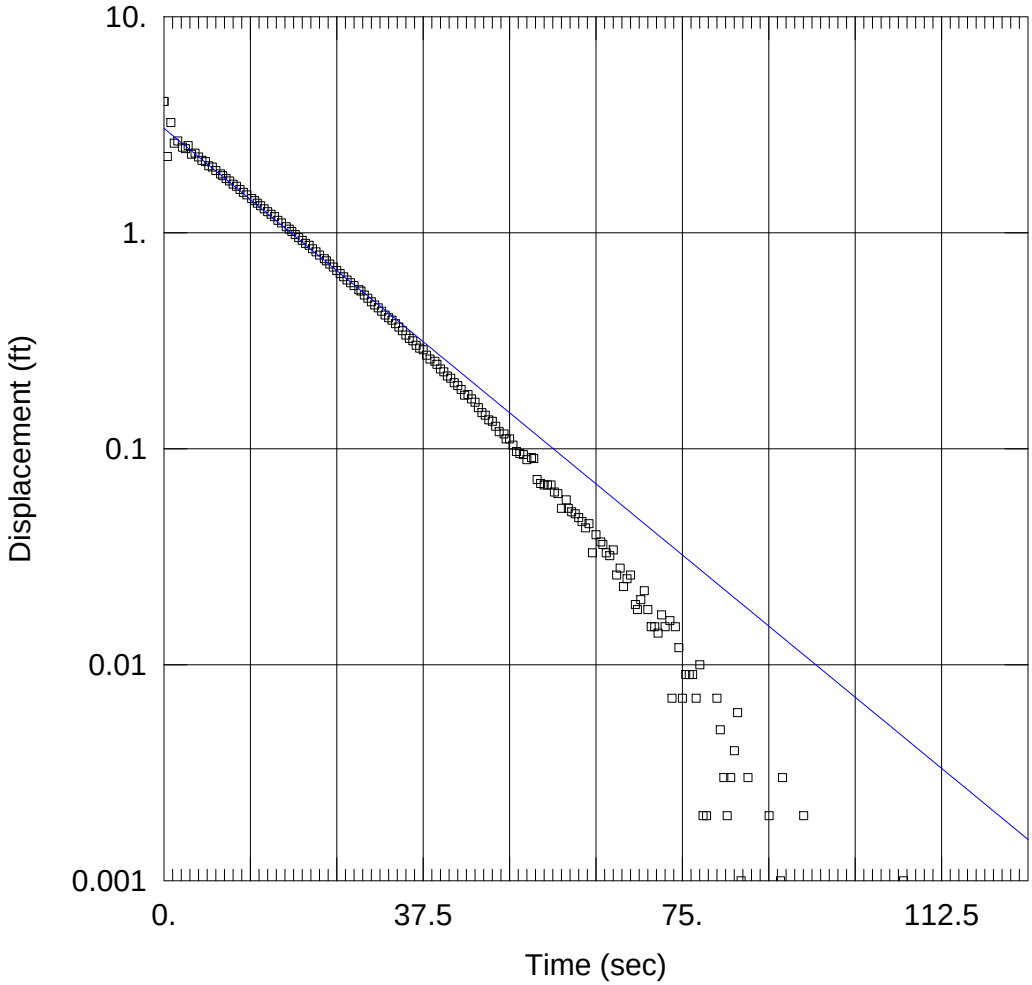
K = 23.56 ft/day y0 = 3.546 ft

WELL DATA (MW-2A)

Initial Displacement: 4.303 ft
Static Water Column Height: 40. ft
Total Well Penetration Depth: 40.3 ft
Screen Length: 40. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-2A (slug test 2)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

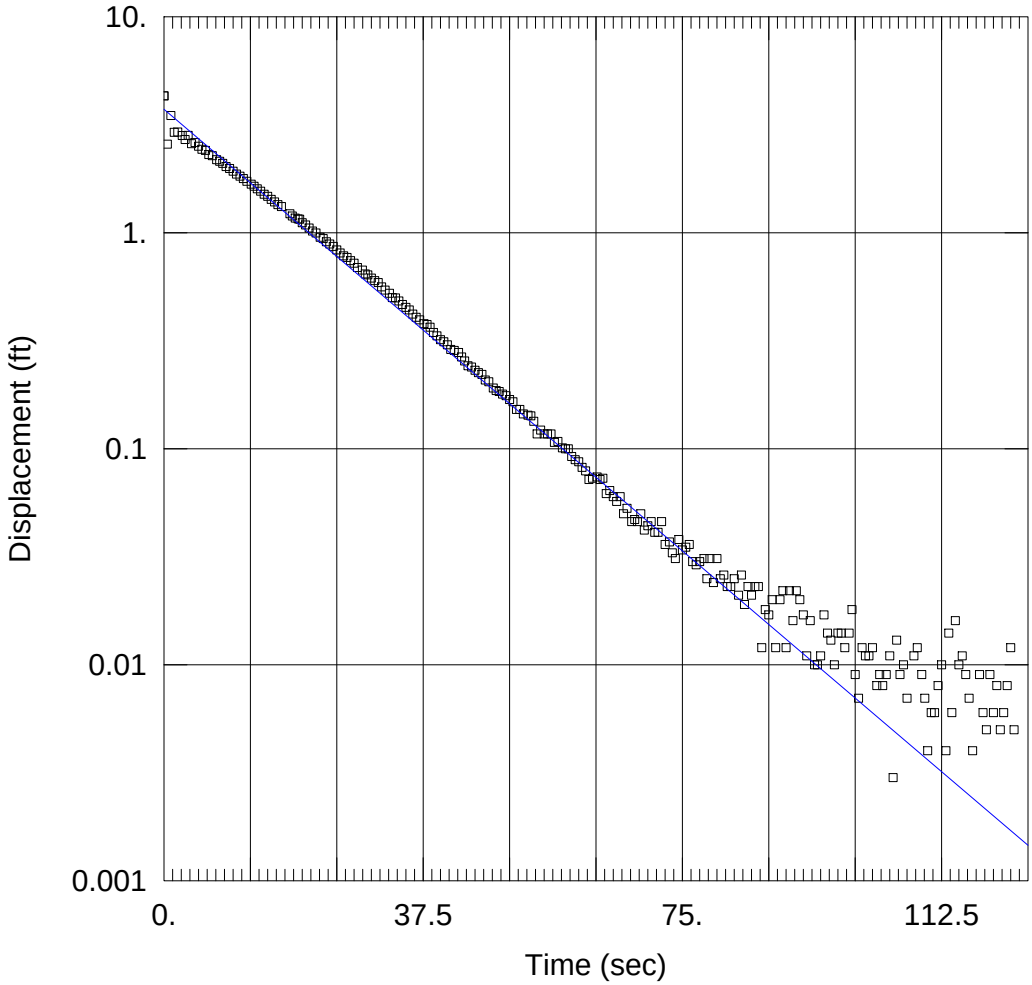
K = 22.84 ft/day y0 = 3.041 ft

WELL DATA (MW-2A)

Initial Displacement: 4.051 ft
Static Water Column Height: 40. ft
Total Well Penetration Depth: 40.3 ft
Screen Length: 40. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-2A (slug test 1)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

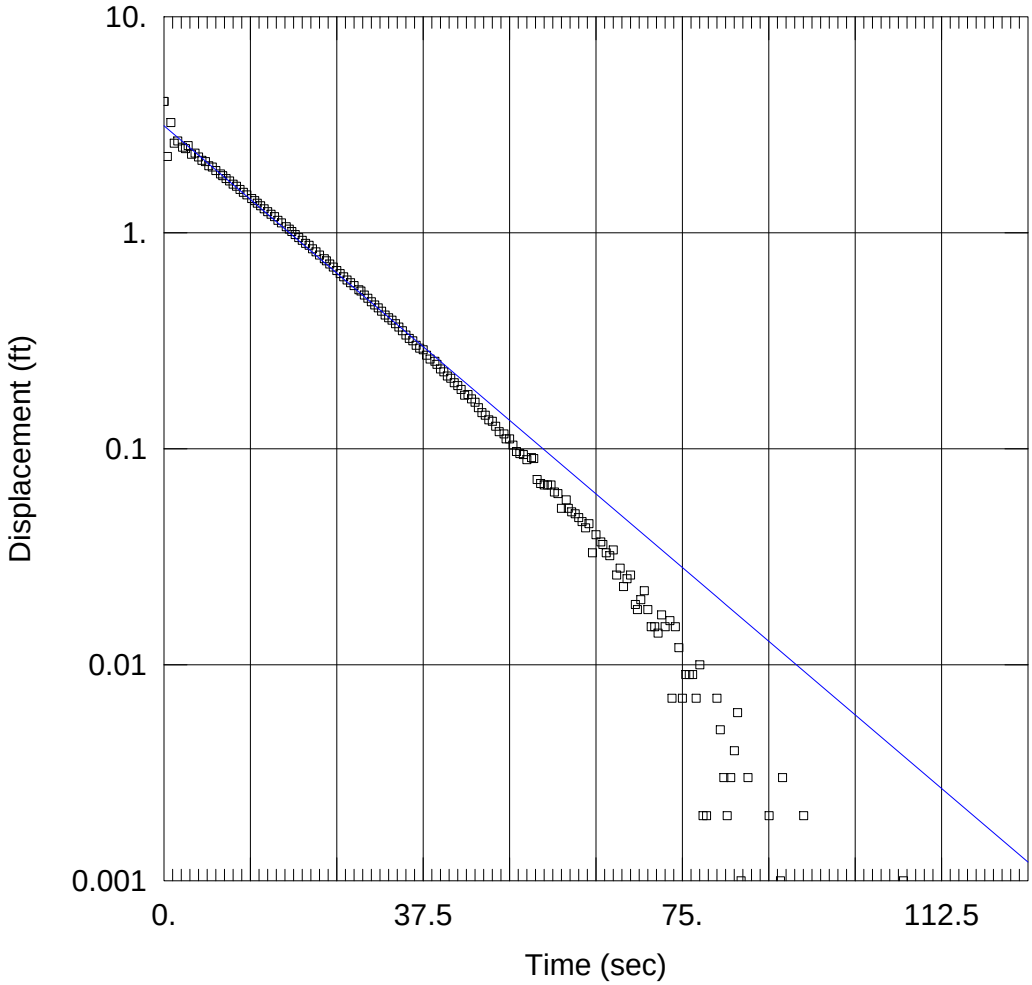
K = 39.82 ft/day y0 = 3.726 ft

WELL DATA (MW-2A)

Initial Displacement: 4.303 ft
Static Water Column Height: 40. ft
Total Well Penetration Depth: 40.3 ft
Screen Length: 40. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-2A (slug test 2)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

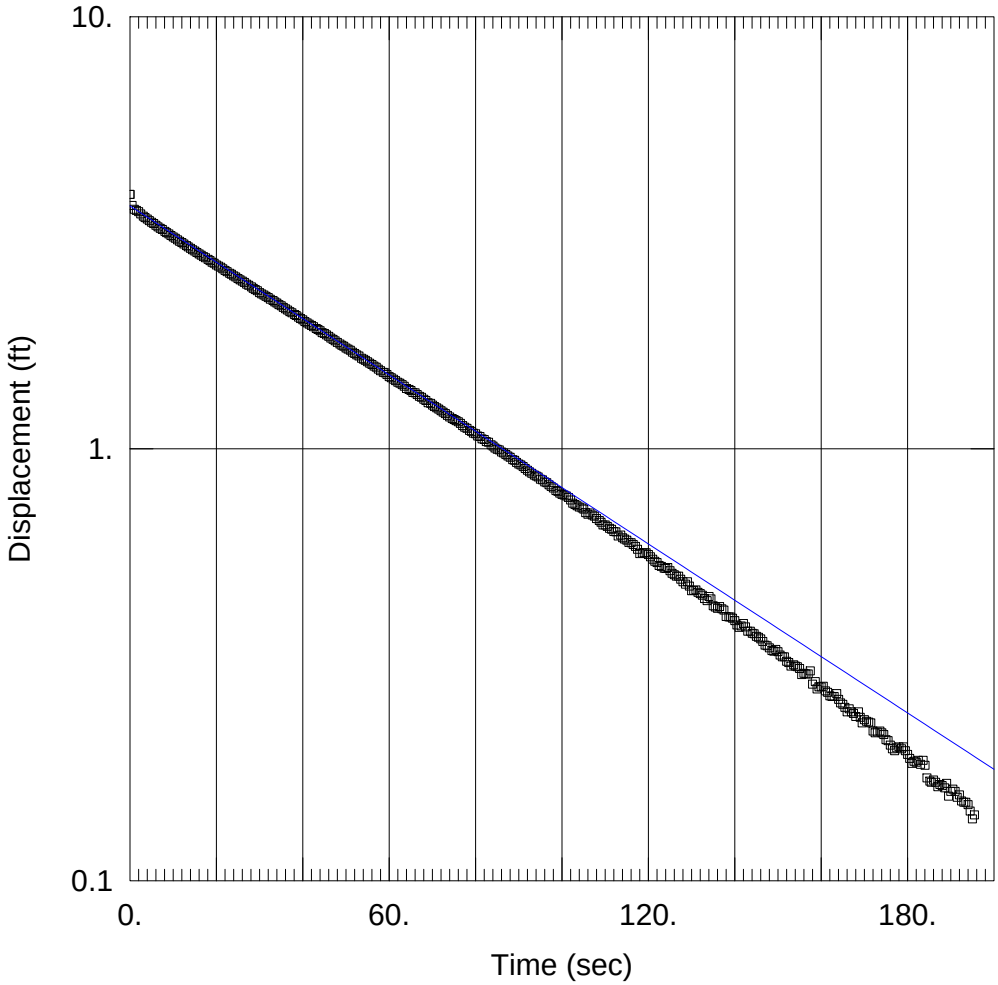
K = 39.84 ft/day y0 = 3.126 ft

WELL DATA (MW-2A)

Initial Displacement: 4.051 ft
Static Water Column Height: 40. ft
Total Well Penetration Depth: 40.3 ft
Screen Length: 40. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-3 (slug test 1)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

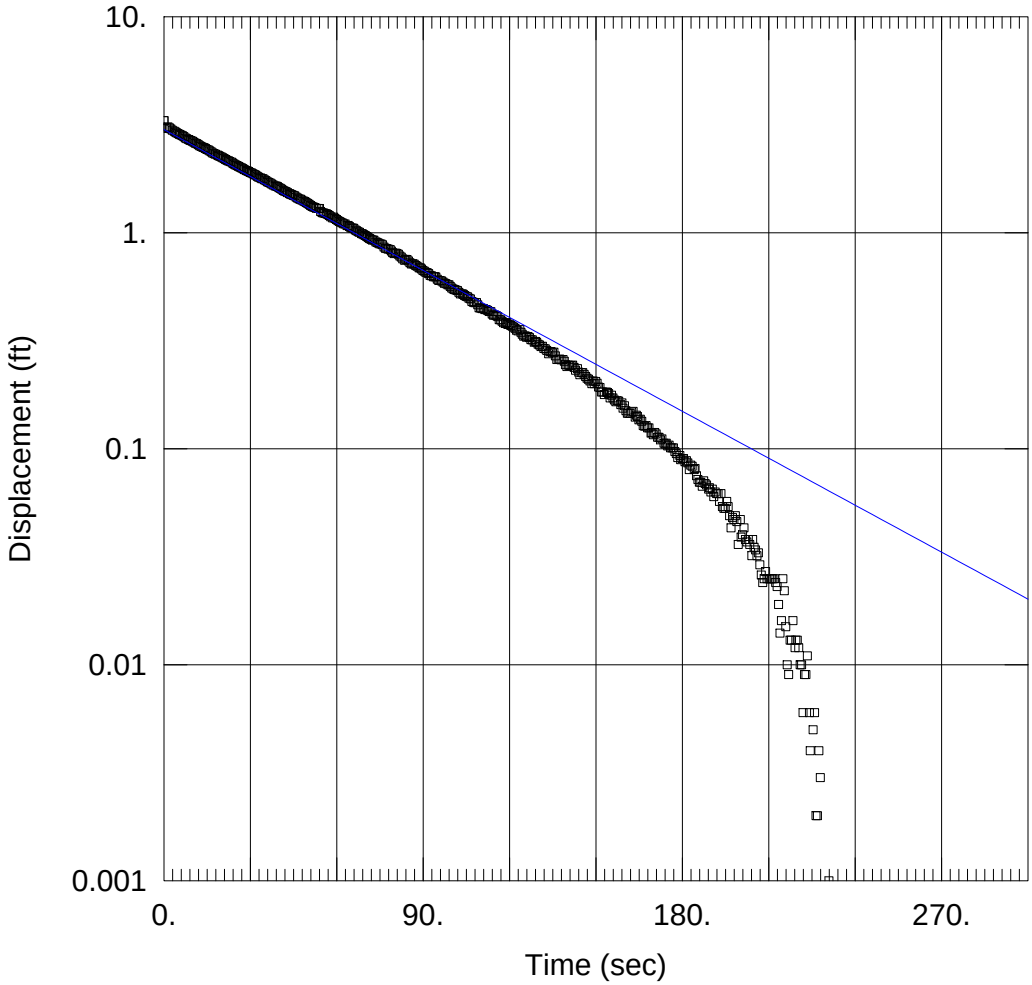
K = 9.955 ft/day y0 = 3.648 ft

WELL DATA (MW-3)

Initial Displacement: 3.88 ft
Static Water Column Height: 27.5 ft
Total Well Penetration Depth: 27.5 ft
Screen Length: 20. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-3 (slug test 2)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

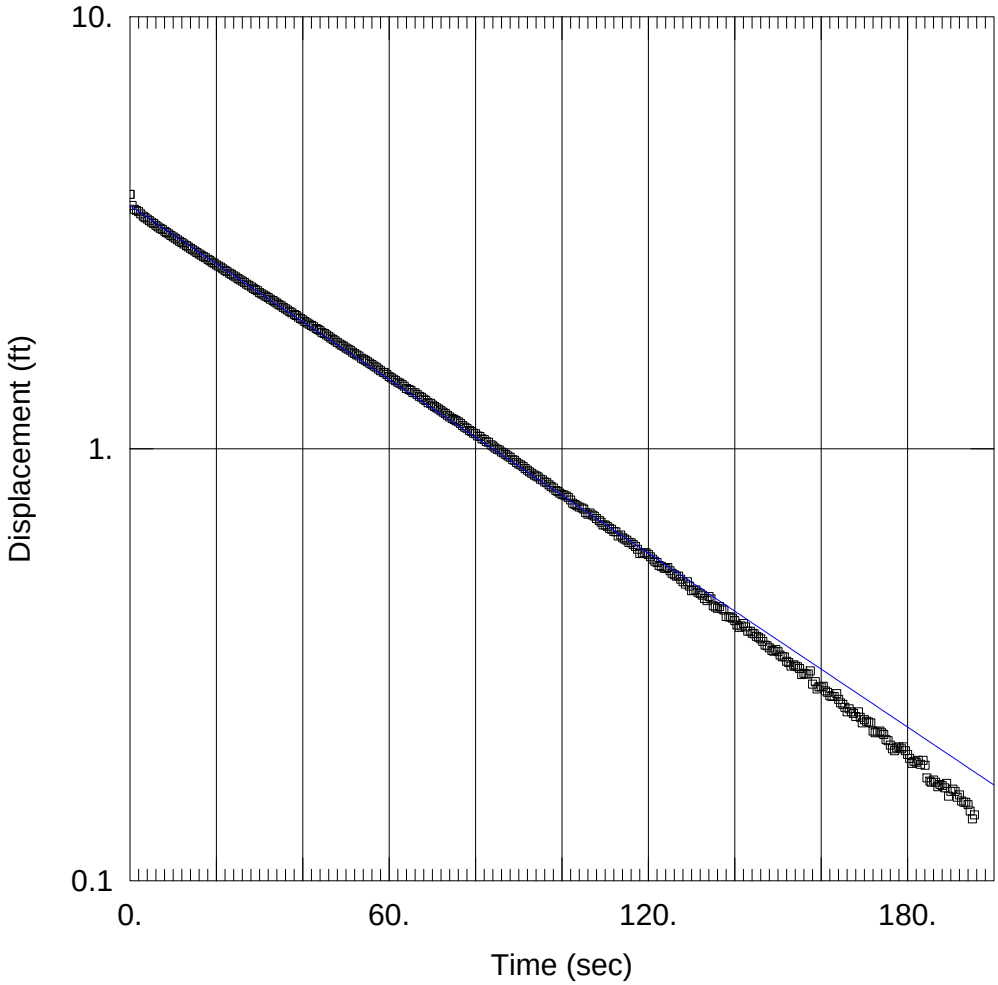
K = 11.06 ft/day y0 = 3.003 ft

WELL DATA (MW-3)

Initial Displacement: 3.302 ft
Static Water Column Height: 27.5 ft
Total Well Penetration Depth: 27.5 ft
Screen Length: 20. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-3 (slug test 1)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

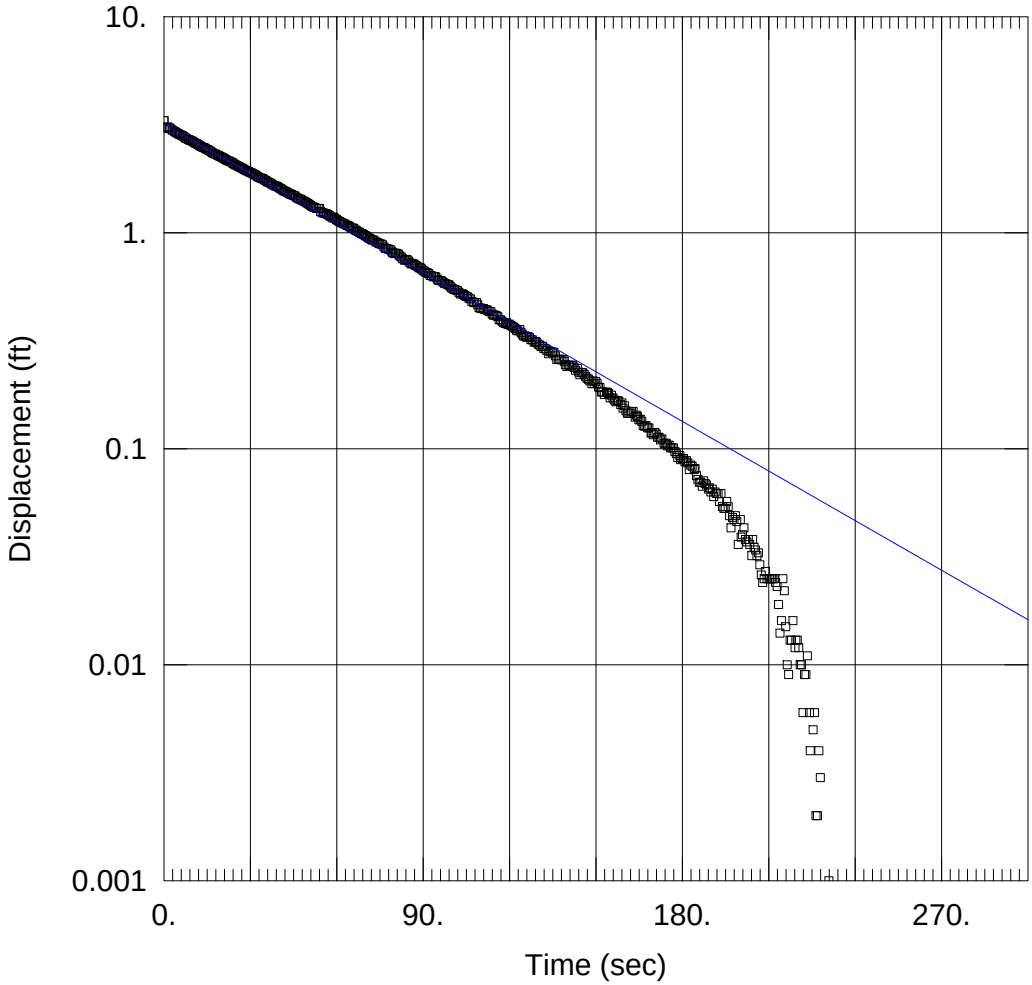
K = 15.14 ft/day y0 = 3.651 ft

WELL DATA (MW-3)

Initial Displacement: 3.88 ft
Static Water Column Height: 27.5 ft
Total Well Penetration Depth: 27.5 ft
Screen Length: 20. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-3 (slug test 2)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

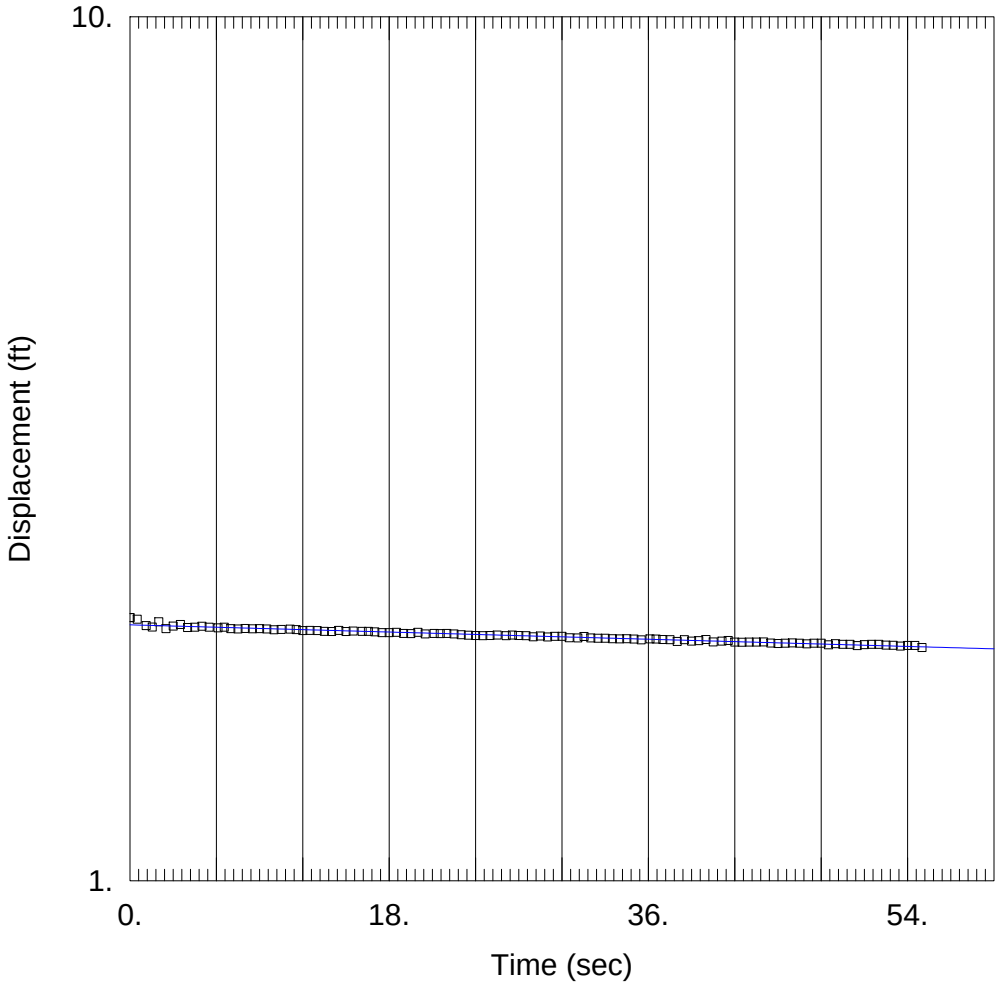
K = 17.29 ft/day y0 = 3.194 ft

WELL DATA (MW-3)

Initial Displacement: 3.302 ft
Static Water Column Height: 27.5 ft
Total Well Penetration Depth: 27.5 ft
Screen Length: 20. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-4 (slug test 1)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Bouwer-Rice

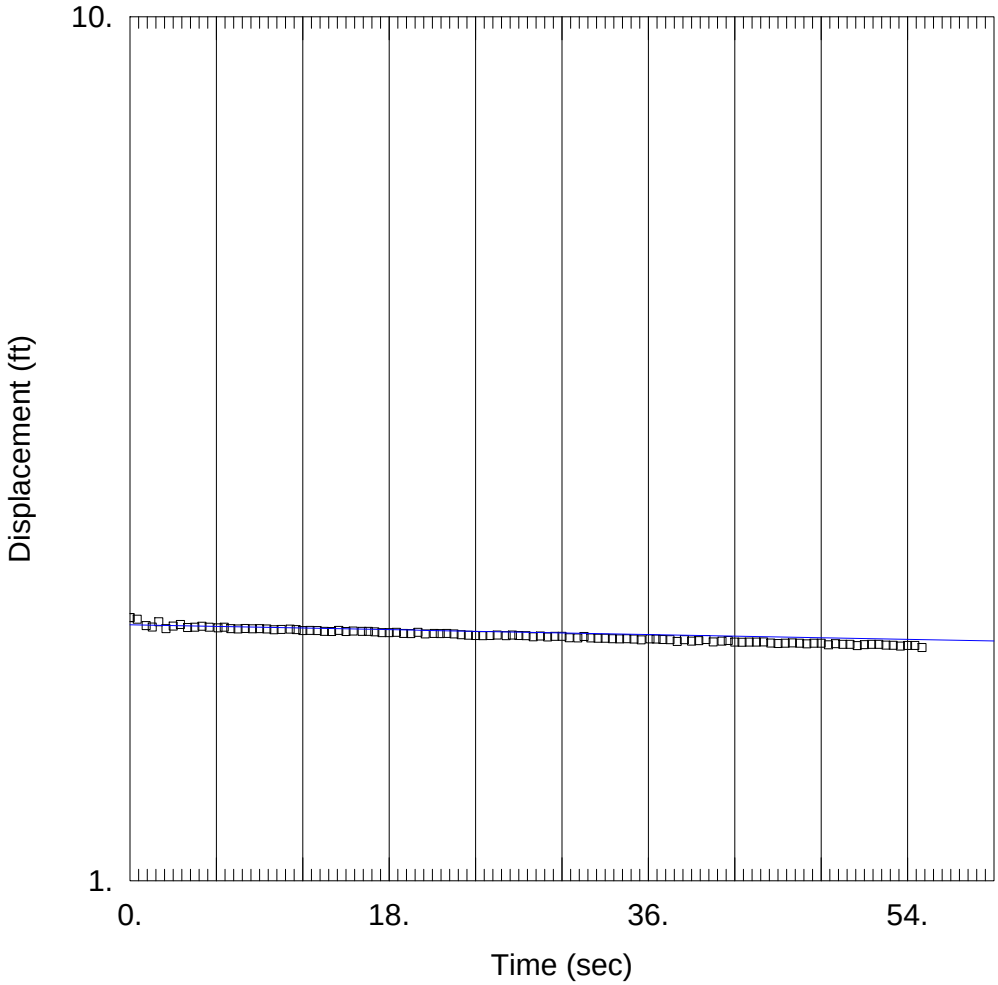
K = 0.7014 ft/day y0 = 1.978 ft

WELL DATA (MW-4)

Initial Displacement: 2.016 ft
Static Water Column Height: 26.7 ft
Total Well Penetration Depth: 26.71 ft
Screen Length: 20. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

MW-4 (slug test 1)

Prepared By:	Prepared For:
JBR Environmental Inc.	PMR
Project:	Location:
B.A10424.00	TSF Site



SOLUTION

Aquifer Model: Unconfined
Solution Method: Hvorslev

K = 0.7014 ft/day y0 = 1.978 ft

WELL DATA (MW-4)

Initial Displacement: 2.016 ft
Static Water Column Height: 26.7 ft
Total Well Penetration Depth: 26.71 ft
Screen Length: 20. ft
Casing Radius: 0.333 ft
Well Radius: 0.666 ft

APPENDIX C

Laboratory Analytical Groundwater Reports

10/15/2012

JBR Environmental Consultants, Inc. (Utah)
8160 South Highland Drive
Sandy, UT 84093
Attn: Thomas Hedrich

OrderID: *1209528*

Dear: Thomas Hedrich

This is to transmit the attached analytical report. The analytical data and information contained therein was generated using specified or selected methods contained in references, such as Standard Methods for the Examination of Water and Wastewater, 18th & 19th editions, Methods for Determination of Organic Compounds in Drinking Water, EPA-600/4-79-020, and Test Methods for Evaluation of Solid Waste, Physical/Chemical Methods (SW846) Third Edition.

The samples were received by WETLAB-Western Environmental Testing Laboratory in good condition on 9/27/2012. Additional comments are located on page 2 of this report.

If you should have any questions or comments regarding this report, please do not hesitate to call.

Sincerely,

Andy Smith
QA Manager

Western Environmental Testing Laboratory
Report Comments

JBR Environmental Consultants, Inc. (Utah) - 1209528

General Comments

None

Specific Comments

Due to a laboratory reanalysis requirement the analysis for Total Dissolved Solids (TDS) on sample 1209528-006 was performed past the EPA recommended holding time. We apologize for any inconvenience this may have caused.

Data Qualifier Legend

B -- Blank contamination; Analyte detected above the method reporting limit in an associated blank

HT -- Sample held beyond the accepted holding time

J -- The reported value is between the laboratory method detection limit and the laboratory practical quantitation limit

M -- Reported value is estimated; The sample matrix interfered with the analysis

N -- There was insufficient sample available to perform a spike and/or duplicate on this analytical batch.

NC -- Not calculated due to matrix interference

Q -- Reported value is estimated; The value failed to meet QC criteria for either precision or accuracy

S -- Surrogate recovery was outside of laboratory acceptance limits due to matrix interference. The associated blank and LCS surrogate recovery was within acceptance limits.

SC -- Spike recovery not calculated. Sample concentration >4X the spike amount; therefore, the spike could not be adequately recovered.

475 East Greg Street Suite #119
Sparks, NV 89431 (775) 355-0202
EPA Lab ID: NV00925 - ELAP No: 2523

1084 Lamoille Hwy
Elko, NV 89801 (775) 777-9933
EPA Lab ID: NV00926

3230 Polaris Ave #4
Las Vegas, NV 89102 (702) 475-8899
EPA Lab ID: NV00932

Western Environmental Testing Laboratory
Analytical Report

JBR Environmental Consultants, Inc. (Utah)
8160 South Highland Drive
Sandy, UT 84093
Attn: Thomas Hedrich
Phone: (801) 943-4144 **Fax:** (801) 942-1852
PO\Project: *Dean Ranch*

Date Printed: 10/15/2012
OrderID: *1209528*

Customer Sample ID: MW-1
WETLAB Sample ID: 1209528-001

Collect Date/Time: 9/26/2012 13:10
Receive Date: 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
pH	SM 4500-H+ B	7.56	pH Units		9/27/2012
Trace Metals Digestion, Dissolved	EPA 200.2	Complete			10/3/2012
Bicarbonate (HCO3)	SM 2320B	190	mg/L	1.0	9/27/2012
Carbonate (CO3)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Hydroxide (OH)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Total Alkalinity	SM 2320B	160	mg/L as CaCO3	1.0	9/27/2012
Chloride	EPA 300.0	34	mg/L	1.0	10/4/2012
Fluoride	EPA 300.0	0.66	mg/L	0.10	10/4/2012
Sulfate	EPA 300.0	47	mg/L	1.0	10/4/2012
Nitrate + Nitrite Nitrogen	EPA 353.2	1.2	mg/L	0.10	10/5/2012
Total Kjeldahl Nitrogen	EPA 351.2	1.4	mg/L	0.10	10/9/2012
Total Nitrogen	Calc.	2.6	mg/L	1.1	10/9/2012
Total Dissolved Solids (TDS)	SM 2540C	350	mg/L	10	9/28/2012
WAD Cyanide	SM 4500CNI	<0.010	mg/L	0.010	10/1/2012
Aluminum, Dissolved	EPA 200.7	<0.045	mg/L	0.045	10/4/2012
Barium, Dissolved	EPA 200.7	0.085	mg/L	0.010	10/4/2012
Beryllium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Bismuth, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Boron, Dissolved	EPA 200.7	0.24	mg/L	0.10	10/4/2012
Cadmium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Calcium, Dissolved	EPA 200.7	35	mg/L	0.50	10/4/2012
Chromium, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Cobalt, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Copper, Dissolved	EPA 200.7	<0.050	mg/L	0.050	10/4/2012
Gallium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Iron, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Lithium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012

475 East Greg Street Suite #119
Sparks, NV 89431 (775) 355-0202
EPA Lab ID: NV00925 - ELAP No: 2523

1084 Lamoille Hwy
Elko, NV 89801 (775) 777-9933
EPA Lab ID: NV00926

3230 Polaris Ave #4
Las Vegas, NV 89102 (702) 475-8899
EPA Lab ID: NV00932

Customer Sample ID: MW-1 **Collect Date/Time:** 9/26/2012 13:10
WETLAB Sample ID: 1209528-001 **Receive Date:** 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Magnesium, Dissolved	EPA 200.7	9.8	mg/L	0.50	10/4/2012
Manganese, Dissolved	EPA 200.7	0.049	mg/L	0.0050	10/4/2012
Molybdenum, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Nickel, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Phosphorus, Dissolved	EPA 200.7	<0.50	mg/L	0.50	10/4/2012
Potassium, Dissolved	EPA 200.7	4.8	mg/L	0.50	10/4/2012
Scandium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Silver, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Sodium, Dissolved	EPA 200.7	53	mg/L	0.50	10/4/2012
Strontium, Dissolved	EPA 200.7	0.28	mg/L	0.10	10/4/2012
Tin, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Titanium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Vanadium, Dissolved	EPA 200.7	0.013	mg/L	0.010	10/4/2012
Zinc, Dissolved	EPA 200.7	0.040	mg/L	0.010	10/4/2012
Mercury, Dissolved	EPA 200.8	<0.00010	mg/L	0.00010	10/3/2012
Antimony, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Arsenic, Dissolved	EPA 200.8	<0.0050	mg/L	0.0050	10/3/2012
Lead, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Selenium, Dissolved	EPA 200.8	<0.0050	mg/L	0.0050	10/3/2012
Thallium, Dissolved	EPA 200.8	<0.0010	mg/L	0.0010	10/3/2012
Anions	Calculation	5.17	meq/L	0.10	
Cations	Calculation	4.98	meq/L	0.10	
Error	Calculation	1.9	%	1.0	

Customer Sample ID: MW-2A **Collect Date/Time:** 9/26/2012 12:00
WETLAB Sample ID: 1209528-002 **Receive Date:** 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
pH	SM 4500-H+ B	7.65	pH Units		9/27/2012
Trace Metals Digestion, Dissolved	EPA 200.2	Complete			10/3/2012
Bicarbonate (HCO3)	SM 2320B	240	mg/L	1.0	9/27/2012
Carbonate (CO3)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Hydroxide (OH)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Total Alkalinity	SM 2320B	200	mg/L as CaCO3	1.0	9/27/2012
Chloride	EPA 300.0	32	mg/L	1.0	10/4/2012
Fluoride	EPA 300.0	0.75	mg/L	0.10	10/4/2012
Sulfate	EPA 300.0	45	mg/L	1.0	10/4/2012
Nitrate + Nitrite Nitrogen	EPA 353.2	1.4	mg/L	0.10	10/5/2012

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EPA Lab ID: NV00926

3230 Polaris Ave #4
Las Vegas, NV 89102 (702) 475-8899
EPA Lab ID: NV00932

Customer Sample ID: MW-2A
WETLAB Sample ID: 1209528-002

Collect Date/Time: 9/26/2012 12:00
Receive Date: 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Total Kjeldahl Nitrogen	EPA 351.2	<0.10	mg/L	0.10	10/9/2012
Total Nitrogen	Calc.	1.4	mg/L	1.1	10/9/2012
Total Dissolved Solids (TDS)	SM 2540C	380	mg/L	10	9/28/2012
WAD Cyanide	SM 4500CNI	<0.010	mg/L	0.010	10/1/2012
Aluminum, Dissolved	EPA 200.7	<0.045	mg/L	0.045	10/4/2012
Barium, Dissolved	EPA 200.7	0.081	mg/L	0.010	10/4/2012
Beryllium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Bismuth, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Boron, Dissolved	EPA 200.7	0.29	mg/L	0.10	10/4/2012
Cadmium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Calcium, Dissolved	EPA 200.7	44	mg/L	0.50	10/4/2012
Chromium, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Cobalt, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Copper, Dissolved	EPA 200.7	<0.050	mg/L	0.050	10/4/2012
Gallium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Iron, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Lithium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Magnesium, Dissolved	EPA 200.7	12	mg/L	0.50	10/4/2012
Manganese, Dissolved	EPA 200.7	0.11	mg/L	0.0050	10/4/2012
Molybdenum, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Nickel, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Phosphorus, Dissolved	EPA 200.7	<0.50	mg/L	0.50	10/4/2012
Potassium, Dissolved	EPA 200.7	6.6	mg/L	0.50	10/4/2012
Scandium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Silver, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Sodium, Dissolved	EPA 200.7	57	mg/L	0.50	10/4/2012
Strontium, Dissolved	EPA 200.7	0.39	mg/L	0.10	10/4/2012
Tin, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Titanium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Vanadium, Dissolved	EPA 200.7	0.014	mg/L	0.010	10/4/2012
Zinc, Dissolved	EPA 200.7	0.023	mg/L	0.010	10/4/2012
Mercury, Dissolved	EPA 200.8	<0.00011	mg/L	0.00011	10/3/2012
Antimony, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Arsenic, Dissolved	EPA 200.8	0.0062	mg/L	0.0050	10/3/2012
Lead, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Selenium, Dissolved	EPA 200.8	<0.0050	mg/L	0.0050	10/3/2012
Thallium, Dissolved	EPA 200.8	<0.0010	mg/L	0.0010	10/3/2012
Anions	Calculation	5.91	meq/L	0.10	

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EPA Lab ID: NV00926

3230 Polaris Ave #4
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EPA Lab ID: NV00932

Customer Sample ID: MW-2A **Collect Date/Time:** 9/26/2012 12:00
WETLAB Sample ID: 1209528-002 **Receive Date:** 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Cations	Calculation	5.84	meq/L	0.10	
Error	Calculation	<1.0	%	1.0	

Customer Sample ID: MW-3 **Collect Date/Time:** 9/25/2012 17:30
WETLAB Sample ID: 1209528-003 **Receive Date:** 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
pH	SM 4500-H+ B	7.74	pH Units		9/27/2012
Trace Metals Digestion, Dissolved	EPA 200.2	Complete			10/3/2012
Bicarbonate (HCO3)	SM 2320B	210	mg/L	1.0	9/27/2012
Carbonate (CO3)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Hydroxide (OH)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Total Alkalinity	SM 2320B	170	mg/L as CaCO3	1.0	9/27/2012
Chloride	EPA 300.0	32	mg/L	1.0	10/4/2012
Fluoride	EPA 300.0	0.74	mg/L	0.10	10/4/2012
Sulfate	EPA 300.0	45	mg/L	1.0	10/4/2012
Nitrate + Nitrite Nitrogen	EPA 353.2	1.5	mg/L	0.10	10/5/2012
Total Kjeldahl Nitrogen	EPA 351.2	<0.10	mg/L	0.10	10/9/2012
Total Nitrogen	Calc.	1.5	mg/L	1.1	10/9/2012
Total Dissolved Solids (TDS)	SM 2540C	380	mg/L	10	9/28/2012
WAD Cyanide	SM 4500CNI	<0.010	mg/L	0.010	10/3/2012
Aluminum, Dissolved	EPA 200.7	<0.045	mg/L	0.045	10/4/2012
Barium, Dissolved	EPA 200.7	0.078	mg/L	0.010	10/4/2012
Beryllium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Bismuth, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Boron, Dissolved	EPA 200.7	0.27	mg/L	0.10	10/4/2012
Cadmium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Calcium, Dissolved	EPA 200.7	37	mg/L	0.50	10/4/2012
Chromium, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Cobalt, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Copper, Dissolved	EPA 200.7	<0.050	mg/L	0.050	10/4/2012
Gallium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Iron, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Lithium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Magnesium, Dissolved	EPA 200.7	11	mg/L	0.50	10/4/2012
Manganese, Dissolved	EPA 200.7	0.11	mg/L	0.0050	10/4/2012
Molybdenum, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Nickel, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012

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EPA Lab ID: NV00932

Customer Sample ID: MW-3 **Collect Date/Time:** 9/25/2012 17:30
WETLAB Sample ID: 1209528-003 **Receive Date:** 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Phosphorus, Dissolved	EPA 200.7	<0.50	mg/L	0.50	10/4/2012
Potassium, Dissolved	EPA 200.7	5.7	mg/L	0.50	10/4/2012
Scandium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Silver, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Sodium, Dissolved	EPA 200.7	53	mg/L	0.50	10/4/2012
Strontium, Dissolved	EPA 200.7	0.33	mg/L	0.10	10/4/2012
Tin, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Titanium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Vanadium, Dissolved	EPA 200.7	0.014	mg/L	0.010	10/4/2012
Zinc, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Mercury, Dissolved	EPA 200.8	<0.00010	mg/L	0.00010	10/3/2012
Antimony, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Arsenic, Dissolved	EPA 200.8	<0.0050	mg/L	0.0050	10/3/2012
Lead, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Selenium, Dissolved	EPA 200.8	<0.0050	mg/L	0.0050	10/3/2012
Thallium, Dissolved	EPA 200.8	<0.0010	mg/L	0.0010	10/3/2012
Anions	Calculation	5.43	meq/L	0.10	
Cations	Calculation	5.21	meq/L	0.10	
Error	Calculation	2.1	%	1.0	

Customer Sample ID: MW-4 **Collect Date/Time:** 9/25/2012 20:00
WETLAB Sample ID: 1209528-004 **Receive Date:** 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
pH	SM 4500-H+ B	7.85	pH Units		9/27/2012
Trace Metals Digestion, Dissolved	EPA 200.2	Complete			10/3/2012
Bicarbonate (HCO3)	SM 2320B	190	mg/L	1.0	9/27/2012
Carbonate (CO3)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Hydroxide (OH)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Total Alkalinity	SM 2320B	150	mg/L as CaCO3	1.0	9/27/2012
Chloride	EPA 300.0	38	mg/L	1.0	10/4/2012
Fluoride	EPA 300.0	0.79	mg/L	0.10	10/4/2012
Sulfate	EPA 300.0	50	mg/L	1.0	10/4/2012
Nitrate + Nitrite Nitrogen	EPA 353.2	1.4	mg/L	0.10	10/5/2012
Total Kjeldahl Nitrogen	EPA 351.2	0.19	mg/L	0.10	10/9/2012
Total Nitrogen	Calc.	1.5	mg/L	1.1	10/9/2012
Total Dissolved Solids (TDS)	SM 2540C	380	mg/L	10	9/28/2012
WAD Cyanide	SM 4500CNI	<0.010	mg/L	0.010	10/1/2012

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EPA Lab ID: NV00926

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EPA Lab ID: NV00932

Customer Sample ID: MW-4 **Collect Date/Time:** 9/25/2012 20:00
WETLAB Sample ID: 1209528-004 **Receive Date:** 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Aluminum, Dissolved	EPA 200.7	<0.045	mg/L	0.045	10/4/2012
Barium, Dissolved	EPA 200.7	0.11	mg/L	0.010	10/4/2012
Beryllium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Bismuth, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Boron, Dissolved	EPA 200.7	0.24	mg/L	0.10	10/4/2012
Cadmium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Calcium, Dissolved	EPA 200.7	35	mg/L	0.50	10/4/2012
Chromium, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Cobalt, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Copper, Dissolved	EPA 200.7	<0.050	mg/L	0.050	10/4/2012
Gallium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Iron, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Lithium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Magnesium, Dissolved	EPA 200.7	12	mg/L	0.50	10/4/2012
Manganese, Dissolved	EPA 200.7	0.47	mg/L	0.0050	10/4/2012
Molybdenum, Dissolved	EPA 200.7	0.035	mg/L	0.010	10/4/2012
Nickel, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Phosphorus, Dissolved	EPA 200.7	<0.50	mg/L	0.50	10/4/2012
Potassium, Dissolved	EPA 200.7	6.1	mg/L	0.50	10/4/2012
Scandium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Silver, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Sodium, Dissolved	EPA 200.7	52	mg/L	0.50	10/4/2012
Strontium, Dissolved	EPA 200.7	0.31	mg/L	0.10	10/4/2012
Tin, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Titanium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Vanadium, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Zinc, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Mercury, Dissolved	EPA 200.8	<0.0005	mg/L	0.0005	10/4/2012
Antimony, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Arsenic, Dissolved	EPA 200.8	<0.0050	mg/L	0.0050	10/3/2012
Lead, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Selenium, Dissolved	EPA 200.8	<0.0050	mg/L	0.0050	10/3/2012
Thallium, Dissolved	EPA 200.8	<0.0010	mg/L	0.0010	10/3/2012
Anions	Calculation	5.37	meq/L	0.10	
Cations	Calculation	5.17	meq/L	0.10	
Error	Calculation	1.9	%	1.0	

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EPA Lab ID: NV00926

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EPA Lab ID: NV00932

Customer Sample ID: DUP-1 **Collect Date/Time:** 9/26/2012

WETLAB Sample ID: 1209528-005 **Receive Date:** 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
pH	SM 4500-H+ B	7.67	pH Units		9/27/2012
Trace Metals Digestion, Dissolved	EPA 200.2	Complete			10/3/2012
Bicarbonate (HCO3)	SM 2320B	240	mg/L	1.0	9/27/2012
Carbonate (CO3)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Hydroxide (OH)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Total Alkalinity	SM 2320B	200	mg/L as CaCO3	1.0	9/27/2012
Chloride	EPA 300.0	31	mg/L	1.0	10/4/2012
Fluoride	EPA 300.0	0.73	mg/L	0.10	10/4/2012
Sulfate	EPA 300.0	44	mg/L	1.0	10/4/2012
Nitrate + Nitrite Nitrogen	EPA 353.2	1.4	mg/L	0.10	10/5/2012
Total Kjeldahl Nitrogen	EPA 351.2	<0.10	mg/L	0.10	10/9/2012
Total Nitrogen	Calc.	1.4	mg/L	1.1	10/9/2012
Total Dissolved Solids (TDS)	SM 2540C	390	mg/L	10	9/28/2012
WAD Cyanide	SM 4500CNI	<0.010	mg/L	0.010	10/1/2012
Aluminum, Dissolved	EPA 200.7	<0.045	mg/L	0.045	10/4/2012
Barium, Dissolved	EPA 200.7	0.078	mg/L	0.010	10/4/2012
Beryllium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Bismuth, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Boron, Dissolved	EPA 200.7	0.27	mg/L	0.10	10/4/2012
Cadmium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Calcium, Dissolved	EPA 200.7	42	mg/L	0.50	10/4/2012
Chromium, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Cobalt, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Copper, Dissolved	EPA 200.7	<0.050	mg/L	0.050	10/4/2012
Gallium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Iron, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Lithium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Magnesium, Dissolved	EPA 200.7	12	mg/L	0.50	10/4/2012
Manganese, Dissolved	EPA 200.7	0.10	mg/L	0.0050	10/4/2012
Molybdenum, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Nickel, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Phosphorus, Dissolved	EPA 200.7	<0.50	mg/L	0.50	10/4/2012
Potassium, Dissolved	EPA 200.7	6.2	mg/L	0.50	10/4/2012
Scandium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Silver, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Sodium, Dissolved	EPA 200.7	54	mg/L	0.50	10/4/2012
Strontium, Dissolved	EPA 200.7	0.37	mg/L	0.10	10/4/2012
Tin, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012

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EPA Lab ID: NV00932

Customer Sample ID: DUP-1 **Collect Date/Time:** 9/26/2012
WETLAB Sample ID: 1209528-005 **Receive Date:** 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Titanium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Vanadium, Dissolved	EPA 200.7	0.014	mg/L	0.010	10/4/2012
Zinc, Dissolved	EPA 200.7	0.022	mg/L	0.010	10/4/2012
Mercury, Dissolved	EPA 200.8	<0.00010	mg/L	0.00010	10/3/2012
Antimony, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Arsenic, Dissolved	EPA 200.8	0.0059	mg/L	0.0050	10/3/2012
Lead, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Selenium, Dissolved	EPA 200.8	<0.0050	mg/L	0.0050	10/3/2012
Thallium, Dissolved	EPA 200.8	<0.0010	mg/L	0.0010	10/3/2012
Anions	Calculation	5.86	meq/L	0.10	
Cations	Calculation	5.60	meq/L	0.10	
Error	Calculation	2.3	%	1.0	

Customer Sample ID: Eq. Blank **Collect Date/Time:** 9/26/2012
WETLAB Sample ID: 1209528-006 **Receive Date:** 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
pH	SM 4500-H+ B	5.81 Q	pH Units		9/27/2012
Trace Metals Digestion, Dissolved	EPA 200.2	Complete			10/3/2012
Bicarbonate (HCO3)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Carbonate (CO3)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Hydroxide (OH)	SM 2320B	<1.0	mg/L	1.0	9/27/2012
Total Alkalinity	SM 2320B	<1.0	mg/L as CaCO3	1.0	9/27/2012
Chloride	EPA 300.0	<1.0	mg/L	1.0	10/4/2012
Fluoride	EPA 300.0	<0.10	mg/L	0.10	10/4/2012
Sulfate	EPA 300.0	<1.0	mg/L	1.0	10/4/2012
Nitrate + Nitrite Nitrogen	EPA 353.2	<0.10	mg/L	0.10	10/5/2012
Total Kjeldahl Nitrogen	EPA 351.2	<0.10	mg/L	0.10	10/9/2012
Total Nitrogen	Calc.	<1.1	mg/L	1.1	10/9/2012
Total Dissolved Solids (TDS)	SM 2540C	<10 HT	mg/L	10	10/9/2012
WAD Cyanide	SM 4500CNI	<0.010	mg/L	0.010	10/1/2012
Aluminum, Dissolved	EPA 200.7	<0.045	mg/L	0.045	10/4/2012
Barium, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Beryllium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Bismuth, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Boron, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Cadmium, Dissolved	EPA 200.7	<0.0010	mg/L	0.0010	10/4/2012
Calcium, Dissolved	EPA 200.7	<0.50	mg/L	0.50	10/4/2012

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EPA Lab ID: NV00932

Customer Sample ID: Eq. Blank
WETLAB Sample ID: 1209528-006

Collect Date/Time: 9/26/2012
Receive Date: 9/27/2012 09:00

PROFILE II

Parameter	Method	Results	Units	Reporting Limit	Date Analyzed
Chromium, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Cobalt, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Copper, Dissolved	EPA 200.7	<0.050	mg/L	0.050	10/4/2012
Gallium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Iron, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Lithium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Magnesium, Dissolved	EPA 200.7	<0.50	mg/L	0.50	10/4/2012
Manganese, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Molybdenum, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Nickel, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Phosphorus, Dissolved	EPA 200.7	<0.50	mg/L	0.50	10/4/2012
Potassium, Dissolved	EPA 200.7	<0.50	mg/L	0.50	10/4/2012
Scandium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Silver, Dissolved	EPA 200.7	<0.0050	mg/L	0.0050	10/4/2012
Sodium, Dissolved	EPA 200.7	<0.50	mg/L	0.50	10/4/2012
Strontium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Tin, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Titanium, Dissolved	EPA 200.7	<0.10	mg/L	0.10	10/4/2012
Vanadium, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Zinc, Dissolved	EPA 200.7	<0.010	mg/L	0.010	10/4/2012
Mercury, Dissolved	EPA 200.8	<0.00010	mg/L	0.00010	10/3/2012
Antimony, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Arsenic, Dissolved	EPA 200.8	<0.0050	mg/L	0.0050	10/3/2012
Lead, Dissolved	EPA 200.8	<0.0025	mg/L	0.0025	10/3/2012
Selenium, Dissolved	EPA 200.8	<0.0050	mg/L	0.0050	10/3/2012
Thallium, Dissolved	EPA 200.8	<0.0010	mg/L	0.0010	10/3/2012
Anions	Calculation	<0.10	meq/L	0.10	
Cations	Calculation	<0.10	meq/L	0.10	
Error	Calculation	NA	%	1.0	

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EPA Lab ID: NV00932

Western Environmental Testing Laboratory
QC Report

QCBatchID	QCType	Parameter	Method	Result	Units
QC12100048	Blank 1	WAD Cyanide	SM 4500CNI	<0.010	mg/L
QC12100048	Blank 2	WAD Cyanide	SM 4500CNI	<0.010	mg/L
QC12100048	Blank 3	WAD Cyanide	SM 4500CNI	<0.010	mg/L
QC12100084	Blank 1	Total Dissolved Solids (TDS)	SM 2540C	<10	mg/L
QC12100084	Blank 2	Total Dissolved Solids (TDS)	SM 2540C	<10	mg/L
QC12100160	Blank 1	Mercury, Dissolved	EPA 200.8	<0.00010	mg/L
		Antimony, Dissolved	EPA 200.8	<0.0025	mg/L
		Arsenic, Dissolved	EPA 200.8	<0.0050	mg/L
		Lead, Dissolved	EPA 200.8	<0.0025	mg/L
		Selenium, Dissolved	EPA 200.8	<0.0050	mg/L
		Thallium, Dissolved	EPA 200.8	<0.0010	mg/L
QC12100172	Blank 1	Fluoride	EPA 300.0	<0.10	mg/L
QC12100172	Blank 2	Fluoride	EPA 300.0	<0.10	mg/L
QC12100176	Blank 1	Chloride	EPA 300.0	<1.0	mg/L
QC12100176	Blank 2	Chloride	EPA 300.0	<1.0	mg/L
QC12100180	Blank 1	Sulfate	EPA 300.0	<1.0	mg/L
QC12100180	Blank 2	Sulfate	EPA 300.0	<1.0	mg/L
QC12100180	Blank 3	Sulfate	EPA 300.0	<1.0	mg/L
QC12100188	Blank 1	Aluminum, Dissolved	EPA 200.7	<0.045	mg/L
		Barium, Dissolved	EPA 200.7	<0.010	mg/L
		Beryllium, Dissolved	EPA 200.7	<0.0010	mg/L
		Bismuth, Dissolved	EPA 200.7	<0.10	mg/L
		Boron, Dissolved	EPA 200.7	<0.10	mg/L
		Cadmium, Dissolved	EPA 200.7	<0.0010	mg/L
		Calcium, Dissolved	EPA 200.7	<0.50	mg/L
		Chromium, Dissolved	EPA 200.7	<0.0050	mg/L
		Cobalt, Dissolved	EPA 200.7	<0.010	mg/L
		Copper, Dissolved	EPA 200.7	<0.050	mg/L
		Gallium, Dissolved	EPA 200.7	<0.10	mg/L
		Iron, Dissolved	EPA 200.7	<0.010	mg/L
		Lithium, Dissolved	EPA 200.7	<0.10	mg/L
		Magnesium, Dissolved	EPA 200.7	<0.50	mg/L
		Manganese, Dissolved	EPA 200.7	<0.0050	mg/L
		Molybdenum, Dissolved	EPA 200.7	<0.010	mg/L
		Nickel, Dissolved	EPA 200.7	<0.010	mg/L
		Phosphorus, Dissolved	EPA 200.7	<0.50	mg/L
		Potassium, Dissolved	EPA 200.7	<0.50	mg/L
		Scandium, Dissolved	EPA 200.7	<0.10	mg/L
		Silver, Dissolved	EPA 200.7	<0.0050	mg/L
		Sodium, Dissolved	EPA 200.7	<0.50	mg/L
		Strontium, Dissolved	EPA 200.7	<0.10	mg/L
		Tin, Dissolved	EPA 200.7	<0.10	mg/L
		Titanium, Dissolved	EPA 200.7	<0.10	mg/L
		Vanadium, Dissolved	EPA 200.7	<0.010	mg/L
		Zinc, Dissolved	EPA 200.7	<0.010	mg/L
QC12100231	Blank 1	Fluoride	EPA 300.0	<0.10	mg/L
QC12100231	Blank 2	Fluoride	EPA 300.0	<0.10	mg/L

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QCBatchID	QCType	Parameter	Method	Result	Units
QC12100231	Blank 3	Fluoride	EPA 300.0	<0.10	mg/L
QC12100233	Blank 1	Chloride	EPA 300.0	<1.0	mg/L
QC12100233	Blank 2	Chloride	EPA 300.0	<1.0	mg/L
QC12100233	Blank 3	Chloride	EPA 300.0	<1.0	mg/L
QC12100240	Blank 1	Sulfate	EPA 300.0	<1.0	mg/L
QC12100240	Blank 2	Sulfate	EPA 300.0	<1.0	mg/L
QC12100240	Blank 3	Sulfate	EPA 300.0	<1.0	mg/L
QC12100250	Blank 1	Nitrate + Nitrite Nitrogen	EPA 353.2	<0.010	mg/L
QC12100250	Blank 2	Nitrate + Nitrite Nitrogen	EPA 353.2	<0.010	mg/L
QC12100250	Blank 3	Nitrate + Nitrite Nitrogen	EPA 353.2	<0.010	mg/L
QC12100250	Blank 4	Nitrate + Nitrite Nitrogen	EPA 353.2	<0.010	mg/L
QC12100367	Blank 1	Total Kjeldahl Nitrogen	EPA 351.2	<0.050	mg/L
QC12100367	Blank 2	Total Kjeldahl Nitrogen	EPA 351.2	<0.050	mg/L
QC12100367	Blank 3	Total Kjeldahl Nitrogen	EPA 351.2	<0.050	mg/L
QC12100368	Blank 1	Total Kjeldahl Nitrogen	EPA 351.2	<0.050	mg/L
QC12100368	Blank 2	Total Kjeldahl Nitrogen	EPA 351.2	<0.050	mg/L

QCBatchID	QCType	Parameter	Method	Result	Actual	% Recovery	Units
QC12090834	LCS 1	pH	SM 4500-H+ B	7.01	7.00	100	pH Units
QC12090834	LCS 2	pH	SM 4500-H+ B	7.01	7.00	100	pH Units
QC12090835	LCS 1	Alkalinity	SM 2320B	96.3	100	96	mg/L
QC12090835	LCS 2	Alkalinity	SM 2320B	97.5	100	98	mg/L
QC12090835	LCS 3	Alkalinity	SM 2320B	98.2	100	98	mg/L
QC12100048	LCS 1	WAD Cyanide	SM 4500CNI	0.095	0.100	95	mg/L
QC12100084	LCS 1	Total Dissolved Solids (TDS)	SM 2540C	152	150	101	mg/L
QC12100084	LCS 2	Total Dissolved Solids (TDS)	SM 2540C	155	150	103	mg/L
QC12100160	LCS 1	Mercury	EPA 200.8	0.000916	0.001	92	mg/L
		Antimony	EPA 200.8	0.0092	0.010	92	mg/L
		Arsenic	EPA 200.8	0.0507	0.050	101	mg/L
		Lead	EPA 200.8	0.0094	0.010	94	mg/L
		Selenium	EPA 200.8	0.0462	0.050	92	mg/L
		Thallium	EPA 200.8	0.0094	0.010	94	mg/L
QC12100172	LCS 1	Fluoride	EPA 300.0	1.98	2.00	99	mg/L
QC12100176	LCS 1	Chloride	EPA 300.0	10.6	10.0	106	mg/L
QC12100180	LCS 1	Sulfate	EPA 300.0	25.0	25.0	100	mg/L
QC12100188	LCS 1	Aluminum	EPA 200.7	0.960	1.00	96	mg/L
		Barium	EPA 200.7	0.961	1.00	96	mg/L
		Beryllium	EPA 200.7	1.00	1.00	100	mg/L
		Bismuth	EPA 200.7	1.01	1.00	101	mg/L
		Boron	EPA 200.7	0.934	1.00	93	mg/L
		Cadmium	EPA 200.7	0.992	1.00	99	mg/L
		Calcium	EPA 200.7	10.1	10.0	101	mg/L
		Chromium	EPA 200.7	0.964	1.00	96	mg/L
		Cobalt	EPA 200.7	0.973	1.00	97	mg/L
		Copper	EPA 200.7	4.75	5.00	95	mg/L
		Gallium	EPA 200.7	0.963	1.00	96	mg/L
		Iron	EPA 200.7	0.980	1.00	98	mg/L
		Lithium	EPA 200.7	0.977	1.00	98	mg/L
		Magnesium	EPA 200.7	9.85	10.0	98	mg/L
		Manganese	EPA 200.7	0.975	1.00	98	mg/L
		Molybdenum	EPA 200.7	0.966	1.00	97	mg/L
		Nickel	EPA 200.7	4.86	5.00	97	mg/L
		Phosphorus	EPA 200.7	4.88	5.00	98	mg/L

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QCBatchID	QCType	Parameter	Method	Result	Actual	% Recovery	Units
		Potassium	EPA 200.7	9.81	10.0	98	mg/L
		Scandium	EPA 200.7	0.963	1.00	96	mg/L
		Silver	EPA 200.7	0.086	0.090	95	mg/L
		Sodium	EPA 200.7	9.94	10.0	99	mg/L
		Strontium	EPA 200.7	1.01	1.00	101	mg/L
		Tin	EPA 200.7	0.969	1.00	97	mg/L
		Titanium	EPA 200.7	0.997	1.00	100	mg/L
		Vanadium	EPA 200.7	0.956	1.00	96	mg/L
		Zinc	EPA 200.7	1.01	1.00	101	mg/L
QC12100231	LCS 1	Fluoride	EPA 300.0	1.97	2.00	98	mg/L
QC12100233	LCS 1	Chloride	EPA 300.0	10.6	10.0	106	mg/L
QC12100240	LCS 1	Sulfate	EPA 300.0	24.9	25.0	100	mg/L
QC12100250	LCS 1	Nitrate + Nitrite Nitrogen	EPA 353.2	0.834	0.800	104	mg/L
QC12100250	LCS 2	Nitrate + Nitrite Nitrogen	EPA 353.2	0.838	0.800	105	mg/L
QC12100367	LCS 1	Total Kjeldahl Nitrogen	EPA 351.2	0.725	0.690	105	mg/L
QC12100368	LCS 1	Total Kjeldahl Nitrogen	EPA 351.2	0.717	0.690	104	mg/L

QCBatchID	QCType	Parameter	Method	Duplicate Sample	Sample Result	Duplicate Result		Units	RPD
QC12090834	Duplicate	pH	SM 4500-H+ B	1209526-001	7.75	7.80		pH Units	1 %
QC12090834	Duplicate	pH	SM 4500-H+ B	1209528-006	5.81	5.60	Q	pH Units	4 %
QC12090834	Duplicate	pH	SM 4500-H+ B	1209549-001	7.55	7.56		pH Units	<1%
QC12090835	Duplicate	Bicarbonate (HCO3)	SM 2320B	1209526-001	174	174		mg/L	<1%
		Carbonate (CO3)	SM 2320B	1209526-001	<1.000	<1.000		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1209526-001	<1.000	<1.000		mg/L	<1%
		Total Alkalinity	SM 2320B	1209526-001	143	143		mg/L as CaCO3	<1%
QC12090835	Duplicate	Bicarbonate (HCO3)	SM 2320B	1209528-006	<1.000	<1.000		mg/L	<1%
		Carbonate (CO3)	SM 2320B	1209528-006	<1.000	<1.000		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1209528-006	<1.000	<1.000		mg/L	<1%
		Total Alkalinity	SM 2320B	1209528-006	<1.000	<1.000		mg/L as CaCO3	<1%
QC12090835	Duplicate	Bicarbonate (HCO3)	SM 2320B	1209549-001	47.3	47.0		mg/L	1 %
		Carbonate (CO3)	SM 2320B	1209549-001	<1.000	<1.000		mg/L	<1%
		Hydroxide (OH)	SM 2320B	1209549-001	<1.000	<1.000		mg/L	<1%
		Total Alkalinity	SM 2320B	1209549-001	38.8	38.6		mg/L as CaCO3	1 %
QC12100084	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1209479-003	49.0	46.0		mg/L	6 %
QC12100084	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1209508-001	132	145	Q	mg/L	9 %
QC12100084	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1209527-005	608	617		mg/L	1 %
QC12100084	Duplicate	Total Dissolved Solids (TDS)	SM 2540C	1209536-003	357	361		mg/L	1 %

QCBatchID	QCType	Parameter	Method	Spike Sample	Sample Result		MS Result	MSD Result	Spike Value	Units	MS % Rec.	MSD % Rec.	RPD
QC12100048	MS 1	WAD Cyanide	SM 4500CNI	1209558-002	0.642	M	0.697	0.721	0.100	mg/L	NC	NC	NC
QC12100048	MS 2	WAD Cyanide	SM 4500CNI	1209528-006	<0.010		0.101	0.095	0.100	mg/L	101	95	6 %
QC12100160	MS 1	Mercury, Dissolved	EPA 200.8	1209528-004	<0.00050		0.001300	0.001300	0.001	mg/L	110	110	<1%
		Antimony, Dissolved	EPA 200.8	1209528-004	<0.0025		0.0097	0.0096	0.010	mg/L	96	95	1 %
		Arsenic, Dissolved	EPA 200.8	1209528-004	<0.0050		0.0540	0.0534	0.050	mg/L	104	102	1 %
		Lead, Dissolved	EPA 200.8	1209528-004	<0.0025		0.0089	0.0088	0.010	mg/L	89	88	1 %
		Selenium, Dissolved	EPA 200.8	1209528-004	<0.0050		0.0454	0.0441	0.050	mg/L	88	86	3 %
		Thallium, Dissolved	EPA 200.8	1209528-004	<0.0010		0.0090	0.0089	0.010	mg/L	90	89	1 %

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QCBatchID	QCType	Parameter	Method	Spike Sample	Sample Result		MS Result	MSD Result	Spike Value	Units	MS % Rec.	MSD % Rec.	RPD
QC12100172	MS 1	Fluoride	EPA 300.0	1210058-009	1.45		3.12	3.15	2.00	mg/L	84	85	1 %
QC12100176	MS 1	Chloride	EPA 300.0	1210058-009	1.69		6.79	6.88	5.00	mg/L	102	104	1 %
QC12100180	MS 1	Sulfate	EPA 300.0	1210058-001	1.30		11.4	11.6	10.0	mg/L	101	103	2 %
QC12100180	MS 2	Sulfate	EPA 300.0	1210058-009	12.7		21.9	22.0	10.0	mg/L	92	94	<1%
QC12100188	MS 1	Aluminum, Dissolved	EPA 200.7	1209528-004	<0.045		0.995	0.994	1.00	mg/L	97	97	<1%
		Barium, Dissolved	EPA 200.7	1209528-004	0.107		1.07	1.07	1.00	mg/L	96	96	<1%
		Beryllium, Dissolved	EPA 200.7	1209528-004	<0.001		1.01	1.02	1.00	mg/L	101	102	1 %
		Bismuth, Dissolved	EPA 200.7	1209528-004	<0.100		0.973	0.980	1.00	mg/L	96	97	1 %
		Boron, Dissolved	EPA 200.7	1209528-004	0.242		1.25	1.25	1.00	mg/L	101	101	<1%
		Cadmium, Dissolved	EPA 200.7	1209528-004	<0.001		0.997	1.00	1.00	mg/L	100	100	<1%
		Calcium, Dissolved	EPA 200.7	1209528-004	34.8		45.2	45.2	10.0	mg/L	104	104	<1%
		Chromium, Dissolved	EPA 200.7	1209528-004	<0.005		0.960	0.964	1.00	mg/L	96	96	<1%
		Cobalt, Dissolved	EPA 200.7	1209528-004	<0.010		0.973	0.976	1.00	mg/L	97	97	<1%
		Copper, Dissolved	EPA 200.7	1209528-004	<0.050		4.88	4.88	5.00	mg/L	98	98	<1%
		Gallium, Dissolved	EPA 200.7	1209528-004	<0.100		0.958	0.959	1.00	mg/L	96	96	<1%
		Iron, Dissolved	EPA 200.7	1209528-004	<0.010		1.00	0.996	1.00	mg/L	99	99	<1%
		Lithium, Dissolved	EPA 200.7	1209528-004	<0.100		0.948	0.950	1.00	mg/L	90	91	<1%
		Magnesium, Dissolved	EPA 200.7	1209528-004	11.6		21.2	21.1	10.0	mg/L	96	95	<1%
		Manganese, Dissolved	EPA 200.7	1209528-004	0.467		1.45	1.45	1.00	mg/L	98	98	<1%
		Molybdenum, Dissolved	EPA 200.7	1209528-004	0.035		1.01	1.01	1.00	mg/L	98	98	<1%
		Nickel, Dissolved	EPA 200.7	1209528-004	<0.010		4.76	4.78	5.00	mg/L	95	96	<1%
		Phosphorus, Dissolved	EPA 200.7	1209528-004	<0.500		5.12	5.15	5.00	mg/L	101	102	1 %
		Potassium, Dissolved	EPA 200.7	1209528-004	6.08		15.5	15.4	10.0	mg/L	94	93	1 %
		Scandium, Dissolved	EPA 200.7	1209528-004	<0.100		0.960	0.962	1.00	mg/L	96	96	<1%
		Silver, Dissolved	EPA 200.7	1209528-004	<0.005		0.085	0.086	0.090	mg/L	95	96	1 %
		Sodium, Dissolved	EPA 200.7	1209528-004	51.8		61.5	61.4	10.0	mg/L	97	96	<1%
		Strontium, Dissolved	EPA 200.7	1209528-004	0.310		1.31	1.33	1.00	mg/L	100	102	2 %
		Tin, Dissolved	EPA 200.7	1209528-004	<0.100		0.981	0.988	1.00	mg/L	101	101	1 %
		Titanium, Dissolved	EPA 200.7	1209528-004	<0.100		1.00	1.00	1.00	mg/L	100	100	<1%
		Vanadium, Dissolved	EPA 200.7	1209528-004	<0.010		0.983	0.984	1.00	mg/L	98	98	<1%
		Zinc, Dissolved	EPA 200.7	1209528-004	<0.010		1.04	1.05	1.00	mg/L	104	105	1 %
QC12100231	MS 1	Fluoride	EPA 300.0	1210085-004	0.204		2.21	2.23	2.00	mg/L	100	101	1 %
QC12100231	MS 2	Fluoride	EPA 300.0	1209528-006	<0.100		2.03	2.07	2.00	mg/L	101	103	2 %
QC12100233	MS 1	Chloride	EPA 300.0	1210085-004	<1.000		5.55	5.56	5.00	mg/L	107	107	<1%
QC12100233	MS 2	Chloride	EPA 300.0	1209528-006	<1.000		5.43	5.41	5.00	mg/L	108	108	<1%
QC12100240	MS 1	Sulfate	EPA 300.0	1210085-004	13.3		22.9	22.9	10.0	mg/L	96	96	<1%
QC12100240	MS 2	Sulfate	EPA 300.0	1209528-006	<1.000		10.2	10.3	10.0	mg/L	102	102	1 %
QC12100250	MS 1	Nitrate + Nitrite Nitrogen	EPA 353.2	1209470-003	<0.100	M	11.0	11.2	1.00	mg/L	NC	NC	NC
QC12100250	MS 2	Nitrate + Nitrite Nitrogen	EPA 353.2	1209478-001	<0.100		10.8	11.0	1.00	mg/L	108	110	2 %
QC12100250	MS 3	Nitrate + Nitrite Nitrogen	EPA 353.2	1209528-003	1.50		11.7	12.3	1.00	mg/L	102	108	5 %
QC12100367	MS 1	Total Kjeldahl Nitrogen	EPA 351.2	1209509-007	0.454		1.13	1.13	0.690	mg/L	97	97	<1%
QC12100367	MS 2	Total Kjeldahl Nitrogen	EPA 351.2	1209509-011	0.628		1.33	1.37	0.690	mg/L	102	108	3 %
QC12100368	MS 1	Total Kjeldahl Nitrogen	EPA 351.2	1209528-001	1.39		2.07	2.01	0.690	mg/L	99	90	3 %

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Las Vegas, NV 89102 (702) 475-8899
EPA Lab ID: NV00932

OrderID	Sample#	Matrix	Method	Cust Sample #	Date Collected	Time Col.	Date Rec'd	Cust. Name	Param	Result	Units	Dilu-tion	Rep Limit	Analysis Date
1209528	1209528-001	MonWell	SM 4500-H+ B	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	pH	7.56	pH Units	1		9/27/2012
1209528	1209528-001	MonWell	EPA 200.2	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Trace Metals Digestion, Dissolved	Complete		1		10/3/2012
1209528	1209528-001	MonWell	SM 2320B	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Bicarbonate (HCO3)	190	mg/L	1	1.0	9/27/2012
1209528	1209528-001	MonWell	SM 2320B	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Carbonate (CO3)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-001	MonWell	SM 2320B	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Hydroxide (OH)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-001	MonWell	SM 2320B	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Total Alkalinity	160	mg/L as CaCO3	1	1.0	9/27/2012
1209528	1209528-001	MonWell	EPA 300.0	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Chloride	34	mg/L	1	1.0	10/4/2012
1209528	1209528-001	MonWell	EPA 300.0	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Fluoride	0.66	mg/L	1	0.10	10/4/2012
1209528	1209528-001	MonWell	EPA 300.0	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Sulfate	47	mg/L	1	1.0	10/4/2012
1209528	1209528-001	MonWell	EPA 353.2	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Nitrate + Nitrite Nitrogen	1.2	mg/L	10	0.10	10/5/2012
1209528	1209528-001	MonWell	EPA 351.2	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Total Kjeldahl Nitrogen	1.4	mg/L	1	0.10	10/9/2012
1209528	1209528-001	MonWell	Calc.	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Total Nitrogen	2.6	mg/L	1	1.1	10/9/2012
1209528	1209528-001	MonWell	SM 2540C	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Total Dissolved Solids (TDS)	350	mg/L	1	10	9/28/2012
1209528	1209528-001	MonWell	SM 4500CNI	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	WAD Cyanide	<0.010	mg/L	1	0.010	10/1/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Aluminum, Dissolved	<0.045	mg/L	1	0.045	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Barium, Dissolved	0.085	mg/L	1	0.010	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Beryllium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Bismuth, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Boron, Dissolved	0.24	mg/L	1	0.10	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Cadmium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Calcium, Dissolved	35	mg/L	1	0.50	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Chromium, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Cobalt, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Copper, Dissolved	<0.050	mg/L	1	0.050	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Gallium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Iron, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Lithium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Magnesium, Dissolved	9.8	mg/L	1	0.50	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Manganese, Dissolved	0.049	mg/L	1	0.0050	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Molybdenum, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Nickel, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Phosphorus, Dissolved	<0.50	mg/L	1	0.50	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Potassium, Dissolved	4.8	mg/L	1	0.50	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Scandium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Silver, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Sodium, Dissolved	53	mg/L	1	0.50	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Strontium, Dissolved	0.28	mg/L	1	0.10	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Tin, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Titanium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Vanadium, Dissolved	0.013	mg/L	1	0.010	10/4/2012
1209528	1209528-001	MonWell	EPA 200.7	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Zinc, Dissolved	0.040	mg/L	1	0.010	10/4/2012

OrderID	Sample#	Matrix	Method	Cust Sample #	Date Collected	Time Col.	Date Rec'd	Cust. Name	Param	Result	Units	Dilu-tion	Rep Limit	Analysis Date
1209528	1209528-001	MonWell	EPA 200.8	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Mercury, Dissolved	<0.00010	mg/L	1	0.00010	10/3/2012
1209528	1209528-001	MonWell	EPA 200.8	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Antimony, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-001	MonWell	EPA 200.8	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Arsenic, Dissolved	<0.0050	mg/L	1	0.0050	10/3/2012
1209528	1209528-001	MonWell	EPA 200.8	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Lead, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-001	MonWell	EPA 200.8	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Selenium, Dissolved	<0.0050	mg/L	1	0.0050	10/3/2012
1209528	1209528-001	MonWell	EPA 200.8	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Thallium, Dissolved	<0.0010	mg/L	1	0.0010	10/3/2012
1209528	1209528-001	MonWell	Calculation	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Anions	5.17	meq/L	1	0.10	
1209528	1209528-001	MonWell	Calculation	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Cations	4.98	meq/L	1	0.10	
1209528	1209528-001	MonWell	Calculation	MW-1	9/26/2012	13:10	9/27/2012	JBR Env	Error	1.9	%	1	1.0	
1209528	1209528-002	MonWell	SM 4500-H+ B	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	pH	7.65	pH Units	1		9/27/2012
1209528	1209528-002	MonWell	EPA 200.2	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Trace Metals Digestion, Dissolved	Complete		1		10/3/2012
1209528	1209528-002	MonWell	SM 2320B	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Bicarbonate (HCO3)	240	mg/L	1	1.0	9/27/2012
1209528	1209528-002	MonWell	SM 2320B	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Carbonate (CO3)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-002	MonWell	SM 2320B	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Hydroxide (OH)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-002	MonWell	SM 2320B	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Total Alkalinity	200	mg/L as CaCO3	1	1.0	9/27/2012
1209528	1209528-002	MonWell	EPA 300.0	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Chloride	32	mg/L	1	1.0	10/4/2012
1209528	1209528-002	MonWell	EPA 300.0	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Fluoride	0.75	mg/L	1	0.10	10/4/2012
1209528	1209528-002	MonWell	EPA 300.0	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Sulfate	45	mg/L	1	1.0	10/4/2012
1209528	1209528-002	MonWell	EPA 353.2	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Nitrate + Nitrite Nitrogen	1.4	mg/L	10	0.10	10/5/2012
1209528	1209528-002	MonWell	EPA 351.2	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Total Kjeldahl Nitrogen	<0.10	mg/L	1	0.10	10/9/2012
1209528	1209528-002	MonWell	Calc.	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Total Nitrogen	1.4	mg/L	1	1.1	10/9/2012
1209528	1209528-002	MonWell	SM 2540C	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Total Dissolved Solids (TDS)	380	mg/L	1	10	9/28/2012
1209528	1209528-002	MonWell	SM 4500CNI	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	WAD Cyanide	<0.010	mg/L	1	0.010	10/1/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Aluminum, Dissolved	<0.045	mg/L	1	0.045	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Barium, Dissolved	0.081	mg/L	1	0.010	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Beryllium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Bismuth, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Boron, Dissolved	0.29	mg/L	1	0.10	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Cadmium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Calcium, Dissolved	44	mg/L	1	0.50	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Chromium, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Cobalt, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Copper, Dissolved	<0.050	mg/L	1	0.050	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Gallium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Iron, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Lithium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Magnesium, Dissolved	12	mg/L	1	0.50	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Manganese, Dissolved	0.11	mg/L	1	0.0050	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Molybdenum, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Nickel, Dissolved	<0.010	mg/L	1	0.010	10/4/2012

OrderID	Sample#	Matrix	Method	Cust Sample #	Date Collected	Time Col.	Date Rec'd	Cust. Name	Param	Result	Units	Dilu-tion	Rep Limit	Analysis Date
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Phosphorus, Dissolved	<0.50	mg/L	1	0.50	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Potassium, Dissolved	6.6	mg/L	1	0.50	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Scandium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Silver, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Sodium, Dissolved	57	mg/L	1	0.50	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Strontium, Dissolved	0.39	mg/L	1	0.10	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Tin, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Titanium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Vanadium, Dissolved	0.014	mg/L	1	0.010	10/4/2012
1209528	1209528-002	MonWell	EPA 200.7	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Zinc, Dissolved	0.023	mg/L	1	0.010	10/4/2012
1209528	1209528-002	MonWell	EPA 200.8	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Mercury, Dissolved	<0.00011	mg/L	1	0.00011	10/3/2012
1209528	1209528-002	MonWell	EPA 200.8	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Antimony, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-002	MonWell	EPA 200.8	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Arsenic, Dissolved	0.0062	mg/L	1	0.0050	10/3/2012
1209528	1209528-002	MonWell	EPA 200.8	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Lead, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-002	MonWell	EPA 200.8	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Selenium, Dissolved	<0.0050	mg/L	1	0.0050	10/3/2012
1209528	1209528-002	MonWell	EPA 200.8	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Thallium, Dissolved	<0.0010	mg/L	1	0.0010	10/3/2012
1209528	1209528-002	MonWell	Calculation	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Anions	5.91	meq/L	1	0.10	
1209528	1209528-002	MonWell	Calculation	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Cations	5.84	meq/L	1	0.10	
1209528	1209528-002	MonWell	Calculation	MW-2A	9/26/2012	12:00	9/27/2012	JBR Env	Error	<1.0	%	1	1.0	
1209528	1209528-003	MonWell	SM 4500-H+ B	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	pH	7.74	pH Units	1		9/27/2012
1209528	1209528-003	MonWell	EPA 200.2	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Trace Metals Digestion, Dissolved	Complete		1		10/3/2012
1209528	1209528-003	MonWell	SM 2320B	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Bicarbonate (HCO3)	210	mg/L	1	1.0	9/27/2012
1209528	1209528-003	MonWell	SM 2320B	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Carbonate (CO3)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-003	MonWell	SM 2320B	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Hydroxide (OH)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-003	MonWell	SM 2320B	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Total Alkalinity	170	mg/L as CaCO3	1	1.0	9/27/2012
1209528	1209528-003	MonWell	EPA 300.0	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Chloride	32	mg/L	1	1.0	10/4/2012
1209528	1209528-003	MonWell	EPA 300.0	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Fluoride	0.74	mg/L	1	0.10	10/4/2012
1209528	1209528-003	MonWell	EPA 300.0	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Sulfate	45	mg/L	1	1.0	10/4/2012
1209528	1209528-003	MonWell	EPA 353.2	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Nitrate + Nitrite Nitrogen	1.5	mg/L	10	0.10	10/5/2012
1209528	1209528-003	MonWell	EPA 351.2	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Total Kjeldahl Nitrogen	<0.10	mg/L	1	0.10	10/9/2012
1209528	1209528-003	MonWell	Calc.	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Total Nitrogen	1.5	mg/L	1	1.1	10/9/2012
1209528	1209528-003	MonWell	SM 2540C	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Total Dissolved Solids (TDS)	380	mg/L	1	10	9/28/2012
1209528	1209528-003	MonWell	SM 4500CNI	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	WAD Cyanide	<0.010	mg/L	1	0.010	10/3/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Aluminum, Dissolved	<0.045	mg/L	1	0.045	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Barium, Dissolved	0.078	mg/L	1	0.010	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Beryllium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Bismuth, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Boron, Dissolved	0.27	mg/L	1	0.10	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Cadmium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Calcium, Dissolved	37	mg/L	1	0.50	10/4/2012

OrderID	Sample#	Matrix	Method	Cust Sample #	Date Collected	Time Col.	Date Rec'd	Cust. Name	Param	Result	Units	Dilu-tion	Rep Limit	Analysis Date
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Chromium, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Cobalt, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Copper, Dissolved	<0.050	mg/L	1	0.050	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Gallium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Iron, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Lithium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Magnesium, Dissolved	11	mg/L	1	0.50	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Manganese, Dissolved	0.11	mg/L	1	0.0050	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Molybdenum, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Nickel, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Phosphorus, Dissolved	<0.50	mg/L	1	0.50	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Potassium, Dissolved	5.7	mg/L	1	0.50	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Scandium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Silver, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Sodium, Dissolved	53	mg/L	1	0.50	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Strontium, Dissolved	0.33	mg/L	1	0.10	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Tin, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Titanium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Vanadium, Dissolved	0.014	mg/L	1	0.010	10/4/2012
1209528	1209528-003	MonWell	EPA 200.7	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Zinc, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-003	MonWell	EPA 200.8	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Mercury, Dissolved	<0.00010	mg/L	1	0.00010	10/3/2012
1209528	1209528-003	MonWell	EPA 200.8	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Antimony, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-003	MonWell	EPA 200.8	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Arsenic, Dissolved	<0.0050	mg/L	1	0.0050	10/3/2012
1209528	1209528-003	MonWell	EPA 200.8	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Lead, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-003	MonWell	EPA 200.8	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Selenium, Dissolved	<0.0050	mg/L	1	0.0050	10/3/2012
1209528	1209528-003	MonWell	EPA 200.8	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Thallium, Dissolved	<0.0010	mg/L	1	0.0010	10/3/2012
1209528	1209528-003	MonWell	Calculation	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Anions	5.43	meq/L	1	0.10	
1209528	1209528-003	MonWell	Calculation	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Cations	5.21	meq/L	1	0.10	
1209528	1209528-003	MonWell	Calculation	MW-3	9/25/2012	17:30	9/27/2012	JBR Env	Error	2.1	%	1	1.0	
1209528	1209528-004	MonWell	SM 4500-H+ B	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	pH	7.85	pH Units	1		9/27/2012
1209528	1209528-004	MonWell	EPA 200.2	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Trace Metals Digestion, Dissolved	Complete		1		10/3/2012
1209528	1209528-004	MonWell	SM 2320B	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Bicarbonate (HCO3)	190	mg/L	1	1.0	9/27/2012
1209528	1209528-004	MonWell	SM 2320B	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Carbonate (CO3)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-004	MonWell	SM 2320B	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Hydroxide (OH)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-004	MonWell	SM 2320B	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Total Alkalinity	150	mg/L as CaCO3	1	1.0	9/27/2012
1209528	1209528-004	MonWell	EPA 300.0	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Chloride	38	mg/L	1	1.0	10/4/2012
1209528	1209528-004	MonWell	EPA 300.0	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Fluoride	0.79	mg/L	1	0.10	10/4/2012
1209528	1209528-004	MonWell	EPA 300.0	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Sulfate	50	mg/L	1	1.0	10/4/2012
1209528	1209528-004	MonWell	EPA 353.2	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Nitrate + Nitrite Nitrogen	1.4	mg/L	10	0.10	10/5/2012
1209528	1209528-004	MonWell	EPA 351.2	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Total Kjeldahl Nitrogen	0.19	mg/L	1	0.10	10/9/2012

OrderID	Sample#	Matrix	Method	Cust Sample #	Date Collected	Time Col.	Date Rec'd	Cust. Name	Param	Result	Units	Dilu-tion	Rep Limit	Analysis Date
1209528	1209528-004	MonWell	Calc.	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Total Nitrogen	1.5	mg/L	1	1.1	10/9/2012
1209528	1209528-004	MonWell	SM 2540C	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Total Dissolved Solids (TDS)	380	mg/L	1	10	9/28/2012
1209528	1209528-004	MonWell	SM 4500CNI	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	WAD Cyanide	<0.010	mg/L	1	0.010	10/1/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Aluminum, Dissolved	<0.045	mg/L	1	0.045	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Barium, Dissolved	0.11	mg/L	1	0.010	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Beryllium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Bismuth, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Boron, Dissolved	0.24	mg/L	1	0.10	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Cadmium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Calcium, Dissolved	35	mg/L	1	0.50	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Chromium, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Cobalt, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Copper, Dissolved	<0.050	mg/L	1	0.050	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Gallium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Iron, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Lithium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Magnesium, Dissolved	12	mg/L	1	0.50	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Manganese, Dissolved	0.47	mg/L	1	0.0050	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Molybdenum, Dissolved	0.035	mg/L	1	0.010	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Nickel, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Phosphorus, Dissolved	<0.50	mg/L	1	0.50	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Potassium, Dissolved	6.1	mg/L	1	0.50	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Scandium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Silver, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Sodium, Dissolved	52	mg/L	1	0.50	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Strontium, Dissolved	0.31	mg/L	1	0.10	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Tin, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Titanium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Vanadium, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-004	MonWell	EPA 200.7	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Zinc, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-004	MonWell	EPA 200.8	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Mercury, Dissolved	<0.0005	mg/L	5	0.0005	10/4/2012
1209528	1209528-004	MonWell	EPA 200.8	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Antimony, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-004	MonWell	EPA 200.8	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Arsenic, Dissolved	<0.0050	mg/L	1	0.0050	10/3/2012
1209528	1209528-004	MonWell	EPA 200.8	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Lead, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-004	MonWell	EPA 200.8	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Selenium, Dissolved	<0.0050	mg/L	1	0.0050	10/3/2012
1209528	1209528-004	MonWell	EPA 200.8	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Thallium, Dissolved	<0.0010	mg/L	1	0.0010	10/3/2012
1209528	1209528-004	MonWell	Calculation	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Anions	5.37	meq/L	1	0.10	
1209528	1209528-004	MonWell	Calculation	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Cations	5.17	meq/L	1	0.10	
1209528	1209528-004	MonWell	Calculation	MW-4	9/25/2012	20:00	9/27/2012	JBR Env	Error	1.9	%	1	1.0	
1209528	1209528-005	MonWell	SM 4500-H+ B	DUP-1	9/26/2012		9/27/2012	JBR Env	pH	7.67	pH Units	1		9/27/2012
1209528	1209528-005	MonWell	EPA 200.2	DUP-1	9/26/2012		9/27/2012	JBR Env	Trace Metals Digestion, Dissolved	Complete		1		10/3/2012

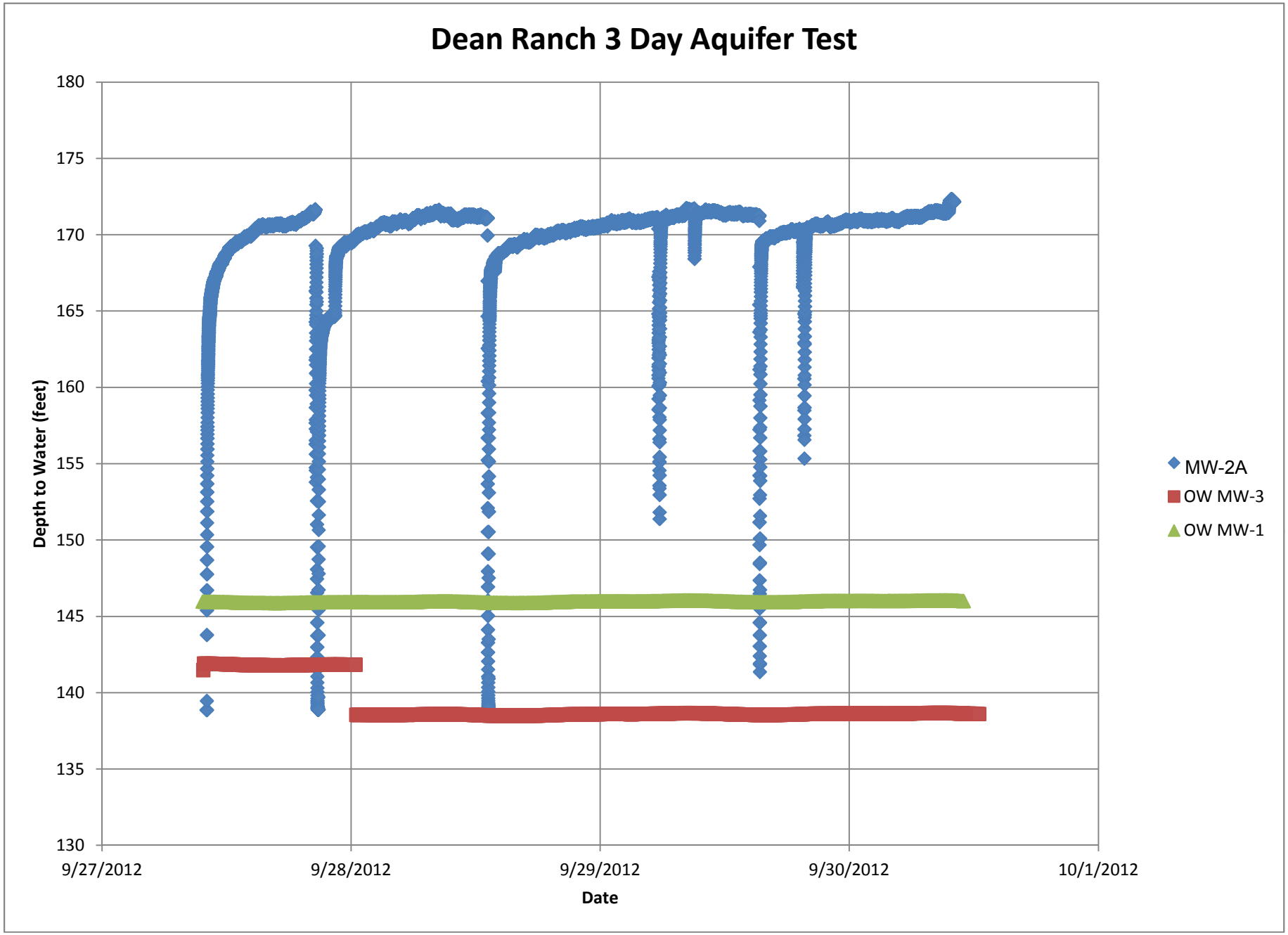
OrderID	Sample#	Matrix	Method	Cust Sample #	Date Collected	Time Col.	Date Rec'd	Cust. Name	Param	Result	Units	Dilu-tion	Rep Limit	Analysis Date
1209528	1209528-005	MonWell	SM 2320B	DUP-1	9/26/2012		9/27/2012	JBR Env	Bicarbonate (HCO3)	240	mg/L	1	1.0	9/27/2012
1209528	1209528-005	MonWell	SM 2320B	DUP-1	9/26/2012		9/27/2012	JBR Env	Carbonate (CO3)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-005	MonWell	SM 2320B	DUP-1	9/26/2012		9/27/2012	JBR Env	Hydroxide (OH)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-005	MonWell	SM 2320B	DUP-1	9/26/2012		9/27/2012	JBR Env	Total Alkalinity	200	mg/L as CaCO3	1	1.0	9/27/2012
1209528	1209528-005	MonWell	EPA 300.0	DUP-1	9/26/2012		9/27/2012	JBR Env	Chloride	31	mg/L	1	1.0	10/4/2012
1209528	1209528-005	MonWell	EPA 300.0	DUP-1	9/26/2012		9/27/2012	JBR Env	Fluoride	0.73	mg/L	1	0.10	10/4/2012
1209528	1209528-005	MonWell	EPA 300.0	DUP-1	9/26/2012		9/27/2012	JBR Env	Sulfate	44	mg/L	1	1.0	10/4/2012
1209528	1209528-005	MonWell	EPA 353.2	DUP-1	9/26/2012		9/27/2012	JBR Env	Nitrate + Nitrite Nitrogen	1.4	mg/L	10	0.10	10/5/2012
1209528	1209528-005	MonWell	EPA 351.2	DUP-1	9/26/2012		9/27/2012	JBR Env	Total Kjeldahl Nitrogen	<0.10	mg/L	1	0.10	10/9/2012
1209528	1209528-005	MonWell	Calc.	DUP-1	9/26/2012		9/27/2012	JBR Env	Total Nitrogen	1.4	mg/L	1	1.1	10/9/2012
1209528	1209528-005	MonWell	SM 2540C	DUP-1	9/26/2012		9/27/2012	JBR Env	Total Dissolved Solids (TDS)	390	mg/L	1	10	9/28/2012
1209528	1209528-005	MonWell	SM 4500CNI	DUP-1	9/26/2012		9/27/2012	JBR Env	WAD Cyanide	<0.010	mg/L	1	0.010	10/1/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Aluminum, Dissolved	<0.045	mg/L	1	0.045	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Barium, Dissolved	0.078	mg/L	1	0.010	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Beryllium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Bismuth, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Boron, Dissolved	0.27	mg/L	1	0.10	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Cadmium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Calcium, Dissolved	42	mg/L	1	0.50	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Chromium, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Cobalt, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Copper, Dissolved	<0.050	mg/L	1	0.050	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Gallium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Iron, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Lithium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Magnesium, Dissolved	12	mg/L	1	0.50	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Manganese, Dissolved	0.10	mg/L	1	0.0050	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Molybdenum, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Nickel, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Phosphorus, Dissolved	<0.50	mg/L	1	0.50	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Potassium, Dissolved	6.2	mg/L	1	0.50	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Scandium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Silver, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Sodium, Dissolved	54	mg/L	1	0.50	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Strontium, Dissolved	0.37	mg/L	1	0.10	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Tin, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Titanium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Vanadium, Dissolved	0.014	mg/L	1	0.010	10/4/2012
1209528	1209528-005	MonWell	EPA 200.7	DUP-1	9/26/2012		9/27/2012	JBR Env	Zinc, Dissolved	0.022	mg/L	1	0.010	10/4/2012
1209528	1209528-005	MonWell	EPA 200.8	DUP-1	9/26/2012		9/27/2012	JBR Env	Mercury, Dissolved	<0.00010	mg/L	1	0.00010	10/3/2012
1209528	1209528-005	MonWell	EPA 200.8	DUP-1	9/26/2012		9/27/2012	JBR Env	Antimony, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012

OrderID	Sample#	Matrix	Method	Cust Sample #	Date Collected	Time Col.	Date Rec'd	Cust. Name	Param	Result	Units	Dilu-tion	Rep Limit	Analysis Date
1209528	1209528-005	MonWell	EPA 200.8	DUP-1	9/26/2012		9/27/2012	JBR Env	Arsenic, Dissolved	0.0059	mg/L	1	0.0050	10/3/2012
1209528	1209528-005	MonWell	EPA 200.8	DUP-1	9/26/2012		9/27/2012	JBR Env	Lead, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-005	MonWell	EPA 200.8	DUP-1	9/26/2012		9/27/2012	JBR Env	Selenium, Dissolved	<0.0050	mg/L	1	0.0050	10/3/2012
1209528	1209528-005	MonWell	EPA 200.8	DUP-1	9/26/2012		9/27/2012	JBR Env	Thallium, Dissolved	<0.0010	mg/L	1	0.0010	10/3/2012
1209528	1209528-005	MonWell	Calculation	DUP-1	9/26/2012		9/27/2012	JBR Env	Anions	5.86	meq/L	1	0.10	
1209528	1209528-005	MonWell	Calculation	DUP-1	9/26/2012		9/27/2012	JBR Env	Cations	5.60	meq/L	1	0.10	
1209528	1209528-005	MonWell	Calculation	DUP-1	9/26/2012		9/27/2012	JBR Env	Error	2.3	%	1	1.0	
1209528	1209528-006	MonWell	SM 4500-H+ B	Eq. Blank	9/26/2012		9/27/2012	JBR Env	pH	5.81	pH Units	1		9/27/2012
1209528	1209528-006	MonWell	EPA 200.2	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Trace Metals Digestion, Dissolved	Complete		1		10/3/2012
1209528	1209528-006	MonWell	SM 2320B	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Bicarbonate (HCO3)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-006	MonWell	SM 2320B	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Carbonate (CO3)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-006	MonWell	SM 2320B	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Hydroxide (OH)	<1.0	mg/L	1	1.0	9/27/2012
1209528	1209528-006	MonWell	SM 2320B	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Total Alkalinity	<1.0	mg/L as CaCO3	1	1.0	9/27/2012
1209528	1209528-006	MonWell	EPA 300.0	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Chloride	<1.0	mg/L	1	1.0	10/4/2012
1209528	1209528-006	MonWell	EPA 300.0	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Fluoride	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-006	MonWell	EPA 300.0	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Sulfate	<1.0	mg/L	1	1.0	10/4/2012
1209528	1209528-006	MonWell	EPA 353.2	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Nitrate + Nitrite Nitrogen	<0.10	mg/L	10	0.10	10/5/2012
1209528	1209528-006	MonWell	EPA 351.2	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Total Kjeldahl Nitrogen	<0.10	mg/L	1	0.10	10/9/2012
1209528	1209528-006	MonWell	Calc.	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Total Nitrogen	<1.1	mg/L	1	1.1	10/9/2012
1209528	1209528-006	MonWell	SM 2540C	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Total Dissolved Solids (TDS)	<10	mg/L	1	10	10/9/2012
1209528	1209528-006	MonWell	SM 4500CNI	Eq. Blank	9/26/2012		9/27/2012	JBR Env	WAD Cyanide	<0.010	mg/L	1	0.010	10/1/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Aluminum, Dissolved	<0.045	mg/L	1	0.045	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Barium, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Beryllium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Bismuth, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Boron, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Cadmium, Dissolved	<0.0010	mg/L	1	0.0010	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Calcium, Dissolved	<0.50	mg/L	1	0.50	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Chromium, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Cobalt, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Copper, Dissolved	<0.050	mg/L	1	0.050	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Gallium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Iron, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Lithium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Magnesium, Dissolved	<0.50	mg/L	1	0.50	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Manganese, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Molybdenum, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Nickel, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Phosphorus, Dissolved	<0.50	mg/L	1	0.50	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Potassium, Dissolved	<0.50	mg/L	1	0.50	10/4/2012

OrderID	Sample#	Matrix	Method	Cust Sample #	Date Collected	Time Col.	Date Rec'd	Cust. Name	Param	Result	Units	Dilu-tion	Rep Limit	Analysis Date
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Scandium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Silver, Dissolved	<0.0050	mg/L	1	0.0050	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Sodium, Dissolved	<0.50	mg/L	1	0.50	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Strontium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Tin, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Titanium, Dissolved	<0.10	mg/L	1	0.10	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Vanadium, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-006	MonWell	EPA 200.7	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Zinc, Dissolved	<0.010	mg/L	1	0.010	10/4/2012
1209528	1209528-006	MonWell	EPA 200.8	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Mercury, Dissolved	<0.00010	mg/L	1	0.00010	10/3/2012
1209528	1209528-006	MonWell	EPA 200.8	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Antimony, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-006	MonWell	EPA 200.8	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Arsenic, Dissolved	<0.0050	mg/L	1	0.0050	10/3/2012
1209528	1209528-006	MonWell	EPA 200.8	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Lead, Dissolved	<0.0025	mg/L	1	0.0025	10/3/2012
1209528	1209528-006	MonWell	EPA 200.8	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Selenium, Dissolved	<0.0050	mg/L	1	0.0050	10/3/2012
1209528	1209528-006	MonWell	EPA 200.8	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Thallium, Dissolved	<0.0010	mg/L	1	0.0010	10/3/2012
1209528	1209528-006	MonWell	Calculation	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Anions	<0.10	meq/L	1	0.10	
1209528	1209528-006	MonWell	Calculation	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Cations	<0.10	meq/L	1	0.10	
1209528	1209528-006	MonWell	Calculation	Eq. Blank	9/26/2012		9/27/2012	JBR Env	Error	NA	%	1	1.0	

APPENDIX D

Constant Discharge Test Hydrographs


Dean Ranch 3 Day Aquifer Test
180
175
170
165
160
155
150
145
140
135
130
Depth to Water (feet)
9/27/2012
9/28/2012
9/29/2012
9/30/2012
10/1/2012
Date
MW-2A
OW MW-3
OW MW-1

APPENDIX 20-C

Geotechnical Survey Report

GEOTECHNICAL INVESTIGATION
BARRICK GOLDSTRIKE MINES
PRECIOUS METALS RECOVERY PROJECT
CRESCENT VALLEY, NEVADA

File No. 29586

October 16, 2012

SUMMIT ENGINEERING CORPORATION
5405 MAE ANNE AVENUE, RENO, NV. 89523
PHONE:(775) 747-8550 FAX:(775) 747-8559

PROFESSIONAL ENGINEER STATE OF NEVADA
CLINTON G. THIESSE
Exp: 6-30-14
CIVIL
No. 6159

10/16/12

Prepared For:

Mr. Benjamin Veach
JBR Environmental, Inc
595 Double Eagle Court, Suite 2000
Reno, Nevada 89521

Prepared By:

Summit Engineering Corporation
5405 Mae Anne Avenue
Reno, Nevada 89523

SUMMIT ENGINEERING CORPORATION™

October 16, 2012 Job No. 1-29586

Mr. Benjamin Veach, P.E.
JBR Environmental, Inc.
595 Double Eagle Court, Ste 2000
Reno, Nevada 89521

RE: Geotechnical Investigation
Barrick Goldstrike Mines – Precious Metals Recovery Project
Crescent Valley, Nevada

Dear Mr. Veach:

Attached please find the results of our Geotechnical Investigation for the proposed Barrick Goldstrike Mines – Precious Metals Recovery Project in Crescent Valley, Nevada. Summit drilled 10 boreholes to depths of up to 150 feet and 13 test pit excavations to depths up to 14 feet in order to characterize the geotechnical conditions at the site. A Wenner Soils resistivity survey was also completed on the property. Material testing was performed on samples obtained during the investigation. Results of the analyses and logs of the boreholes and test pit excavations are included as sheets in this report.

The native soils found on site classify as sandy silts (ML), silty sands (SM), clayey sands (SC), silty gravels (GM), clayey gravels (GC) and a few isolated areas of sandy lean clays (CL). The majority of the soils found on site are not expansive, and as such, will provide adequate support for the proposed facilities. However, the sandy silts (ML) and the silty clays (CL) will not provide adequate support and should be removed to a depth of 3 feet below grade. Groundwater was not encountered in any of the boreholes, and is estimated to be more than 150 feet deep.

The following report provides geotechnical recommendations and guidelines for the design and construction of the project. The final civil design and project budgets may dictate minor modifications to this report. We wish to thank you for the opportunity of providing our services. We are readily available to answer any related questions.

Sincerely,

SUMMIT ENGINEERING CORPORATION

PROFESSIONAL ENGINEER STATE OF NEVADA
CLINTON G. THIESSE
Exp: 6-30-14
CIVIL
No. 6159

10/16/12

Clinton G. Thiesse, P.E.
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GEOTECHNICAL INVESTIGATION
BARRICK GOLDSTRIKE MINES
PRECIOUS METALS RECOVERY PROJECT
CRESCENT VALLEY, NEVADA

I. INTRODUCTION

A. Project Description

This report presents the results of our Geotechnical Investigation to evaluate the existing conditions for the proposed Precious Metals Recovery Project in Crescent Valley, Nevada. The site is located to the south and east of the town of Crescent Valley, in an area just south of the Dry Hills, and north of Frenchies' Flat. Exploration consisted of drilling 10 boreholes to a maximum depth of 150 feet, and 13 test pit explorations to depths of up to 14 feet. Three boreholes (BH-1, BH-4, and BH-8) were converted to piezometers, sounded and found to be dry, and abandoned. Laboratory testing and engineering analyses were conducted to provide geotechnical recommendations for the design and construction of the proposed Precious Metals Recovery Project facilities, which include a proposed solar panel energy farm, energy storage modules, Main security gate and security fence, and the process facility itself, including elemental mercury storage structures.

Sheet 1 presents a vicinity map and Sheet 2 presents the project site with borehole and test pit locations in relation to the planned improvements mentioned above.

B. Purpose and Scope

The purpose of this investigation was to identify subsurface soil conditions and to provide geotechnical design criteria for the construction of the Barrick Goldstrike Precious Metals Recovery Project. The scope of this investigation included surface reconnaissance, subsurface exploration, analyses of field and laboratory data, research of pertinent geologic literature and report preparation. This report provides conclusions and recommendations concerning:

- General subsurface conditions and geology
- Site preparation and earthwork
- Engineering properties of the soils that will influence design of future structures, including:
    - Bearing capacities
    - Settlement potential
    - Lateral earth pressures

- Portland cement concrete
- Structural road section
- Seismic design criteria

C. Field Exploration and Laboratory Testing

Summit Engineering Corporation conducted the subsurface investigation by drilling 10 boreholes to a maximum depth of 150 feet. The boreholes were drilled with a CME 75, truck mounted 4-wheel drive, hollow-stemmed auger Drill Rig. Representative samples of the soil were collected from the boreholes and the test pits as per the specifications issued by Hatch Engineering and Architecture, Inc. Selected samples were tested at Summit's laboratory and two outside laboratories. Sheet 1 shows the vicinity map and Sheet 2 presents a site map with the locations of the boreholes and proposed construction. General site geology is shown on sheet 3 and a fault map on sheet 4. Sheets 5 through 40 display the logs of soils encountered in the boreholes. Sheet 41 provides a key to the test pit and borehole logs as well as a copy of the Unified Soil Classification System used to identify the site soils.

Representative bulk samples were taken from the boreholes and in-situ drive samples were retrieved from the majority of the drill holes and the test pits at every significant lithologic change. Representative samples were tested as follows: 1) sieve analyses tests (ASTM D422); 2) moisture content tests (ASTM D2216); 3) Atterberg Limits tests (ASTM 4318), to confirm field soil classifications; 4) soluble sulfates tests to determine if the native soils are reactive with Portland cement concrete (AWWA 2540C); 5) and CBR-tests (ASTM D1833-07E2), to determine a flexible pavement structural section. Results of the laboratory tests are displayed on the borehole logs, and presented independently in Sheets 42-56. All laboratory testing methods were conducted in accordance with the applicable standards.

II. DISCUSSION

A. Site Description

The project site for the proposed Barrick Goldstrike Precious Metals Recovery Project is located south and east of the town of Crescent Valley, in an area of Crescent Valley known as Frenchies' Flat. The site is accessed from Interstate 80 and State Route 306. State Route 306 intersects the Railroad Pass Road at the south end of the town of Beowawe, and from there, the Railroad Pass Road intersects with Willow Coral Pass Road, which leads directly to the site just south of the Dry Hills, in Eureka County, Nevada, in Section 5, Township 29 North, Range 50 East M.D.B. & M.
The site is sparsely covered with cheatgrass, and slopes gently to the south.

B. Site Geology

The primary geologic reference reviewed was the Geologic Map of Eureka County, Nevada (R.J. Roberts, R.E. Lehner, and M.M. Bell, 1963). The bulletin and its geologic map (Sheet 3) provided information about the general geology and earthquake hazards for the subject property and surrounding area. The geologic units mapped on the site are "Qoa," and "Qal". The authors characterize these units as the following:

Qoa: **Older Alluvium: "**Silt, sand, and gravel along present streams. Includes alluvial fans"
Qal: **Alluvium**: "Includes playa, dune and stream deposits."

According to the map (#32011C0600D) available by F.E.M.A. (Federal Emergency Management Agency) the site is within Zone X. According to F.E.M.A., Zone X are "Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood."

C. Regional Seismicity

The property, according to International Building Code 2006 maps, may be subject to moderate seismic acceleration, 0.2550g ground acceleration, and therefore has a moderate probability for experiencing a major seismic event. The effect of seismic shaking, therefore, is an important consideration for elevated improvements. The site has a native soil profile of D, "stiff soil." The following table summarizes seismic design parameters for the 2006 International Building Code criteria for structural design of the project:

IBC SEISMIC DESIGN

Site Class	D
Soil Profile Type	Stiff Soil
Soil Shear Wave Velocity ($\ddot{\upsilon}_s$)	600-1200
Standard penetration resistance (N)	15-50
Soil undrained shear strength (s_u)	1000-2000
Site Coefficient (F_a) w/ short accel. (s_s)	0.615
Site Coefficient (F_v) w/ 1-sec. accel. (s_1)	0.205
Max. ground motion, 0.2-sec SA (S_s), g	0.805
Max. ground motion, 1.0-sec SA (S_1), g	0.408
Design acceleration, S_{DS}, g	0.537
Design acceleration, S_{D1}, g	0.272

Design of improvements shall be based on Site Class D as per IBC 2006 standards. The Peak Ground Acceleration (PGA) of the site with a Probability of Exceedance of 2% and Exposure Time of 50 years was calculated to be $K_H = 0.1275g$. The site is not located in any of the major Nevada Seismic Belts. According to the USGS, there is a 0.5-1.0% probability that a magnitude 7.0 or greater earthquake could occur within 50 km of the site within the next 50 years (USGS, 2009b).

The State of Nevada requires the use of seismic provisions set by the IBC, as well as adoptions of appropriate local standards (NRS 278.580.5). Most geological consultants in Nevada follow the conventions established by the Nevada Earthquake Safety Council, whose guidelines are based on the Alquist-Priolo Act of 1972 in California. According to the Geologic Map of Eureka County, Nevada (R.J. Roberts, R.E. Lehner, and M.M. Bell 1967; Sheet 4), no mapped faults cross the site, nor were any encountered during this investigation. The closest mapped fault is located approximately 4 miles to the south/southeast of the site, and is labeled as the Crescent Fault.

Groundwater was not encountered in any of the boreholes. Static groundwater is expected to be approximately 150+ feet below grade. Liquefaction, a hazard in seismic zones where water-saturated granular cohesionless soils lose their bearing during seismic shaking, is not anticipated to be a problem on the project site due to the percentage of fines in the native soils and the depth to groundwater.

D. Subsurface Materials and Conditions

Ten boreholes were drilled and thirteen test pits were excavated in the course of this investigation. The native materials encountered included sandy silts (ML) with minor amounts of gravels, silty sands (SM), clayey sands (SC), silty gravels (GM), clayey gravels (GC) and a few isolated areas of sandy lean clays (CL).

Groundwater was not encountered in any of the borings, and it is estimated to be more than 150 feet below ground surface at the time of drilling.

E. Wenner-4 point Soil Resistivity Survey

The Wenner 4-point survey was completed on the project site and results can be found in Appendix C of the report.

III. CONCLUSIONS AND RECOMMENDATIONS

From a geotechnical engineering standpoint, it is our opinion that the Barrick Goldstrike Precious Metals Recovery Project area is suitable for construction of the proposed structure, provided that the recommendations contained in this report are incorporated into design and construction. The following sections present our conclusions and recommendations concerning the proposed project.

A. Foundation Considerations

The native materials uncovered during the course of the investigation, sandy silts (ML) with minor amounts of gravels, silty sands (SM), clayey sands (SC), silty gravels (GM), clayey gravels (GC) and a few isolated areas of sandy lean clays (CL). The sandy silts and silt clays should not be considered suitable and will require complete removal to a depth of 3 feet below grade. The remaining silty sands, clayey gravels and silty gravels will provide adequate support for the proposed foundations. Analysis obtained from field and laboratory testing indicates the native materials will provide vertical and lateral support and can typically support up to 2,000 pounds per square foot for dead plus long term live loads (per IBC 2006 Table 1804.2) on spread type footings with less than 1 inch of total settlement and less than ½ inch of differential settlement across the length of the structures.

The passive soil pressure was calculated as 305 pounds per cubic foot (305 psf per foot of depth). The active soil pressure was calculated as 35 pounds per cubic foot (35 psf per foot of depth). The at-rest soil pressure, when walls are braced on the top and the bottom was calculated as 51 pounds per cubic foot (51 psf per foot of depth). A design value for the coefficient of friction of 0.50 should be used. For design purpose Poissons' Ratio was determined to be μ_s =0.3. All exterior footings shall be embedded a minimum of 36 inches below adjacent finished grade for frost protection.

B. Grading and Filling

No grading plans were available for review at the time of this report, however, areas stated for development and/or structures will require stripping of the native grasses and topsoil.

All areas that are to receive fill or structural loading shall be scarified to a depth of at least 12 inches, moisture conditioned to within 2 percent of optimum, and recompacted to at least 90 percent relative compaction (ASTM D 1557). If the native subgrade is too coarse to density test, then moisture conditioning and compaction shall be completed to the satisfaction of the Geotechnical Engineer. A proof-rolling program of a minimum 5 complete passes with a Cat 825 self propelled sheepsfoot (or equivalent) may be acceptable. For footing trenches, three complete passes with hand compactors may be adequate.

All fill, except rock fill, shall be placed in 12-inch maximum lifts, moisture conditioned to within 2 percent of optimum, and compacted to at least 90 percent (ASTM D 1557). If any of the on-site materials are too coarse for density testing (>30% retained on the ¾" sieve), these materials must be treated as rock fill. Whenever structural foundations will be placed partially in cut and partially in structural fill, over-excavation and replacement of material on the cut side may be necessary in order to reduce the potential for differential settlement.

The maximum particle size shall be 12 inches up to 5 feet below finished grade and 6 inches from 5 feet below finished grade to finished grade. This material shall be placed in 12-inch lifts (maximum), moisture conditioned, and compacted to the satisfaction of the Geotechnical Engineer. Care should be taken to insure that voids between cobbles and boulders are filled with finer materials. Five complete passes of a Cat 825 sheepsfoot compactor (or equivalent) may achieve adequate compaction. Acceptance of density requirements for this type of rock fill shall be by observation of lift thickness, moisture conditioning, and applied compactive effort. The maximum allowable particle size shall be decreased if the Geotechnical Engineer is not satisfied with the achieved compaction and/or "nesting" of particles is observed.

Expansive soil shall be defined as any soil or bedrock with more than 30 percent (by weight) passing the No. 200 sieve and/or a plasticity index of 16 or greater and/or an expansion index of at least 21. Expansive soils may only be placed as fill in non-structural areas, or as structural fill to within 3 feet of footing grade or 2 feet of pavement subgrade. Expansive soils utilized as fill shall be moisture conditioned to at least optimum and compacted to a minimum of 90 percent. All direct structural support shall be provided by non-expansive material. Any imported structural fill for this project should meet or exceed the following guideline specifications:

Sieve Sizes	Percentage Passing (by weight)
4 Inch	100
3/4 Inch	70-100
No. 40	15-50
No. 200	10-30
Additional Requirements are as follows:	
Water Soluble Sulfate (SO_4)(max)	0.1%
Total Available Water Soluble Sodium Sulfate (Na_2SO_4)(max)	0.2%
Solubility (max)(AWWA 2540C)	0.5%
Liquid Limit (max.)	38
Plasticity Index (max.)	15
Expansion Index (max.)	20

This specification is meant as a guideline to pre-approve imported structural fill. Other materials not meeting this specification may be suitable, but will require approval from the Geotechnical Engineer. Mining of structural fill material on-site is not permissible unless taken from non-structural areas, or from re-using suitable material as structural fill taken from areas of designated cut.

C. Surface and Subsurface Drainage

Grading plans should be designed to minimize the potential for ponding or pooling in areas of newly placed asphalt or concrete.

D. Slope Stability and Erosion Control

The results of our exploration and testing indicate that 2:1 (H:V) slopes will be stable for on-site materials in cut and fill. All cut and fill slopes should incorporate brow ditches to divert surface drainage away from the slope face.

The potential for dust generation, both during and after construction, is high at this project. Dust control will be mandatory on this project in order to comply with air quality standards. The contractor shall submit a dust control plan and obtain the required permits from The Nevada Department of Environmental Protection (NDEP) prior to commencing site grading.

Stabilization of all slopes and areas disturbed by construction will be required to prevent erosion and to control dust. Stabilization may consist of riprap, revegetation and landscaping, or dust palliative. Slopes steeper than 3:1 (H:V) will require stabilization.

Where the fill extends onto native slopes with gradients greater than 5:1, the fill shall be keyed into the native soils. The keys will have a minimum width of equipment width or 10 feet, whichever is lesser, and constructed with a minimum 5 percent slope into the hillside.

E. Trenching and Excavation

All trenching and excavation shall be conducted in accordance with all local, state, and federal (OSHA) standards. Trenching in the cemented sands for this area is considered very difficult and may require blasting. In general, the soils encountered during exploration meets the criteria for OSHA Type B soils. Any oversized material loosened during excavation will require scaling prior to permitting workmen to enter the trench.

Any area in question should be examined by the Geotechnical Engineer. The following table is reproduced from Occupational Safety and Health, Subpart P, 1926.652, Appendix B:

TABLE B-1

MAXIMUM ALLOWABLE SLOPES

SOIL OR ROCK TYPE	MAXIMUM ALLOWABLE SLOPES (H:V) [1] FOR EXCAVATIONS LESS THAN 20 FEET DEEP [3]	
STABLE ROCK	VERTICAL	(90°)
TYPE A [2]	3/4:1	(53°)
TYPE B	1:1	(45°)
TYPE C	1 1/2:1	(34°)

NOTES

1. Numbers shown in parentheses next to maximum allowable slopes are angles expressed in degrees from the horizontal. Angles have been rounded off.
2. A short-term maximum allowable slope of 1/2 H:1V (63°) is allowed in excavations in Type A soil that are 12 feet (3.67 m) or less in depth. Short-term maximum allowable slopes for excavations greater than 12 feet (3.67 m) in depth shall be 3/4 H:1V (53°).
3. Sloping or benching for excavations greater than 20 feet deep shall be designed by a registered professional engineer.

Bedding and initial backfill over the pipe will require import to meet the specifications of the utility having jurisdiction. On-site soils may be used for trench backfill, provided particles over 4 inches in diameter are removed. Imported structural cap material or native material meeting the requirements for structural fill will be required within 3 feet below bottom of footing and 2 feet below bottom of pavement subgrade. All trench backfill shall be placed in 8 inch (max.) finished lifts, moisture conditioned to within 2 percent of optimum, and densified to at least 90 percent relative compaction (ASTM D 1557). If metal pipes are to be utilized, corrosion protective measures shall be taken.

F. Structural Road Section

Based on the field investigation, the native subgrade soils for the proposed roadway consist of silty sands with gravel and produced the CBR values shown in Table B-2. Preliminary traffic estimates were

provided for this project by Hatch Engineering & Architecture, Inc.

TABLE B-2

CBR RESULTS

LOCATION	CBR	RESILIENT MODULUS (psi)
TP-1@ 0'-2.0'	1.5	2250
TP-3@ 1.0'-3.0'	5.3	7950
TP-5@ 0'-2.0'	3.1	4650
TP-7 @ 0'-2.0'	3.1	4650
TP-9 @ 0'-2.0'	4.0	6000
TP-13 @ 1.5'-3.0'	4.6	6900
AVERAGE	3.6	5400

The average value for the resilient modulus value was used in the calculations for the design structural number. The information provided by Hatch Engineering stated that a 5000 US gallon truck would deliver liquids to the site. The axle loads for this truck fully loaded were used to calculate a truck factor which was used in the estimated single axle load calculations. A 20 year design life was assumed. The total ESAL was calculated at 96,072. The ESAL calculations and structural section can be found in Appendix B.

A Structural Section of 4 inches of Type 2 (3/4 inch nominal aggregate size) asphalt on 6 inches of aggregate base is recommended for use on the proposed roadway. The extreme weather conditions of the Cresent Valley area and northern Nevada area were taken into consideration during design and a more durable structural section was chosen to ensure the strength of the proposed roadway. The use of PG64-28NV is also recommended in order to increase the resistance to thermal cracking and help reduce pavement maintenance over the life of the pavement. A mix design shall be submitted to the Geotechnical Engineer for approval one week prior to paving.

Subgrade material shall be scarified to a minimum depth of 12 inches below finished subgrade, moisture conditioned to within 2 percent of optimum, and compacted to at least 90 percent. Next, 6 inches of aggregate base materials shall be placed on top of the subgrade. The aggregate base materials shall be approved by the Geotechnical Engineer prior to incorporation into the pavement structure. Aggregate base shall be moisture conditioned to within 2 percent of optimum and compacted to at least 95 percent compaction (ASTM D 1557). Finally, 4 inches of Type II, 75 blow asphalt mix placed in approximately 2

equal lifts and compacted to 96% of the Marshall Unit Weight shall be placed on top of the base.

Summit Engineering would like the chance to review the structural section if a more detailed traffic analyses is performed or if the daily traffic increases or if the proposed truck types change. This would ensure that the structural section design is adequate for the proposed intended use of the roadway.

G. Concrete Slabs

All dedicated concrete walkways and driveways should be directly underlain by aggregate base per accepted standards. The concrete mix design for exterior concrete shall have a minimum of 6 sacks of Type V Portland cement, with a maximum water to cement ratio of 0.45, and air content between 4.5 and 7.5 percent. This recommendation is to provide resistance to freeze-thaw cycles that occur in the Eureka area. Additional requirements for exterior concrete are as follows:

Minimum compression strength = 4,500 psi,
Maximum slump = 4”

Interior slab-on-grade and foundation concrete shall follow criteria established by the project structural engineer. Soluble sulfates have a detrimental effect on Portland cement concrete. Three samples were tested for soluble sulfates. The results (Sheet 50) indicates two samples are ranked as negligible, and one as severe as indicated in Table 4.3.1 of the ACI Building Code Requirements (as per IBC, 2006):

TABLE 4.3.1

REQUIREMENTS FOR CONCRETE EXPOSED TO SULFATE-CONTAINING SOLUTIONS

SULFATE EXPOSURE	WATER SOLUBLE SULFATE (SO_4)IN SOIL, PERCENT BY WEIGHT	SULFATE (SO_4) IN WATER (ppm)	CEMENT TYPE	MAXIMUM WATER-CEMENTITIOUS MATERIAL RATIO, BY WEIGHT, NORMAL WEIGHT AGGREGATE CONCRETE *	MINIMUM f'_c NORMAL-WEIGHT AND LIGHTWEIGHT AGGREGATE CONCRETE (psi)*
Negligible	$0.00 \leq SO_4 < 0.10$	$0 \leq SO_4 < 150$	-	-	-
Moderate†	$0.10 \leq SO_4 < 0.20$	$150 \leq SO_4 < 1500$	II, IP(MS), IS(MS), P(MS), I(PM)(MS), I(SM)(MS)	0.50	4,000
Severe	$0.20 \leq SO_4 < 2.00$	$1500 \leq SO_4 < 10,000$	V	0.45	4,500
Very severe	$SO_4 > 0.20$	$SO_4 > 10,000$	V plus pozzolan‡	0.45	4,500

* When both Table 4.3.1 and Table 4.2.2 are considered, the lowest applicable maximum water-cementitious material ratio and highest applicable minimum f'_c shall be used.

† Seawater.

‡ Pozzolan that has been determined by test or service record to improve sulfate resistance when used in concrete containing Type V cement.

Structural concrete mix designs for interior and private improvements only should meet one of the additional following criteria:

TYPE OF CEMENT	MINIMUM SACKS OF CEMENT PER CUBIC YARD (prior to replacement with fly ash)	MAXIMUM WATER TO CEMENTIOUS MATERIALS RATIO
Type II	6	0.5
Type II and fly ash	5.5	0.53
Type IP	5.5	0.53
Type V	5.5	0.53
Type V and fly ash	5.5	0.53

Concrete mix designs shall be determined per Chapter 7 of "Design and Control of Concrete Mixtures" by the Portland Cement Association and as further modified by IBC 2006 standards, and submitted to the Geotechnical Engineer for approval at least one week prior to pouring the concrete.

The Crescent Valley area is in a climatic zone of low humidity and concrete is susceptible to shrinkage cracking and curling during curing. All concrete work shall follow the procedures of the American Concrete Institute.

H. Anticipated Construction Problems

The site has a high potential for dust generation, and will require constant dust suppression measures during construction.

LIMITATIONS

This report is prepared solely for the use of Summit Engineering's client. Any entity wishing to utilize this report must obtain permission from them prior to doing so. Our services consist of professional opinions and recommendations made in accordance with generally accepted soil and foundation engineering principles and practices. The analyses and recommendations contained in this report are based on our site reconnaissance, the information derived from our field exploration and laboratory testing, our understanding of the proposed development, and the assumption that the soil conditions in the proposed building and grading areas do not deviate from the anticipated conditions.

Unanticipated variations in soil conditions could exist in unexplored areas on the site. If any soil or groundwater conditions are encountered at the site that are different from those discussed in this report, our firm should be immediately notified so that our recommendations can be modified to accommodate the situation. In addition, if the scope of the proposed construction, including proposed loads or structural location, changes from that described in this report, our firm should be notified.

Recommendations made in this report are based on the assumption that an adequate number of tests and inspections will be made during construction to verify compliance with these recommendations. Such tests and inspections should include, but not necessarily be limited to, the following:

- Review of site construction plans for conformance with soils investigation.
- Observation and testing during site preparation, grading, excavation, and placement of fill.
- Observation and testing of materials, and placement of asphalt concrete and site concrete.
- Foundation observation and review.
- Consultation as may be required during construction.

The findings in this report are valid as of the present date; however, changes in the conditions of the property can occur with the passage of time, whether they are due to natural processes or to the works of man on this or adjacent lands. In addition, changes in applicable or appropriate standards occur, whether they result from legislation or from the broadening of knowledge. Accordingly, the findings in this report might be invalidated, wholly or partially, by changes outside of our control.

REFERENCES

R.J. Roberts, R.E. Lehner, and M.M. Bell, 1963, Geology of Eureka County, Nevada: Nevada Bureau of Mines and Geology. (Bulletin 64)

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U.S. Geological Survey and Nevada Bureau of Mines and Geology, 2009a, Quaternary fault and fold database for the United States, accessed Oct. 6, 2009, from USGS web site: http://earthquake.usgs.gov/regional/qfaults/

Standard Specifications for Public Works Construction, 2007, Sponsored by Regional Transportation Commission of Washoe County, Elko County, Eureka County, et al.

APPENDIX A
SPECIFICATIONS

APPENDIX A

SPECIFICATIONS FOR SITE PREPARATION, EXCAVATION, COMPACTION STRUCTURAL FILL, AND SUBGRADE PREPARATION

1.0 GENERAL

1.1 Standard Specifications - Where referred to in these specifications, "Standard Specifications, ICC 2006" shall mean the Standard Specifications for Public Works Construction sponsored and distributed by the Regional Transportation Commission of Washoe County, Eureka County, Elko County, *et al.* (2007 edition). In addition to the SSPWC, The International Building Code 2006, International Conference of Building Officials.

1.2 Scope - All work shall be done in accordance with the Standard Specifications except as may be modified by the specifications outlined below. The work done under these specifications shall include clearing, stripping, removal of unsuitable material, excavation and preparation of natural soil, placement and compaction of on-site and/or imported fill material, or as specifically referred to in the plans or specifications.

1.3 Geotechnical Engineer - When used herein, Geotechnical Engineer shall mean the engineer or a representative under the engineer's supervision. The work covered by these specifications shall be inspected by a Geotechnical Engineer, who shall be retained by the Owner. The Geotechnical Engineer will be present during the site preparation and grading to inspect the work and to perform the tests necessary to evaluate material quality and compaction. The Geotechnical Engineer shall submit a report to the Owner, including a tabulation of all tests performed.

1.4 Soils Report - A "Geotechnical Investigation" report, prepared by Summit Engineering Corporation, is available for review and may be used as a reference to the surface and subsurface soil and groundwater conditions on this project. The Contractor shall make his own interpretation with regards to the methods and equipment necessary to perform the excavations.

1.5 Percent Relative Compaction - Where referred to herein, percent relative compaction shall mean the in-place dry unit weight of soil expressed as a percentage of the maximum dry unit weight of the same material, as determined by ASTM D 1557, laboratory compaction test procedure. Optimum moisture content is the moisture content corresponding to the maximum dry density determined by ASTM D 1557.

2.0 SITE PREPARATION AND EARTHWORK

2.1 All earthwork and site preparation should be performed in accordance with the requirements of this report and attached specifications, and the Standard Specifications.

2.2 Clearing - Areas to be graded shall be cleared of brush and debris. These materials shall be removed from the site and discarded by an acceptable means approved by the owner.

2.3 Stripping - Surface soils containing roots and organic matter shall be stripped from areas to be graded and stockpiled or discarded as specified by the plans and specifications or at the discretion of the owner. Strippings may be used as the final lift of fill for areas to be planted.

2.4 Dust Control - The contractor shall prevent and maintain control of all dust generated during construction in compliance with all federal, state, and county regulations. The project specifications should include an indemnification by the contractor of the engineer and owner for all dust generated during the entire construction period.

2.5 Materials - All material not suitable for use as structural fill, shall be removed from the sites by the Contractor, or placed in non-structural fill areas. The Geotechnical Engineer shall determine the suitability of material for reuse as structural fill.

2.6 Ground Surface - The ground surface exposed by stripping and/or excavation shall be scarified to a minimum depth of 12 inches, moisture conditioned, by aerating or adding water, to within 2 percent of optimum moisture content and compacted to 90 percent relative compaction, unless otherwise specified. Compaction of the ground surface shall be approved by the Geotechnical Engineer prior to placement of fill, structural fill, aggregate base, and/or Portland cement concrete.

3.0 FILL MATERIAL

3.1 Fill material shall be free of perishable, organic material. Rock used in the fill shall be placed in such a manner that no voids are present, either between or around the rock, after compacting the layer.

3.2 Structural Fill Material - Material shall consist of suitable non-expansive soils having a plasticity index 15 or less, and a minimum R-value of 30. The gradation requirements shall be as follows:

Sieve Sizes	Percentage Passing (by weight)
4"	100
3/4"	70 - 100
#40	15 - 50
#200	10 - 30

Materials not meeting the above requirements may be suitable for use as structural cap material at the discretion of the Geotechnical Engineer. Samples of imported fill proposed for use as structural cap material shall be submitted to the Geotechnical Engineer and approved before it is delivered to a site.

3.3 Rock Fill - Fill material containing over 30 percent (by weight) of rock larger than 3/4 inches in greatest dimension is defined as rock fill. Rock Fill located five or more feet below finished grade may be constructed in loose lifts up to the maximum size of the rock in the material but not exceeding diameters of 18 inches. The voids around the rock in each rock fill lift shall be filled with granular material and fines and compacted to the satisfaction of the Geotechnical Engineer. Rocks larger than 18 inches in diameter shall be placed in non-structural areas or in deep fills at the discretion of the Geotechnical Engineer. Care should be taken to fill all voids with finer grained materials. No nesting of larger rocks shall be allowed. Rock fill shall not be used for slab-on-grade construction without the approval of the Geotechnical Engineer. The maximum allowable particle size shall be decreased by the Geotechnical Engineer if the achieved compaction is not satisfactory to the Geotechnical Engineer or “nesting” is observed by the Geotechnical Engineer.

4.0 EARTHWORK AND FILL PLACEMENT

4.1 Placement - Fill material shall be placed in layers that shall not exceed 8 inches in compacted thickness, unless otherwise approved by the Geotechnical Engineer. Each layer shall be evenly spread and moisture conditioned to within 2 percent of optimum moisture content. Unless otherwise specified, each layer of earth fill shall be compacted to 90 percent relative compaction. Compaction shall be approved by the Geotechnical Engineer. Rock fill shall be placed in accordance with the appropriate sections of the Standard Specifications. Rock fill placement and compaction shall be approved by the Geotechnical Engineer. Full time inspection of fill placement is required in structural areas unless otherwise approved by the Engineer.

4.2 Keyways - Where the fill extends onto native slopes with gradients greater than 5:1, the fill shall be keyed into the native soils. The keys will have a minimum width of equipment width or 10 feet, whichever is lesser, and constructed with a minimum 5 percent slope into the hillside.

4.3 Compaction Equipment - The Contractor shall provide and use equipment of a type and weight suitable for the conditions encountered in the field. The equipment shall be capable of obtaining the required degree of compaction in all areas including those that are inaccessible to ordinary rolling equipment.

4.4 Reworking - When, in the judgment of the Geotechnical Engineer, sufficient compaction effort has not been used, or where the field density tests indicate that the required compaction or moisture content has not been obtained, subgrade and/or fill materials shall be reworked and compacted as needed to obtain the required density and moisture content. This reworking shall be accomplished prior to the placement of fill, structural fill, aggregate base, and/or Portland cement concrete.

4.5 Unstable Areas - If pumping or other indications of instability are noted, fill and/or subgrade materials shall be evaluated by the Geotechnical Engineer, scarified, left to dry, and recompacted or removed and replaced as needed to obtain the required density and moisture content. This work shall be accomplished prior to the placement of fill, structural fill, aggregate base, and/or Portland cement concrete.

4.6 Frozen Materials – Fill shall not be placed on frozen materials, nor shall frozen material be utilized as fill.

5.0 EXCAVATION AND SLOPE REQUIREMENTS

5.1 Finished cut slopes shall not exceed 2 horizontal to 1 vertical and fill slopes should not exceed ratios of 2 horizontal to 1 vertical. Slopes steeper than three horizontal to one vertical or more than ten feet in height should be protected from erosion using riprap, vegetation, or a similar designated and acceptable means meeting the applicable standards.

5.2 Temporary, unsupported construction slopes less than ten feet in height may stand at a slope as steep as 1½:1 (H:V) provided that the length of the unsupported slope does not exceed twenty feet. These temporary slopes should not remain unsupported for extended periods of time.

6.0 UTILITY TRENCH BACKFILL

6.1 Bedding Material - Bedding material shall meet one of the following gradation requirements listed below and shall be nonplastic:

Bedding will require import to meet one of the following specifications:

	CLASS A BACKFILL	**CLASS B BACKFILL**	**CLASS C BACKFILL**
SIEVE SIZE	% PASSING	%PASSING	% PASSING
1”	-	-	100
¾”	-	-	90-100
½”	-	100	-
3/8”	100	-	10-55
	CLASS A BACKFILL	**CLASS B BACKFILL**	**CLASS C BACKFILL**
SIEVE SIZE	% PASSING	%PASSING	% PASSING
#4	90-100	0-15	0-10
#50	10-40	-	-
#100	3-20	-	-
#200	0-15	0-3	-

Bedding as defined in this report shall be within 6 inches of the bottom of the pipe, within 12 inches of the sides of the pipe, and within 12 inches, or to a depth required from the top of the pipe to the top of the groundwater table, whichever is greater, over the pipe. Where groundwater is encountered, filter fabric or filter material shall encapsulate the bedding, if Class B or Class C backfill is utilized. The filter fabric shall be a 10 oz./sq. yd. nonwoven geotextile.

Individual utility companies may have additional specifications, which should also be followed.

6.2 Placement and Compaction - Bedding material shall first be placed so that the pipe is supported for the full length of the barrel with full bearing on the bottom segment of the pipe equal to a minimum of 0.4 times the outside diameter of the barrel. Bedding shall also extend to one foot above the top of the pipe. Pipe bedding within 6 inches of the pipe shall be placed in thin layers not exceeding 8 inches in loose thickness, conditioned to the proper moisture content for compaction. Class A backfill shall be compacted to at least 90 percent relative compaction. Class B and/or C backfill shall be compacted to the satisfaction of the Geotechnical Engineer. All other trench backfill shall be placed in thin layers not exceeding 8 inches in loose thickness, conditioned to within 2 percent of optimum moisture content, and compacted as required for adjacent fill, or if not specified, to at least 90 percent compaction in areas under structures, utilities, roadways, parking areas, and concrete flatwork.

6.3 Drain Rock - Any necessary subsurface drainage systems shall use drain rock conforming to the following Class C gradation:

Sieve Sizes	Percentage Passing (by weight)
1"	100
3/4"	90-100
3/8"	10-55
#4	0-10

7.0 CONCRETE SLAB-ON-GRADE AND FLATWORK CONSTRUCTION

7.1 Slab-on-grade - When used in this report, slab-on-grade shall refer to all interior concrete

floors.

7.2 Concrete flatwork - A general term, flatwork refers to all exterior concrete site work including sidewalks, driveways, curb and gutters, and patios.

7.3 Subgrade - The upper twelve inches of subgrade beneath the aggregate base under concrete flatwork and slabs-on-grade shall be scarified, moisture conditioned to within 2 percent of optimum moisture content, and compacted to 90 percent relative compaction. Compaction shall be approved by the Geotechnical Engineer.

7.4 Concrete Mix Design - The contractor shall submit a concrete mix design to the Geotechnical Engineer for review and approval at least 1 week prior to placement of any concrete. The exterior concrete mix design shall utilize a minimum of 6 sacks of Type V Portland Cement Concrete and a maximum water cement ratio of 0.45. Exterior concrete shall also meet the following specifications:

Minimum 28 day compressive strength = 4500 psi.
Air content = 4.5 – 7.5%
Maximum slump = 4 inches

Admixtures - All admixtures incorporated in the mix design shall be approved by the Geotechnical Engineer.

Finishing - All finishing shall be done in the absence of bleed water. No water shall be
added to placed concrete during finishing.

7.5 Overexcavation - If encountered, expansive soils within two feet of flatwork or three feet of slab-on-grade shall be overexcavated. Overexcavations should extend at least two feet laterally beyond the edge of the flatwork/slab-on-grade section.

7.6 Base - Base material shall be compacted to 95 percent relative compaction. Compaction shall be approved by the Geotechnical Engineer. Type II Class B Aggregate Base meeting

the following requirements shall be used:

Gradation Requirements

Sieve Size	Percentage Passing (by weight)
1"	100
3/4"	90-100
#4	35-65
#16	15-40
#200	2-10

Plasticity Index should meet the following requirements:

Percentage Passing #200 (by weight)	Plasticity Index Maximum
0.1 to 3.0	15
3.1 to 4.0	12
4.1 to 5.0	9
5.1 to 8.0	6
8.0 to 11.0	4

Other Requirements

R-value	Minimum of 70
Fractured faces	Minimum of 35%
LA Abrasion	Maximum of 45%
Liquid Limit	Maximum of 35%

7.7 Concrete slab-on-grade thickness and compressive strength requirements shall be in accordance with design criteria provided by the Structural Engineer. Minimum slab thickness and compressive strength for flatwork shall be in accordance with the applicable requirements.

7.8 Concrete work shall conform to all requirements of ACI 301-84, Specifications for Structural Concrete for Buildings, except as modified by supplemental requirements.

7.9 To facilitate curing of the slab, base materials shall be kept moist until placement of the concrete.

7.10 Excessive slump (high water cement ratio) of the concrete and/or improper curing procedures used during hot or cold weather could lead to excessive shrinkage, cracking or curling of slabs and other flatwork.

8.0 STRUCTURAL ROAD SECTION

8.1 Material and Procedure –The native subgrade soils for the proposed roadway consist of silty sands with gravel and produced and produced CBR values shown in Table B-2. Preliminary traffic estimates were provided for this project by Hatch Engineering. A recommended minimum structural section of 4-inches of Type II (3/4 inch nominal aggregate size) Asphalt shall be used over a layer of 6-inches of Type II Aggregate Base over 12 inches of properly prepared native subgrade material. The Type II Asphalt and the Aggregate Base material should be moisture conditioned to within 2 percent of optimum and compacted in accordance with the technical specifications.

8.2 Subgrade Preparation - After completion of the utility trench backfill and prior to the placement of aggregate base, the upper 12 inches of finished subgrade soil or structural fill material shall be moisture conditioned to at within 2 percent of optimum and compacted to at least 90 percent. This will require scarifying, moisture conditioning and compacting.

8.3 Aggregate Base Rock - After the subgrade and/or structural fill is properly prepared, the aggregate base material shall be placed uniformly on the approved areas. Aggregate base shall be placed in such a manner as to prevent segregation of the different sizes of material and any such segregation, unless satisfactorily corrected, shall be cause for rejection at the discretion of the Geotechnical Engineer. The aggregate base material shall be spread for compaction in layers not to exceed six inches; moisture conditioned to within 2 percent of optimum, and compacted to at least 95 percent compaction. Aggregate base materials shall meet the requirements of Section 200.01.03 of the "Standard Specifications, 2007" for Type 2, Class B Aggregate Base. The aggregate base materials shall be approved by the geotechnical Engineer.

APPENDIX B

STRUCTURAL ROAD SECTION

BARRICK GOLDSTRIKE MINES
PRECIOUS METALS RECOVERY PROJECT

ESALS

Vehicle Type	Daily Traffic Count	Number of Vehicles/Year	Number of Vehicles/Year in Design Lane	Truck Factor	Growth Factor	ESAL
Passenger cars	4	1460	1460	0.006	24.3	213
Single-Unit Trucks						
Single Unit 2 Axle, 4 tire	2.3	840	840	0.189	24.3	3856
5000 US Gallon 3-axle tanker truck						
5000 Gallon Truck	2.3	840	840	4.51	24.3	92003
				Total ESAL		**96,072**

Key Assumptions
Truck Factor for 5000G truck based on 20000lb front axle and 46000lb rear tandem axle
20 year design @ 2% growth
Traffic in Design Lane 100%

1993 AASHTO Pavement Design

DARWin Pavement Design and Analysis System

A Proprietary AASHTOWare
Computer Software Product
Summit Engineering

Flexible Structural Design Module

Barrick Goldstrick Mines
Precious Metals Recovery Project
General Road Section

Flexible Structural Design

18-kip ESALs Over Initial Performance Period	96,072
Initial Serviceability	4.2
Terminal Serviceability	2
Reliability Level	0.85 %
Overall Standard Deviation	0.45
Roadbed Soil Resilient Modulus	5,400 psi
Stage Construction	1
Calculated Design Structural Number	1.47 in

Specified Layer Design

Layer	Material Description	Struct Coef. (Ai)	Drain Coef. (Mi)	Thickness (Di)(in)	Width (ft)	Calculated SN (in)
1	AC	0.4	1	4	12	1.60
2	BASE	0.12	1	6	12	0.72
Total	-	-	-	10.00	-	2.32

APPENDIX C

WENNER 4-POINT SOILS RESISTIVITY CHART

SUMMIT ENGINEERING CORPORATION™
Engineering The West Since 1978.

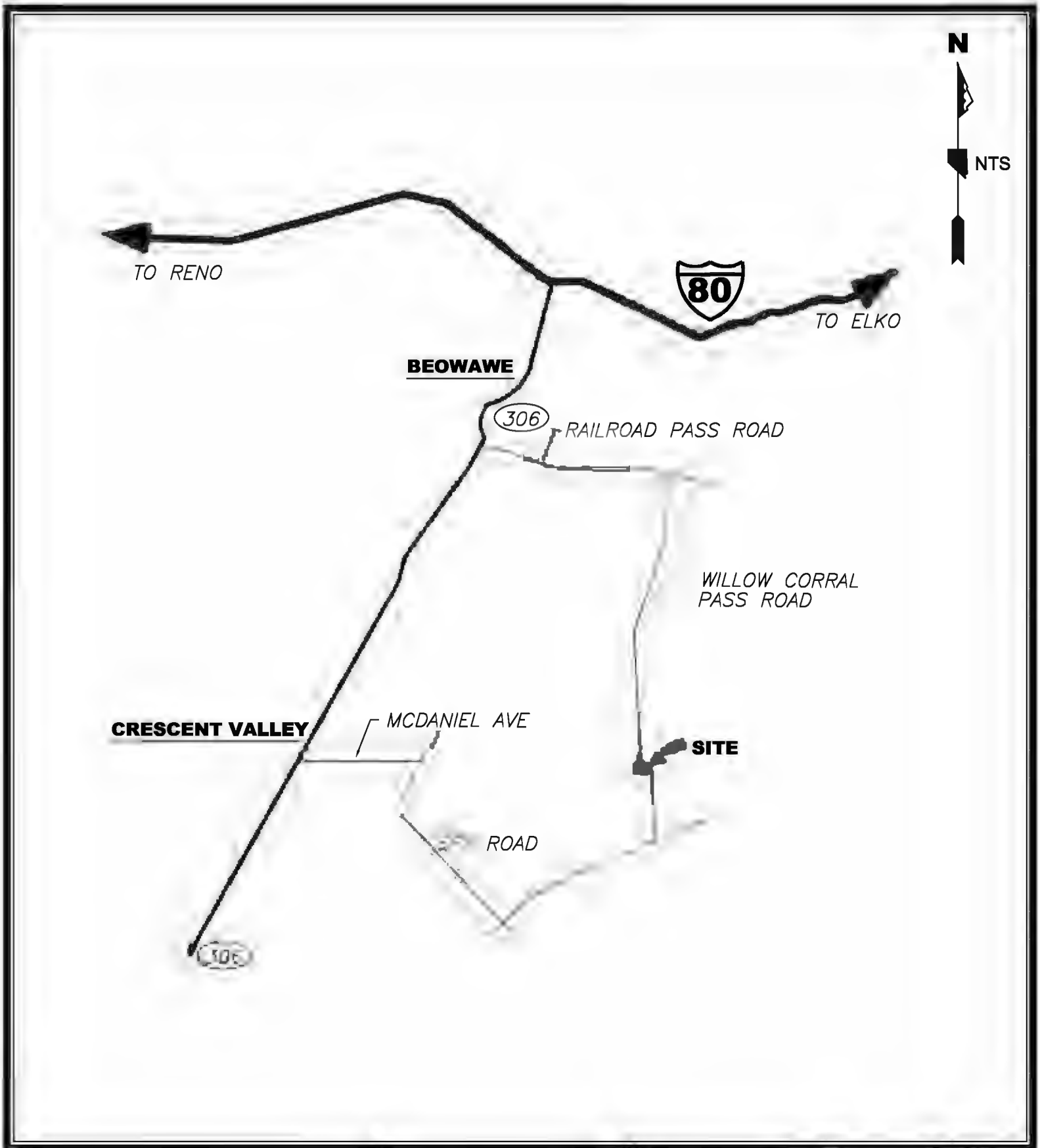
Soil Resistivity Measurement Form

Project: Barrick PMR
Owner: Barrick
Engineer: Summit Engineering
Test completed by: Josh
Calculation:

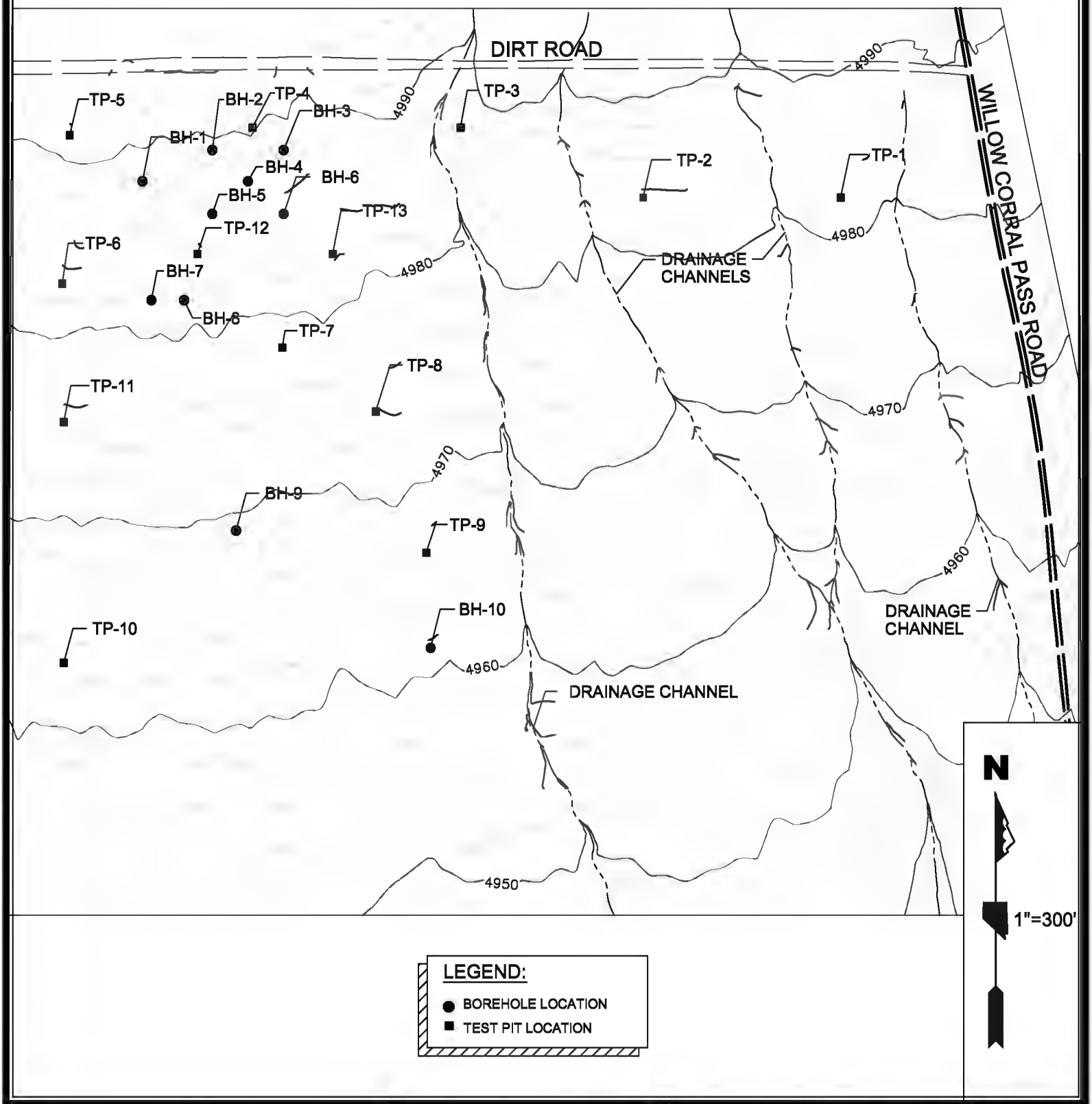
Date of Test: 8/9/2012
Weather Condtions: Clear/ Hot
Soil Conditions: Dry Native Material
Test Method: Werner
Location: Test origin @ TP-12, Vector 1 direction due North, Vector 2 direction due East, Vector 3 direction due North East

Test Location	Probe (P1, P2, P3, P4) Spacing (ft)	Meter Reading (Ω)	Calculated Soil Resistivity (Ω-m)
1	5	4.37	41.9
1	10	1.97	37.7
1	15	1.22	35.2
1	20	0.86	32.8
1	25	0.58	27.7
2	5	5.26	50.4
2	10	2.01	38.5
2	15	1.05	30.1
2	20	0.71	27.1
2	25	0.59	28.4
3	5	5.17	49.5
3	10	2.03	38.8
3	15	1.16	33.2
3	20	0.77	29.6
3	25	0.62	29.5

SHEETS



VICINITY MAP BARRICK PMR PROJECT CRESCENT VALLEY, NEVADA	JOB NO.: 29586 APPR.: JKG BY: CB Copyright SUMMIT ENG 2012	SUMMIT ENGINEERING CORPORATION 5405 MAE ANNE AVE. RENO, NV. 89523	SHEET 1 OF 51
N: MAP.DWG ~ 9:04 AM * 16-OCT-2012			



SITE MAP
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

JOB NO.: 29586
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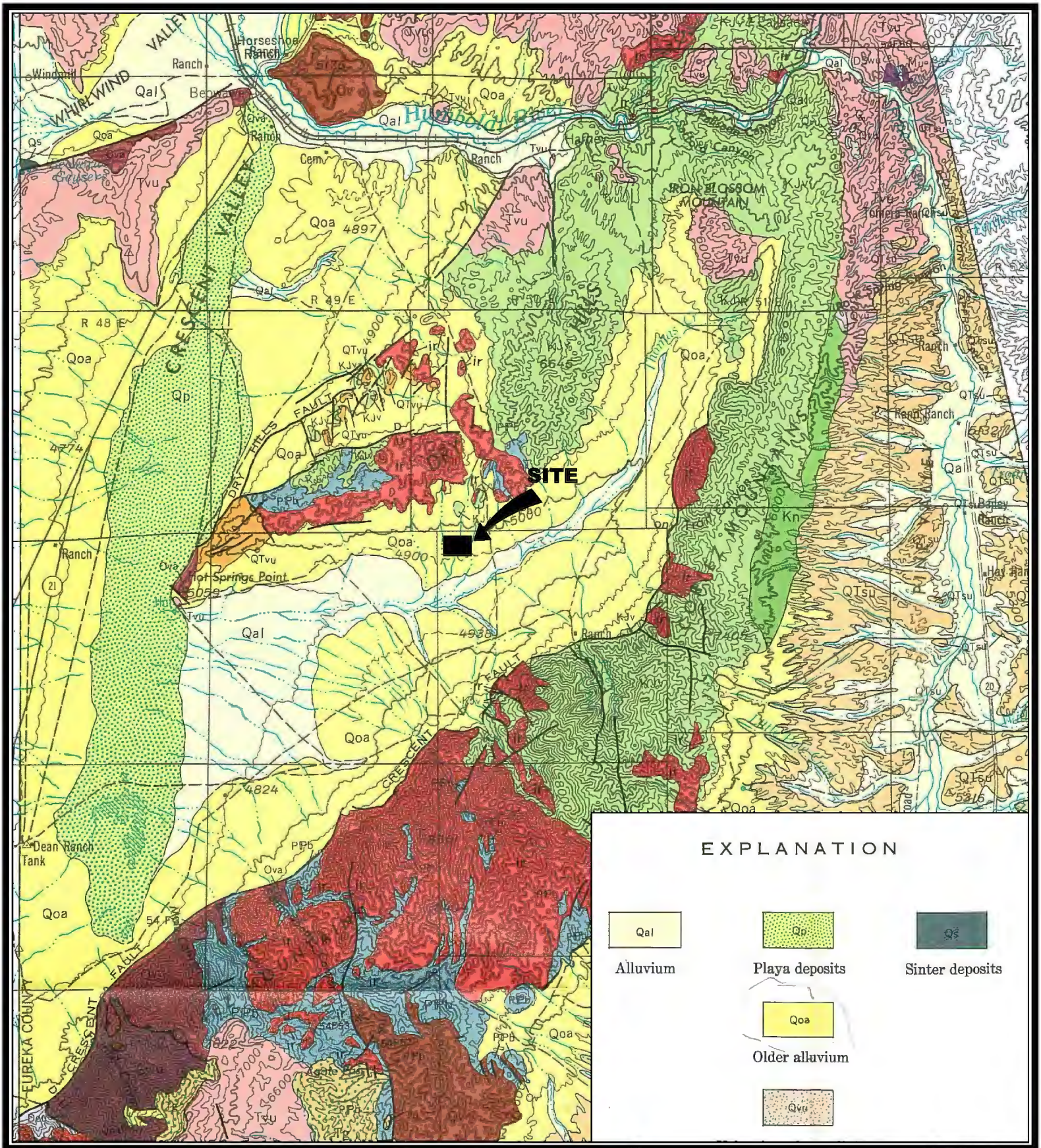

GEOLOGY MAP
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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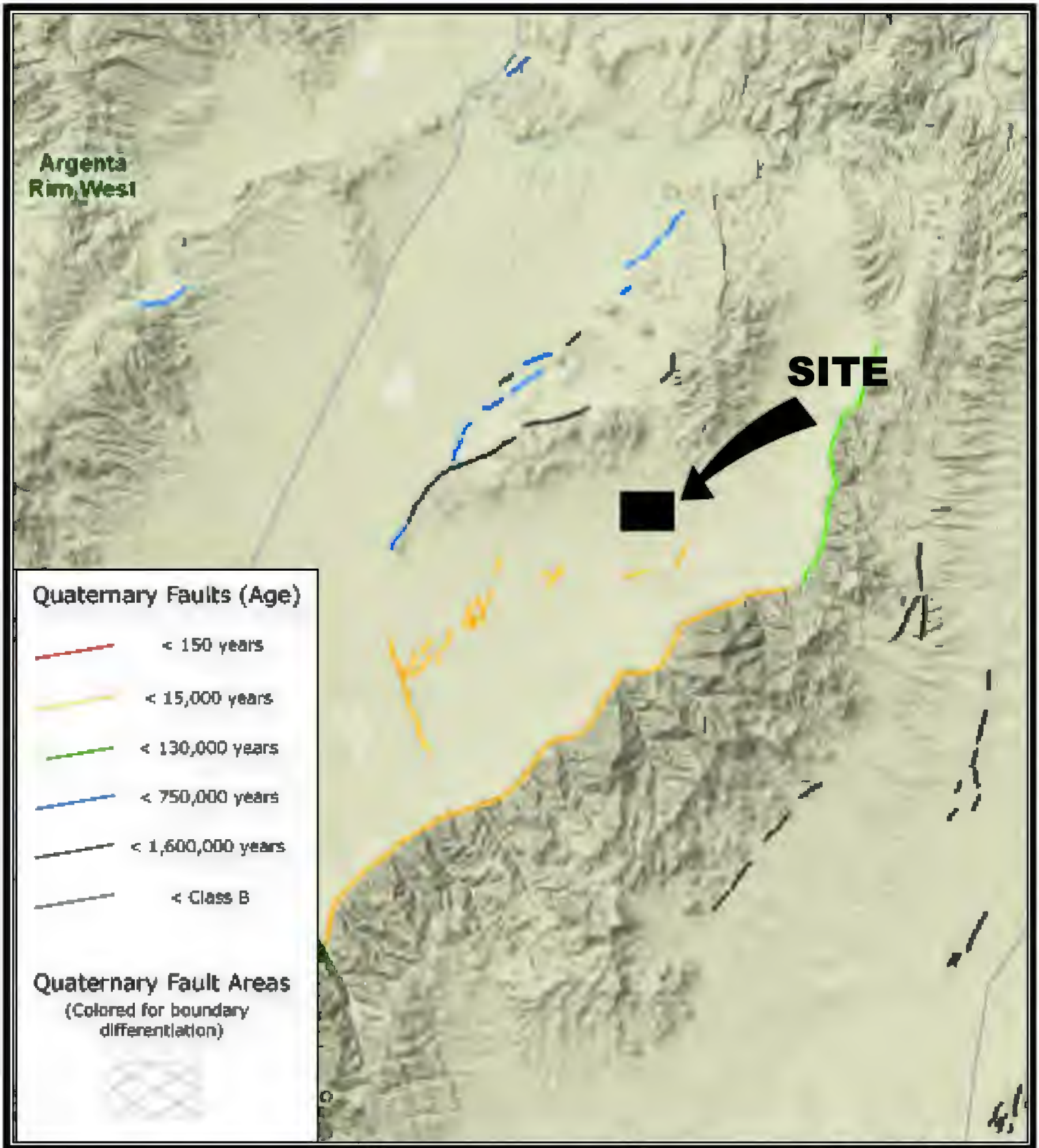

FAULT MAP
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LOG OF BH-1

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV. 4988.5

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
						19		CL-ML	0.0'-5.0': SANDY SILTY CLAY WITH GRAVEL; TAN, DRY, MEDIUM DENSE, ESTIMATED 55% LOW PLASTICITY FINES, 30% FINE TO COARSE SAND, 15% GRAVEL
				5					
4	18.8	8.8				41		SC-SM	5.0'-10.0': SILTY, CLAYEY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, APPROXIMATED 20% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 30% GRAVEL
						44			
				10					
34	21.4	5.3				35		SC	10.0'-12.5': CLAYEY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, MEDIUM DENSE TO VERY DENSE, APPROXIMATED 20% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 30% GRAVEL
34	21.4	5.3				53		GC	12.5'-30.0': CLAYEY GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, MEDIUM DENSE TO VERY DENSE, APPROXIMATED 15% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 45% GRAVEL
				15		34			
				20		43			
				25		41			
				30		29		ML	30.0'-35.0': SILTY SAND; TAN, SLIGHTLY MOIST, MEDIUM DENSE, ESTIMATED 65% LOW PLASTICITY FINES, 35% FINE TO COARSE SAND, NO GRAVEL
				35					

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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EQUIPMENT: CME 75

DATE: 8/13/12 ELEV. 4988.5

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT		
					X	41	SM	35.0'-40.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 20% GRAVEL
				40	X	72	SP	40.0'-50.0': POORLY GRADED SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED NO FINES, 50% FINE TO COARSE SAND, 50% GRAVEL
				45	X	50		
				50	X	52	SP	50.0'-55.0': POORLY GRADED SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED NO FINES, 70% FINE TO COARSE SAND, 30% GRAVEL
				55	X	37	SP-SM	50.0'-65.0': POORLY GRADED SAND WITH SILT AND GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 10% FINES, 70% FINE TO COARSE SAND, 20% GRAVEL
				60	X	47		
				65	X	62	SM	65.0'-70.0': SILTY SAND WITH GRAVEL; TAN-RED, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 25% FINES, 50% FINE TO COARSE SAND, 25% GRAVEL
				70				

BOREHOLE LOG
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EQUIPMENT: CME 75

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PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
					X	56		SM	70.0'-75.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				75	X	67		SP	75.0'-80.0': POORLY GRADED SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED NO FINES, 50% FINE TO COARSE SAND, 50% GRAVEL
				80	X	85		SM	80.0'-85.0': SILTY SAND; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 25% FINES, 65% FINE TO COARSE SAND, 10% GRAVEL
				85	X	63		SP	85.0'-90.0': POORLY GRADED SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 5% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 45% GRAVEL
				90	X	30		SM	90.0'-100.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, MEDIUM TO VERY DENSE, ESTIMATED 20% LOW TO MEDIUM PLASTICITY FINES, 60% FINE TO COARSE SAND, 20% GRAVEL
				95	X	82			
				100	X	54		SP	100.0'-101.5': POORLY GRADED SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED NO FINES, 70% FINE TO COARSE SAND, 30% GRAVEL
				105					BOTTOM OF HOLE @ 150' NO GROUND WATER ENCOUNTERED SAMPLES NOT TAKEN FROM 101.5' TO 150' AS PER SPECS

BOREHOLE LOG
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EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
								ML	0.0'–5.0': SANDY SILT; TAN, DRY, MEDIUM DENSE, APPROXIMATED 50% LOW PLASTICITY FINES, 45% FINE TO COARSE SAND, 5% GRAVEL
2	51.3	6.4			X	19			
				5	X	29		SP-SM	5.0'–7.5': POORLY GRADED SAND WITH SILT AND GRAVEL; LIGHT BROWN, DRY, MEDIUM DENSE, ESTIMATED 10% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 30% GRAVEL
					X	46		SM	7.5'–15.0': SILTY SAND WITH GRAVEL; LIGHT BROWN, SLIGHTLY MOIST, MEDIUM DENSE TO DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 55% FINE TO COARSE SAND, 30% GRAVEL
				10	X	46			
					X	26			
				15	X	21		SM	15.0'–20.0': SILTY SAND; BROWN WITH SMALL TRACES OF DARK RED, MOIST, MEDIUM DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 10% GRAVEL
				20	X	50		SM	20.0'–25.0': SILTY SAND WITH GRAVEL; LIGHT BROWN, MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				25	X	37		SP-SM	25.0'–30.0': POORLY GRADED SAND WITH SILT AND GRAVEL; LIGHT BROWN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST, DENSE, ESTIMATED 10% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 30% GRAVEL
1	15.9	3.4		30	X	49		SM	30.0'–35.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, APPROXIMATED 15% LOW PLASTICITY FINES, 55% FINE TO COARSE SAND, 30% GRAVEL
				35					

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BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
					X	46		SM	35.0'-40.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE TO VERY DENSE, ESTIMATED 15% NON-PLASTIC FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				40	X	55		ML	40.0'-45.0': SANDY SILT WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 40% NON-PLASTIC FINES, 30% FINE TO COARSE SAND, 30% GRAVEL
				45	X	42		SM	45.0'-50.0': SILTY SAND WITH GRAVEL; BROWN, MOIST, DENSE, ESTIMATED 15% NON-PLASTIC FINES, 50% FINE TO COARSE SAND, 35% GRAVEL
				50	X	46		SM	50.0'-51.5': SILTY SAND WITH GRAVEL; LIGHT BROWN, SLIGHTLY MOIST, DENSE, ESTIMATED 15% NON-PLASTIC FINES, 65% FINE TO COARSE SAND, 20% GRAVEL
				55					
				60					
				65					BOTTOM OF HOLE @ 51.5' NO GROUND WATER ENCOUNTERED
				70					

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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LOG OF BH-3

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
								SM	0.0'–2.5': SILTY SAND; TAN, DRY, LOOSE, ESTIMATED 50% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 10% GRAVEL
					X	36		SM	2.5'–5.0': SILTY SAND WITH GRAVEL; LIGHT BROWN, SLIGHTLY MOIST, DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 15% GRAVEL
				5	X	32		SP-SC	5.0'–10.0': POORLY GRADED SAND WITH SILTY CLAY AND GRAVEL; LIGHT BROWN, SLIGHTLY MOIST, DENSE, ESTIMATED 10% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 25% GRAVEL
					X	41			
21	18.9	5.5		10	X	78		SC	10.0'–15.0': CLAYEY SAND WITH GRAVEL; BROWN WITH MINOR LENSES OF WHITE, MOIST, VERY DENSE, ESTIMATED 30% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 20% GRAVEL
					X	66			
				15	X	45		SM	15.0'–25.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE TO VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				20	X	69			
				25	X	34		SP-SC	25.0'–30.0': POORLY GRADED SAND WITH SILTY CLAY AND GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 10% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 20% GRAVEL
				30	X	46		SM	30.0'–35.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				35					

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CRESCENT VALLEY, NEVADA

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EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
					X	68		SM	35.0'-40.0': SILTY SAND WITH GRAVEL; TAN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% NON-PLASTIC FINES, 65% FINE TO COARSE SAND, 20% GRAVEL
				40	X	72		SP-SM	40.0'-45.0': POORLY GRADED SAND WITH GRAVEL; TAN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 10% NON-PLASTIC FINES, 70% FINE TO COARSE SAND, 20% GRAVEL
				45	X	95		SP	45.0'-50.0': POORLY GRADED SAND WITH GRAVEL; TAN TO BROWN, MOIST, VERY DENSE, ESTIMATED 10% NON-PLASTIC FINES, 60% FINE TO COARSE SAND, 30% GRAVEL
				50	X	78		SM	50.0'-61.5': SILTY SAND WITH GRAVEL; TAN, MOIST, VERY DENSE, ESTIMATED 10% NON-PLASTIC FINES, 65% FINE TO COARSE SAND, 25% GRAVEL
				55					
				60					
				65					BOTTOM OF HOLE @ 51.5' NO GROUND WATER ENCOUNTERED
				70					

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

JOB NO.: 29586
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LOG OF BH-4

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV. 4981.6

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
						43		ML	0.0'-5.0': SANDY SILT WITH MINOR GRAVELS; TAN, DRY, DENSE, ESTIMATED 25% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 15% GRAVEL
				5		63		SP	5.0'-12.5': POORLY GRADED SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE TO VERY DENSE, ESTIMATED NO FINES, 50% FINE TO COARSE SAND, 50% GRAVEL
						49			
				10		38			
						71		SP-SC	12.5'-15.0': POORLY GRADED SAND WITH SILTY CALY AND GRAVEL; TAN TO RED, SLIGHTLY MOIST, DENSE, ESTIMATED 5% FINES, 50% FINE TO COARSE SAND, 45% GRAVEL
				15				SC	15.0'-25.0': C:AYEY SAND WITH GRAVEL; TAN TO REDISH TAN, SLIGHTLY MOIST, VERY DENSE, APPROXIMATED 15% FINES, 45% FINE TO COARSE SAND, 40% GRAVEL
8	13.6	4.0				76			
				20		78			
				25		40		SC-SM	25.0'-35.0': SILTY, CLAYEY SAND WITH MINOR GRAVEL; TAN TO REDISH TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 35% FINES, 50% FINE TO COARSE SAND, 15% GRAVEL
				30		46			
				35					

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

JOB NO.: 29586
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BY: KH

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LOG OF BH-4

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV. 4981.6

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
					X	30		SM	35.0'-40.0': SILTY SAND WITH MINOR GRAVEL; TAN TO RED, SLIGHTLY MOIST, DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 20% GRAVEL
				40	X	51		SM	40.0'-45.0': SILTY SAND; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 75% FINE TO COARSE SAND, 10% GRAVEL
				45	X	34		SC	45.0'-55.0': CLAYEY SAND; TAN, SLIGHTLY MOIST, MEDIUM DENSE, ESTIMATED 35% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 5% GRAVEL
				50	X	44			
				55	X	92		SC-SM	55.0'-60.0': SILTY, CLAYEY SAND WITH GRAVEL; TAN TO RED, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% MEDIUM PLASTICITY FINES, 50% FINE TO COARSE SAND, 35% GRAVEL
				60	X	65		SM	60.0'-65.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST TO DRY, VERY DENSE, ESTIMATED 15% LOW TO MEDIUM PLASTICITY FINES, 60% FINE TO COARSE SAND, 25% GRAVEL
				65	X	41		SM	65.0'-70.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST TO DRY, DENSE, ESTIMATED 15% MEDIUM PLASTICITY FINES, 65% FINE TO COARSE SAND, 20% GRAVEL
				70					

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

JOB NO.: 29586
APPR BY: JKG
BY: KH

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5405 MAE ANNE AVE. RENO, NV. 89523

LOG OF BH-4

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV. 4981.6

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
					X	66		SP-SM	70.0'-75.0': POORLY GRADED SAND WITH SILT AND GRAVEL; TAN, DRY, VERY DENSE, ESTIMATED 10% LOW PLASTICITY FINES, 55% FINE TO COARSE SAND, 35% GRAVEL
				75	X	34		SM	75.0'-80.0': SILTY SAND; TAN TO RED, SLIGHTLY MOIST, DENSE, ESTIMATED 35% MEDIUM PLASTICITY FINES, 65% FINE TO COARSE SAND, NO GRAVEL
				80	X	68		SM	80.0'-85.0': SILTY SAND WITH GRAVEL; TAN TO RED, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 20% MEDIUM PLASTICITY FINES, 55% FINE TO COARSE SAND, 25% GRAVEL
				85	X	50/3		SM	85.0'-90.0': SILTY SAND WITH GRAVEL; PINK, DRY, VERY DENSE, ESTIMATED 25% MEDIUM PLASTICITY FINES, 60% FINE TO COARSE SAND, 55% GRAVEL
				90	X	45/3		SP	90.0'-95.0': POORLY GRADED SAND WITH GRAVEL; PINK, DRY, VERY DENSE, ESTIMATED NO FINES, 50% FINE TO COARSE SAND, 50% GRAVEL
1	14.8	10.9		95	X	82		SM	95.0'-101.5': SILTY SAND WITH GRAVEL; TAN, DRY, VERY DENSE, APPROXIMATED N15% FINES, 55% FINE TO COARSE SAND, 30% GRAVEL
				100	X	47/6			
				105					BOTTOM OF HOLE @ 150.0' NO GROUND WATER ENCOUNTERED NO SAMPLES TAKEN FROM 101.5' TO 150' AS PER SPECS

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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LOG OF BH-5

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
								ML	0.0'-2.5': SANDY SILT; TAN, DRY, LOOSE, ESTIMATED 55% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 5% GRAVEL
3	15.9	3.0			X	27		SM	2.5'-5.0': SILTY SAND WITH GRAVEL; LIGHT BROWN, DRY, MEDIUM DENSE, APPROXIMATED 15% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 35% GRAVEL
				5	X	51		SP-SC	5.0'-7.5': POORLY GRADED SAND WITH CLAY AND GRAVEL; LIGHT BROWN WITH MINOR LENSES OF WHITE, DRY, VERY DENSE, ESTIMATED 5% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 20% GRAVEL
13	49.1	8.9			X	28		SC	7.5'-12.5': CLAYEY SAND; BROWN, MOIST, MEDIUM DENSE, APPROXIMATED 50% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 10% GRAVEL
				10	X	24			
					X	38		SP	12.5'-15.0': POORLY GRADED SAND WITH CLAY; TAN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST, DENSE, ESTIMATED 10% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 20% GRAVEL
				15	X	19		SM	15.0'-20.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, MEDIUM DENSE, ESTIMATED 15% NON-PLASTIC FINES, 65% FINE TO COARSE SAND, 20% GRAVEL
				20	X	54		SM	20.0'-25.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% NON-PLASTIC FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				25	X	45		SP-SM	25.0'-30.0': POORLY GRADED SAND WITH GRAVEL; TAN, MEDIUM MOIST, DENSE, ESTIMATED 10% NON-PLASTIC FINES, 70% FINE TO COARSE SAND, 20% GRAVEL
				30	X	46		SP-SM	30.0'-35.0': POORLY GRADED SAND WITH GRAVEL; TAN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST MOIST, DENSE, ESTIMATED 10% NON-PLASTIC FINES, 60% FINE TO COARSE SAND, 30% GRAVEL
				35					

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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LOG OF BH-5

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
					X	52		SM	35.0'-40.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				40	X	56		SM	40.0'-45.0': SILTY SAND WITH GRAVEL; TAN, MEDIUM MOIST, VERY DENSE, ESTIMATED 15% NON-PLASTIC FINES, 65% FINE TO COARSE SAND, 20% GRAVEL
				45	X	63		SM	45.0'-50.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% NON-PLASTIC FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				50	X	40		SM	50.0'-51.5': SILTY SAND WITH GRAVEL; TAN, MOIST, DENSE, ESTIMATED 15% NON-PLASTIC FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				55					
				60					
				65					BOTTOM OF HOLE @ 51.5' NO GROUND WATER ENCOUNTERED
				70					

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

JOB NO.: 29586
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SHEET 16

LOG OF BH-6

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
								ML-CL	0.0'-2.5': SANDY SILTY CLAY; TAN, DRY, LOOSE, ESTIMATED 50% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 10% GRAVEL
					X	24		SC-SM	2.5'-5.0': SILTY, CLAYEY SAND WITH GRAVEL; LIGHT BROWN, DRY, MEDIUM DENSITY, ESTIMATED 30% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 20% GRAVEL
NP	10.1	1.1		5	X	50/2		SM	5.0'-10.0': POORLY GRADED SAND WITH SILT; LIGHT BROWN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST, VERY DENSE, APPROXIMATED 10% NON-PLASTIC FINES, 50% FINE TO COARSE SAND, 40% GRAVEL
					X	27			
				10	X	15		SM	10.0'-15.0': SILTY SAND; BROWN, MOIST, MEDIUM DENSE, ESTIMATED 25% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 5% GRAVEL
					X	22			
8	21.1	7.1		15	X	41		SC	15.0'-20.0': CLAYEY SAND WITH GRAVEL; BROWN, MEDIUM MOIST, DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 20% GRAVEL
				20	X	67		SM	20.0'-25.0': SILTY SAND WITH GRAVEL; LIGHT BROWN, MEDIUM MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 10% GRAVEL
				25	X	52		SM	25.0'-30.0': SILTY SAND WITH GRAVEL; BROWN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 20% GRAVEL
				30	X	43		SM	30.0'-40.0': SILTY SAND WITH GRAVEL; BROWN, SLIGHTLY MOIST, DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 25% GRAVEL
				35					

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CRESCENT VALLEY, NEVADA

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LOG OF BH-6

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT		
					X	50		
				40	X	49	SM	40.0'-45.0': SILTY SAND WITH GRAVEL; BROWN, MOIST, DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 25% GRAVEL
				45	X	47	SP	45.0'-50.0': POORLY GRADED SAND WITH GRAVEL; BROWN, MOIST, DENSE, ESTIMATED 10% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 30% GRAVEL
				50	X	60	SM	50.0'-51.5': SILTY SAND WITH GRAVEL; BROWN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				55				
				60				
				65				
				70				BOTTOM OF HOLE @ 51.5' NO GROUND WATER ENCOUNTERED

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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LOG OF BH-7

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
6	36.4	6.1						SC-SM	0.0'-2.5': SILTY, CLAYEY SAND; TAN, DRY, LOOSE, ESTIMATED 35% LOW PLASTICITY FINES, 55% FINE TO COARSE SAND, 10% GRAVEL
					X	34		SC-SM	2.5'-7.5': SILTY, CLAYEY SAND WITH GRAVEL; TAN, DRY, DENSE, APPROXIMATED 20% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 20% GRAVEL
				5	X	38			
					X	70		SC	7.5'-12.5': CLAYEY SAND WITH GRAVEL; TAN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 25% GRAVEL
				10	X	62			
					X	25		SM	12.5'-20.0': SILTY SAND; BROWN, MOIST, MEDIUM DENSE TO DENSE, ESTIMATED 25% NON-PLASTIC FINES, 70% FINE TO COARSE SAND, 5% GRAVEL
				15	X	43			
				20	X	51		SM	20.0'-25.0': SILTY SAND WITH GRAVEL; LIGHT BROWN, MOIST, VERY DENSE, ESTIMATED 15% NON-PLASTIC FINES, 55% FINE TO COARSE SAND, 30% GRAVEL TO 1"
				25	X	50		SM	25.0'-30.0': SILTY SAND WITH GRAVEL; TAN, MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 55% FINE TO COARSE SAND, 30% GRAVEL UP TO 1"
				30	X	48		SM	30.0'-35.0': SILTY SAND WITH GRAVEL; BROWN, SLIGHTLY MOIST, DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 15% GRAVEL
				35					

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LOG OF BH-7

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
					X	33		SM	35.0'-40.0': SILTY SAND WITH GRAVEL; BROWN, SLIGHTLY MOIST, DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 15% GRAVEL
				40	X	75		SM	40.0'-45.0': SILTY SAND WITH GRAVEL; LIGHT BROWN TO BROWN, SLIGHTLY MOIST, DENSE, ESTIMATED 20% NON-PLASTIC FINES, 50% FINE TO COARSE SAND, 25% GRAVEL
3	18.3	4.7		45	X	72		SM	40.0'-45.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 15% GRAVEL
				50	X	95			
				55					
				60					
				65					
				70					

BOTTOM OF HOLE @ 51.5'
NO GROUND WATER ENCOUNTERED

BOREHOLE LOG
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CRESCENT VALLEY, NEVADA

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LOG OF BH-8

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV. 4982.2

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
						24		SM	0.0'–5.0': SILTY SAND; TAN, DRY, MEDIUM DENSE, ESTIMATED 45% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 5% GRAVEL
				5					
2	25.4	8.0				27		SM	5.0'–7.5': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, MEDIUM DENSE, ESTIMATED 25% LOW PLASTICITY FINES, 55% FINE TO COARSE SAND, 20% GRAVEL
						20		SM	7.5'–12.5': SILTY SAND WITH GRAVEL; TAN TO RED, SLIGHTLY MOIST, MEDIUM DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 55% FINE TO COARSE SAND, 30% GRAVEL
				10		18			
						41		SM	12.5'–20.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE TO VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 25% GRAVEL
				15		69			
				20		52		SC-SM	20.0'–25.0': SILTY, CLAYEY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 45% FINE TO COARSE SAND, 40% GRAVEL
5	30.2	4.7		25		56		SC	25.0'–30.0': CLAYEY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, APPROXIMATED 30% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 30% GRAVEL
				30		44		SC-SM	30.0'–45.0': SILTY, CLAYEY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 40% GRAVEL
				35					

BOREHOLE LOG
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CRESCENT VALLEY, NEVADA

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LOG OF BH-8

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV. 4982.2

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
					X	49			
				40	X	46			
				45	X	48		SC-SM	45.0'-55.0': SILTY, CLAYEY SAND WITH MINOR GRAVEL; TAN, DRY, DENSE TO VERY DENSE, ESTIMATED 30% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 30% GRAVEL
				50	X	93			
				55	X	58		SM	55.0'-65.0': SILTY SAND; TAN, DRY, VERY DENSE, ESTIMATED 25% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 10% MINOR GRAVEL
				60	X	60			
				65	X	29		SM	65.0'-70.0': SILTY SAND WITH GRAVEL; TAN, DRY, MEDIUM DENSE, ESTIMATED 25% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 25% MINOR GRAVEL
				70					

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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LOG OF B-8

EQUIPMENT: CME 75

DATE: 8/13/12

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT					
					X	84				ML	70.0'–75.0': SANDY SILT WITH GRAVEL; TAN TO RED, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 50% LOW PLASTICITY FINES, 15% FINE TO COARSE SAND, 35% GRAVEL
				75	X	55				SM	75.0'–80.0': SILTY SAND WITH GRAVEL; TAN TO LIGHT BROWN, MOIST, VERY DENSE, ESTIMATED 15% NON–PLASTIC FINES, 75% FINE TO COARSE SAND, 15% GRAVEL UP TO ½"
				80	X	56				SM	80.0'–85.0': SILTY SAND; TAN, MOIST, VERY DENSE, ESTIMATED 15% NON–PLASTIC FINES, 75% FINE TO COARSE SAND, 10% GRAVEL UP TO ½"
				85	X	48				SM	85.0'–95.0': SILTY SAND WITH GRAVEL; TAN, MOIST, DENSE TO VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				90	X	55					
				95	X	40				SM	95.0'–101.5': SILTY SAND; TAN, MOIST, DENSE TO VERY DENSE, ESTIMATED 20% NON–PLASTIC FINES, 70% FINE TO COARSE SAND, 10% GRAVEL
				100	X	50					
				105							BOTTOM OF HOLE @ 150' NO GROUND WATER ENCOUNTERED NO SAMPLES TAKEN FROM 101.5' TO 150' PER THE SPECS

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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LOG OF BH-9

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
								ML	0.0'–2.5': SANDY SILT; TAN, DRY, LOOSE, ESTIMATED 50% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 10% GRAVEL
					X	19		SM	2.5'–5.0': SILTY SAND WITH GRAVEL; LIGHT BROWN, MEDIUM DENSITY, DRY, ESTIMATED 35% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 25% GRAVEL
				5	X	82		SM	5.0'–7.5': SILTY SAND WITH GRAVEL; BROWN, VERY DENSE, DRY, ESTIMATED 15% LOW PLASTICITY FINES, 45% FINE TO COARSE SAND, 40% GRAVEL UP TO 1.5"
					X	57		SM	7.5'–10.0': SILTY SAND WITH GRAVEL; BROWN, VERY DENSE, SLIGHTLY MOIST, ESTIMATED 15% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 25% GRAVEL
				10	X	51		SM	10.0'–12.5': SILTY SAND WITH GRAVEL; BROWN, VERY DENSE, MEDIUM MOIST, ESTIMATED 15% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 30% GRAVEL
					X	45		SM	12.5'–15.0': SILTY SAND; BROWN, DENSE, MEDIUM MOIST, ESTIMATED 15% LOW PLASTICITY FINES, 80% FINE TO COARSE SAND, 5% GRAVEL
				15	X	42		SM	15.0'–20.0': SILTY SAND WITH GRAVEL; BROWN, DENSE, MEDIUM MOIST, ESTIMATED 15% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 25% GRAVEL
				20	X	33		SM	20.0'–25.0': SILTY SAND; BROWN, DENSE, MOIST, ESTIMATED 25% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 10% GRAVEL
				25	X	49		SP	25.0'–30.0': POORLY GRADED SAND WITH GRAVEL; TAN WITH MINOR LENSES OF WHITE, DENSE, SLIGHTLY MOIST, ESTIMATED 10% LOW PLASTICITY FINES, 75% FINE TO COARSE SAND, 15% GRAVEL
				30	X	43		SM	30.0'–35.0': SILTY SAND WITH GRAVEL; TAN, DENSE, MEDIUM MOIST, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				35					

BOREHOLE LOG
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CRESCENT VALLEY, NEVADA

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LOG OF BH-9

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
					X	46		SM	35.0'-40.0': SILTY SAND; LIGHT BROWN, SLIGHTLY MOIST, DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 75% FINE TO COARSE SAND, 5% GRAVEL
				40					
4	57.1	7.6			X	31		ML	40.0'-45.0': SANDY SILT; TAN, SLIGHTLY MOIST, DENSE, APPROXIMATED 60% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, NO GRAVEL
				45					
					X	52		SM	45.0'-50.0': SILTY SAND WITH GRAVEL; TAN, MOIST, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 45% FINE TO COARSE SAND, 40% GRAVEL
				50					
					X	64		SP	50.0'-51.5': POORLY GRADED SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, VERY DENSE, ESTIMATED 5% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 45% GRAVEL
				55					
				60					
				65					
				70					BOTTOM OF HOLE @ 51.5' NO GROUND WATER ENCOUNTERED

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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APPR BY: JKG
BY: KH

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LOG OF BH-10

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
NP	61.1	16.3			X	5		ML	0.0'-5.0': SANDY SILT; TAN, MEDIUM MOISTURE, LOOSE, APPROXIMATED 60% NON-PLASTIC FINES, 35% FINE TO COARSE SAND, 5% GRAVEL
				5	X	31		SM	5.0'-7.5': SILTY SAND; TAN, MEDIUM MOISTURE, DENSE, ESTIMATED 35% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 5% GRAVEL
					X	48		SM	7.5'-10.0': SILTY SAND WITH GRAVEL; TAN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST, DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 20% GRAVEL
2	35.7	0.5		10	X	44		SM	10.0'-12.5': SILTY SAND WITH GRAVEL; BROWN, SLIGHTLY MOIST, DENSE, APPROXIMATED 35% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 15% GRAVEL
					X	38		SM	12.5'-15.0': SILTY SAND; TAN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST, DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 10% GRAVEL
				15	X	29		SM	15.0-20.0': SILTY SAND WITH GRAVEL; BROWN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST, MEDIUM DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				20	X	32		SM	20.0-25.0': SILTY SAND WITH GRAVEL; BROWN WITH MINOR LENSES OF WHITE, SLIGHTLY MOIST, DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 15% GRAVEL
				25	X	40		SM	25.0-30.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 15% GRAVEL
				30	X	24		SM	30.0-35.0': SILTY SAND; TAN, SLIGHTLY MOIST, MEDIUM DENSE, ESTIMATED 30% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 10% GRAVEL
				35					

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

JOB NO.: 29586
APPR: JKG
BY: KH

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LOG OF BH-10

EQUIPMENT: CME 75

DATE: 8/13/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
					X	55		SM	35.0'-40.0': SILTY SAND; TAN, MEDIUM MOISTURE, VERY DENSE, ESTIMATED 35% LOW PLASTICITY FINES, 55% FINE TO COARSE SAND, 10% GRAVEL
				40	X	35		SM	40.0'-45.0': SILTY SAND; TAN, MEDIUM MOISTURE, DENSE, ESTIMATED 25% LOW PLASTICITY FINES, 65% FINE TO COARSE SAND, 10% GRAVEL
				45	X	22		SM	45.0'-50.0': SILTY SAND; TAN, MEDIUM MOISTURE, MEDIUM DENSE, ESTIMATED 25% LOW PLASTICITY FINES, 70% FINE TO COARSE SAND, 5% GRAVEL
				50	X	81		SM	50.0'-61.5': SILTY SAND WITH GRAVEL; TAN, MEDIUM MOISTURE, VERY DENSE, ESTIMATED 15% LOW PLASTICITY FINES, 55% FINE TO COARSE SAND, 30% GRAVEL
				55					
				60					
				65					BOTTOM OF HOLE @ 51.5' NO GROUND WATER ENCOUNTERED
				70					

BOREHOLE LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

JOB NO.: 29586
APPR BY: JKG
BY: KH

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LOG OF TP-1

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
15	63.4	12.3						CL	0.0'-1.0': SANDY LEAN CLAY; TAN, SLIGHTLY MOIST, LOOSE, ESTIMATED 60% LOW PLASTICITY FINES, 30% FINE TO COARSE SAND, 10% GRAVEL
46	81.6	29.2						CH	1.0'-2.0': LAYER OF FAT CLAY WITH SAND; BROWN, MOIST, STIFF, SUB-ANGULAR TO SUB-ROUNDED APPROXIMATED 80% HIGH PLASTICITY FINES, 20% FINE TO COARSE SAND, NO GRAVEL
				2				GC	2.0'-14.0': CLAYEY GRAVEL WITH SAND; TAN, MOIST, DENSE, ESTIMATED 35% PLASTIC FINES, 15% FINE TO COARSE SAND, 50% GRAVEL UP TO 4"
				4					
				6					
				8					
				10					
				12					
				14					BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

TEST PIT LOG
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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APPR: JKG

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LOG OF TP-2

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV. 4983.8

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
13	62.3	17.7						ML	0.0'-2.0': SANDY SILT; TAN, SLIGHTLY MOIST, LOOSE, APPROXIMATED 60% LOW PLASTICITY FINES, 35% FINE TO COARSE SAND, 5% GRAVEL
				3				SM	2.0'-4.0': SILTY SAND; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 40% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 10% GRAVEL UP 1/2"
								SM	4.0'-6.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 60% FINE TO COARSE SAND, 20% GRAVEL
				6				GM	6.0'-10.0': SANDY GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 20% LOW PLASTICITY FINES, 35% FINE TO COARSE SAND, 45% GRAVEL
				9					
								SM	10.0'-15.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 35% LOW PLASTICITY FINES, 350% FINE TO COARSE SAND, 15% GRAVEL
				12					
				15					BOTTOM OF TEST PIT @ 15.0' NO GROUND WATER ENCOUNTERED
				18					
				21					

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CRESCENT VALLEY, NEVADA

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LOG OF TP-3

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV. 4986.6'

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT		
							ML	0.0'-1.0': SANDY SILT; TAN, DRY, LOOSE, ESTIMATED 60% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, NO GRAVEL
1	30.8	3.1					SM	1.0'-6.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, SLIGHTLY DENSE, APPROXIMATED 30% NON-PLASITC FINES, 45% FINE TO COARSE SAND, 25% GRAVEL
				2				
				4				
				6			GP	6.0'-14.0': POORLY GRADED GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, DENSE, NON-PLASTIC, ESTIMATED NO FINES, 40% FINE TO COARSE SAND, 60% GRAVEL
				8				
				10				
				12				
				14				BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

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CRESCENT VALLEY, NEVADA

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LOG OF TP-4

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV. 4990.6'

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
								ML	0.0'-2.0': SILTY SAND; TAN, SLIGHTLY MOIST, LOOSE, ESTIMATED 55% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 5%GRAVEL
1	32.0	9.7		2				SM	2.0'-4.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, GRAVELS ROUNDED TO SUB-ANGULAR, APPROXIMATED 30% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 30% GRAVEL
				4				GP	4.0'-6.0': POORLY GRADED GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, DENSE, NON-PLASITC, ESTIMATED NO FINES, 45% FINE TO COARSE SAND, 55% GRAVEL UP TO 6"
				6				GP	6.0'-4.0': POORLY GRADED GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, DENSE, NON-PLASITC, GRAVELS ANGULAR TO SUB-ANGULAR ESTIMATED NO FINES, 45% FINE TO COARSE SAND, 55% GRAVEL UP TO 3"
				8				SM	8.0'-10.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 15% NON-PLASTIC FINES, 55% FINE TO COARSE SAND, 30% GRAVEL
				10				SM	10.0'-14.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, NON-PLASITC, GRAVELS ANGULAR TO SUB-ROUNDED ESTIMATED 15% FINES, 40% FINE TO COARSE SAND, 45% GRAVEL UP TO 3"
				12					
				14					BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

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CRESCENT VALLEY, NEVADA

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LOG OF TP-5

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV. 4991.7'

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT		
1	48.2	4.3					SM	0.0'-2.0': SILTY SAND; TAN, DRY, LOOSE, APPROXIMATED 50% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 10% GRAVEL
				2				
4	8.9	4.8		4			GP-GM	2.0'-10.0': POORLY-GRADED GRAVEL WITH SILT AND SAND; TAN, SLIGHTLY MOIST, MEDIUM DENSE, GRAVELS ANGULAR TO SUB-ANGULAR, APPROXIMATED 10% LOW PLASTICITY FINES, 30% FINE TO COARSE SAND, 60% GRAVEL UP TO 1"
				6				
				8				
				10			GM	10.0'-14.0': WELL-GRADED GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, MEDIUM DENSE TO DENSE, GRAVELS ANGULAR TO SUB-ROUNDED, ESTIMATED NO FINES, 45% FINE TO COARSE SAND, 55% GRAVEL UP TO 6"
				12				
				14				BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

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LOG OF TP-6

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV. 4983.2'

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT		
							ML	0.0'-2.0': SANDY SILT; TAN, DRY, LOOSE, ESTIMATED 70% LOW PLASTICITY FINES, 30% FINE TO COARSE SAND, NO GRAVEL
				2			ML	2.0'-4.0': SANDY SILT WITH GRAVEL; TAN, DRY, LOOSE, GRAVEL ROUNDED TO SUB-ANGULAR ESTIMATED 55% LOW PLASTICITY FINES, 30% FINE TO COARSE SAND, 15% GRAVEL UP TO 4"
11	15.2	5.0		4			GC	4.0'-8.0': CLAYEY GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, MEDIUM DENSITY, GRAVEL ANGULAR TO SUB-ANGULAR APPROXIMATED 15% MEDIUM PLASTICITY FINES, 25% FINE TO COARSE SAND, 60% GRAVEL UP TO 4"
				6				6.0'-6.25': MINOR 3" THICK LENSES OF CEMENTATION
				8			GP	8.0'-10.0': POORLY-GRADED GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, MEDIUM DENSE TO DENSE, GRAVEL ANGULAR TO SUB-ANGULAR, ESTIMATED NO FINES, 45% FINE TO COURSE SAND, 55% GRAVEL UP TO 6"
				10			SP	10.0'-14.0': POORLY GRADED SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED NO FINES, 70% FINE TO COURSE SAND, 30% GRAVEL UP TO 2"
				12				
				14				BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

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LOG OF TP-7

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
1	27.4	2.5						GM	0.0'-2.0': SILTY GRAVEL WITH SAND; TAN, DRY, LOOSE, ESTIMATED 30% LOW PLASTICITY FINES, 30% FINE TO COARSE SAND, 40% GRAVEL
				2				GP	2.0'-8.0': POORLY-GRADED GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, DENSE, GRAVEL ANGULAR TO SUB-ROUNDED, ESTIMATED 5% NON-PLASTIC FINES, 45% FINE TO COURSE SAND, 50% GRAVEL
				4					
				6					6.0'-6.5': MINOR 6" THICK LENSE OF CLAYEY SAND
				8				GC	8.0'-14.0': CLAYEY GRAVEL WITH SAND; TAN, MOIST, MEDIUM DENSITY, APPROXIMATED 25% MEDIUM PLASTICITY FINES, 25% FINE TO COARSE SAND, 50% GRAVEL
13	26	7.9							
				10					
				12					
				14					BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

TEST PIT LOG
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CRESCENT VALLEY, NEVADA

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LOG OF TP-8

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT		
							ML	0.0'-2.0': SANDY SILT; TAN, SLIGHTLY MOIST, LOOSE, ESTIMATED 65% LOW PLASTICITY FINES, 30% FINE TO COARSE SAND, 5% GRAVEL UP TO 1"
				2			ML	2.0'-4.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, MEDIUM DENSITY, ESTIMATED 15% LOW PLASTICITY FINES, 50% FINE TO COARSE SAND, 35% GRAVEL UP TO 1"
				4			GP	4.0'-6.0': POORLY-GRADED GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, DENSE, ANGULAR TO SUB-ROUNDED GRAVELS, ESTIMATED NO FINES, 45% FINE TO COARSE SAND, 50% GRAVEL
6	29.4	14.1		6			SM	6.0'-14.0': SILTY SAND WITH GRAVEL; TAN, SLIGHTLY MOIST, DENSE, APPROXIMATED 30% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 30% GRAVEL 7.5'-8.0': MINOR 6" THICK LENZ OF CEMENTED SAND
				8				
				10				
				12				
				14				BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

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LOG OF TP-9

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
1	13.6	2.7						SM	0.0'-4.0': SILTY SAND WITH GRAVEL; TAN, DRY, LOOSE, ESTIMATED 15% LOW PLASTICITY FINES, 45% FINE TO COARSE SAND, 40% GRAVEL
				2					
				4				GC	4.0'-6.0': CLAYEY GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, DENSE, ANGULAR TO SUB-ROUNDED GRAVELS, APPROXIMATED 20% MEDIUM PLASTICITY FINES, 35% FINE TO COARSE SAND, 45% GRAVEL
13	19.2	8.1							
				6				GP	6.0'-14.0': POORLY-GRADED GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED NO FINES, 45% FINE TO COARSE SAND, 55% GRAVEL
				8					
				10					
				12					
				14					BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

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CRESCENT VALLEY, NEVADA

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LOG OF TP-10

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT		
							ML	0.0'-3.0': SANDY SILT; TAN, DRY, LOOSE, ESTIMATED 70% LOW PLASTICITY FINES, 30% FINE TO COARSE SAND, NO GRAVEL
				2				
							GM	3.0'-11.0': SILTY GRAVEL WITH SAND; TAN TO RED, SLIGHTLY MOIST, DENSE, ESTIMATED 15% NON-PLASTIC FINES, 40% FINE TO COARSE SAND, 45% GRAVEL UP TO 4"
				4				
				6				
				8				
				10				
10	10.9	25.6					GP-GC	11.0'-14.0': POORLY GRADED GRAVEL WITH CLAY AND SAND; TAN TO RED, SLIGHTLY MOIST, DENSE, APPROXIMATED 10% LOW PLASTICITY FINES, 25% FINE TO COARSE SAND, 65% GRAVEL UP TO 4"
				12				
				14				BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

TEST PIT LOG
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CRESCENT VALLEY, NEVADA

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LOG OF TP-11

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV.

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT		
							ML	0.0'-3.5': SANDY SILT; TAN, DRY, LOOSE, ESTIMATED 70% LOW PLASTICITY FINES, 30% FINE TO COARSE SAND, NO GRAVEL
				2				
				4			GM	3.5'-14.0': SILTY GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, MEDIUM DENSITY, LOW PLASTICITY, ESTIMATED NO FINES, 50% FINE TO COARSE SAND, 50% GRAVEL
				6				
				8				
				10				
				12				
				14				BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

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LOG OF TP-12

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV.4984.3

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
NP	58.2	5.1						ML	0.0'-2.0': SANDY SILT; TAN, DRY, LOOSE, APPROXIMATED 60% NON-PLASTIC FINES, 30% FINE TO COARSE SAND, 10% GRAVEL
NP	26.9	4.5		2				GM	2.0'-6.0': SILTY GRAVEL WITH SAND; TAN TO RED, SLIGHTLY MOIST, MEDIUM DENSE, APPROXIMATED 30% NON-PLASTIC FINES, 30% FINE TO COARSE SAND, 40% GRAVEL UP TO 4" 2.0'-3.0': CEMENTED LENZ
				4					
				6				ML	6.0'-12.0': WELL-GRADED GRAVEL WITH SAND; TAN TO RED, SLIGHTLY MOIST, NON-PLASTIC, DENSE, ESTIMATED NO FINES, 45% FINE TO COARSE SAND, 55% GRAVEL UP TO 3"
				8					
				10					
10	32.0	4.5		12				GP-GC	12.0'-14.0': WELL-GRADED GRAVEL WITH SAND; TAN TO RED, SLIGHTLY MOIST, DENSE, APPROXIMATED 5% LOW PLASTICITY FINES, 25% FINE TO COARSE SAND, 70% GRAVEL
				14					BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

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LOG OF TP-13

EQUIPMENT: CAT 320E

DATE: 8/2/12 ELEV.4984.3

PLASTICITY INDEX	% PASSING #200	MOISTURE CONTENT % OF DRY WT.	DRY DENSITY (PCF)	DEPTH (FT.)	SAMPLE LOCATION	BLOWS / FOOT			
2	49.9	6.9						ML	0.0'-3.0': SANDY SILT; TAN, DRY, LOOSE, ESTIMATED 50% LOW PLASTICITY FINES, 40% FINE TO COARSE SAND, 10% GRAVEL
				2					
18	12.5	4.5						GC	3.0'-7.0': CLAYEY GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, DENSE, ESTIMATED 15% HIGH PLASTICITY FINES, 25% FINE TO COARSE SAND, 60% GRAVEL UP TO 1"
				4					
				6					
								GP	7.0'-14.0': POORLY-GRADED GRAVEL WITH SAND; TAN, SLIGHTLY MOIST, DENSE, NON-PLASTIC, ESTIMATED NO FINES, 45% FINE TO COARSE SAND, 55% GRAVEL UP TO 3"
				8					
				10					
				12					
				14					BOTTOM OF TEST PIT @ 14.0' NO GROUND WATER ENCOUNTERED

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CRESCENT VALLEY, NEVADA

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MAJOR DIVISIONS			TYPICAL NAMES	
COARSE GRAINED SOILS LESS THAN 50% PASSING No. 200 SIEVE	GRAVELS LESS THAN 50% COARSE FRACTION PASSES THE No.4 SIEVE	CLEAN GRAVELS WITH LITTLE OR NO FINES	GW	WELL GRADED GRAVELS, GRAVEL/SAND MIXTURE
			GP	POORLY GRADED GRAVELS, GRAVEL/SAND MIXTURE
		GRAVELS WITH OVER 12% FINES	GM	SILTY GRAVEL, POORLY GRADED GRAVEL/SAND/SILT MIXTURE
			GC	CLAYEY GRAVEL, POORLY GRADED GRAVEL/SAND/CLAY MIXTURE
	SANDS MORE THAN 50% COARSE FRACTION PASSES THE No.4 SIEVE	CLEAN SANDS WITH LITTLE OR NO FINES	SW	WELL GRADED SANDS, GRAVELLY SANDS
			SP	POORLY GRADED SANDS, GRAVELLY SANDS
		SANDS WITH OVER 12% FINES	SM	SILTY SANDS, POORLY GRADED SAND/CLAY MIXTURES
			SC	CLAYEY SAND, POORLY GRADED SAND/CLAY MIXTURES
FINE GRAINED SOILS MORE THAN 50% PASSING No. 200 SIEVE	SILTS AND CLAYS LIQUID LIMIT LESS THAN 50		ML	INORGANIC SILTS & VERY FINE SANDS OF LOW PLASTICITY
			CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY, LEAN CLAYS
			OL	ORGANIC CLAYS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
	SILTS AND CLAYS LIQUID LIMIT GREATER THAN 50		MH	INORGANIC SILTS, MICACEOUS OR DIATOMACEOUS FINE SANDY OR SILTY SOILS
			CH	INORGANIC CLAYS OF HIGH PLASTICITY, FAT CLAYS
			OH	ORGANIC CLAYS OF MEDIUM TO HIGH PLASTICITY, ORGANIC SILTS
ORGANIC RICH SOILS			PT	TOPSOIL, PEAT, ORGANIC RICH SOILS
OTHER SOILS			F	FILL MATERIALS

UNIFIED SOIL CLASSIFICATION SYSTEM

UNDISTURBED SAMPLE

BULK SAMPLE

NO RECOVERY

WATER LEVEL AT TIME OF DRILLING

STATIC WATER LEVEL AFTER DRILLING

SOIL KEY
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CRESCENT VALLEY, NEVADA

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APPR: JKG
BY: CB

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SAMPLE LOCATION	SAMPLE DEPTH	% PASSING 3"	% PASSING #4	% PASSING #30	% PASSING #200	LIQUID LIMIT	PLASTICTY INDEX	R-VALUE	USCS
TP-1	0'-2'	100	93	81	63.4	39	15	–	CL
TP-1	1'-2'	100	98	92	81.6	80	46	–	CH
TP-2	0'-2'	100	94	83	62.3	39	13	–	ML
TP-3	1'-3'	100	75	59	30.8	25	1	–	SM
TP-4	2'-4'	100	72	49	32.0	32	1	–	SM
TP-5	0'-3'	100	89	76	48.2	24	1	–	SM
TP-5	4'-6'	100	40	19	8.9	26	5	–	GP-GM
TP-6	4'-6'	100	37	23	15.2	28	11	–	GC
TP-6	5'-6.5'	100	57	23	10.1	–	NP	–	SP-SM
TP-7	0'-2'	100	56	42	27.4	25	1	–	GM
TP-7	8'-10'	100	50	36	26.0	31	13	–	GC
TP-8	6'-8'	100	68	49	29.4	39	6	–	SM
TP-9	0'-2'	100	58	30	16.6	27	1	–	SM
TP-9	4'-6'	100	56	36	19.2	36	13	–	GC
TP-10	11'-13'	100	34	20	10.9	33	10	–	GP-GC
TP-12	0'-2'	100	93	77	58.2	–	NP	–	ML
TP-12	2'-4'	100	60	44	26.9	–	NP	–	GM
TP-12	12'-14'	100	32	15	5.8	32	10	–	GP-GC
TP-13	1.5'-3'	100	91	77	49.9	25	2	–	ML
TP-13	3'-7'	100	39	20	12.5	39	18	–	GC
BH-1	5'-6.5'	100	73	36	18.8	22	4	–	SC-SM
BH-1	10'-11.5'	100	69	39	21.4	29	34	–	SC
BH-1	12.5'-14'	100	56	28	15.8	33	15	–	GC
BH-2	2.5'-4'	100	95	82	51.3	23	2	–	ML
BH-2	30'-31.5'	100	70	36	15.9	20	1	–	SM
BH-3	10'-11.5'	100	69	35	18.9	41	21	–	SC
BH-4	15'-16.5'	100	56	26	13.6	27	8	–	SC
BH-4	95'-96.5'	100	68	34	14.8	21	1	–	SM
BH-5	2.5'-4'	100	65	32	15.9	23	3	–	SM
BH-5	7.5'-9'	100	90	72	49.1	33	13	–	SC

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SAMPLE LOCATION	SAMPLE DEPTH	% PASSING 3"	% PASSING #4	% PASSING #30	% PASSING #200	LIQUID LIMIT	PLASTICTY INDEX	R-VALUE	USCS
BH–6	15'–16.5'	100	81	41	21.1	29	8	–	SC
BH–7	2.5'–4'	100	77	55	36.4	27	6	–	SC–SM
BH–7	45'–46.5'	100	86	42	18.3	21	3	–	SM
BH–8	5'–6.5'	100	81	50	25.4	24	2	–	SM
BH–8	25'–30'	100	71	42	30.2	25	5	–	SC–SM
BH–9	40'–41.5'	100	97	83	57.1	23	4	–	ML
BH–10	2.5'–4'	100	95	81	61.1	–	NP	–	ML
BH–10	10'–11.5'	100	84	60	35.7	32	2	–	SM

SIEVE ANALYSIS
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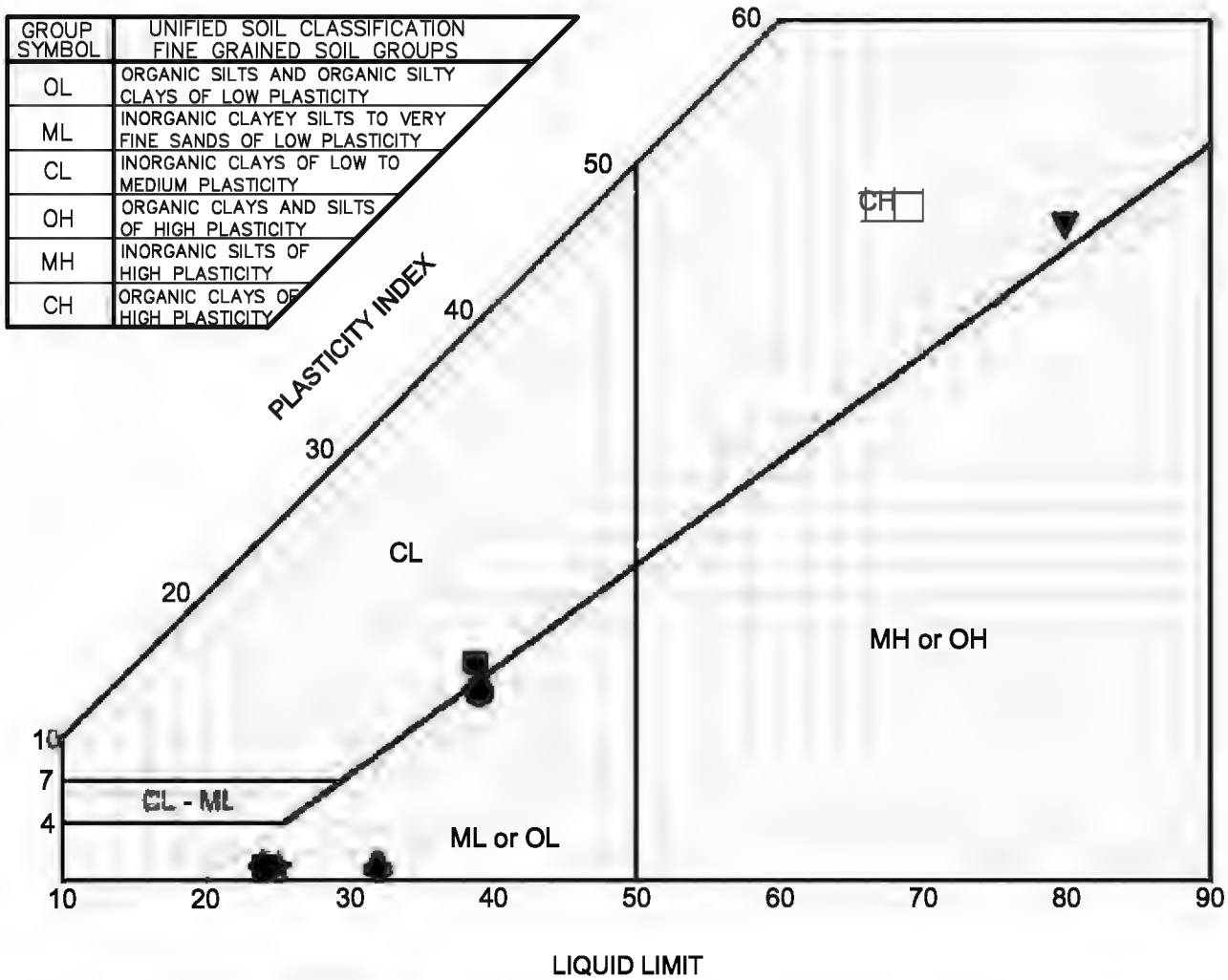

TEST SYMBOL	SAMPLE LOCATION	SAMPLE DEPTH	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTICITY INDEX	EXP. INDEX	CLASSIFICATION
■	TP–1	0'–2'	63.4	39	15	–	CL
▼	TP–1	1'–2'	81.6	80	46	–	CH
●	TP–2	0'–2'	62.3	39	13	–	ML
★	TP–3	1'–3'	30.8	25	1	–	SM
♣	TP–4	2'–4'	32.0	32	1	–	SM
✸	TP–5	0'–3'	48.2	24	1	–	SM

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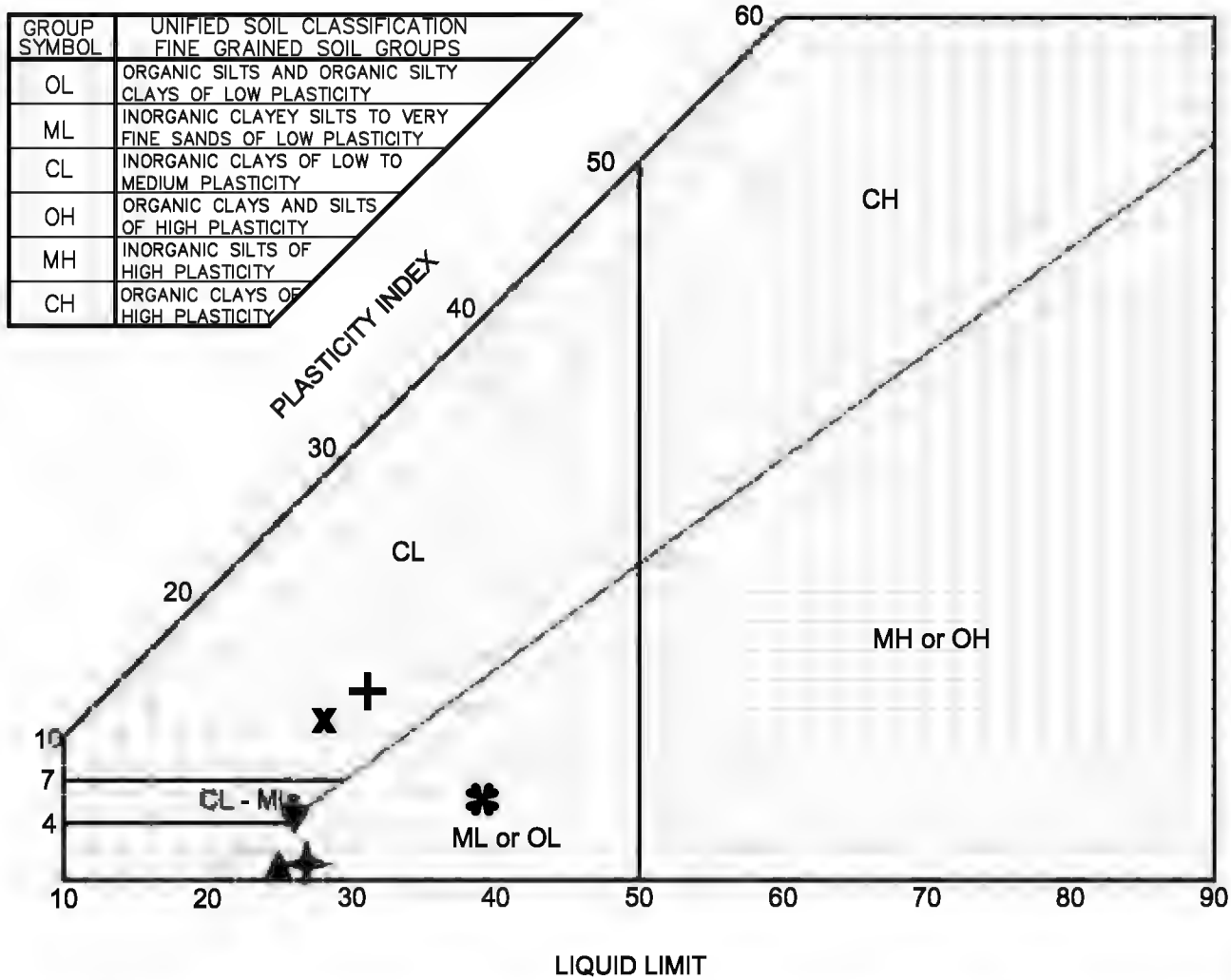

TEST SYMBOL	SAMPLE LOCATION	SAMPLE DEPTH	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTICITY INDEX	EXP. INDEX	CLASSIFICATION
♥	TP–5	4'–6'	8.9	26	5	–	GP–GC
x	TP–6	4'–6'	15.2	28	11	–	GC
▲	TP–7	0'–2'	27.4	25	1	–	GM
+	TP–7	8'–10'	26.0	31	13	–	GC
✱	TP–8	6'–8'	29.4	39	6	–	SM
✦	TP–9	0'–2'	16.6	27	1	–	SM

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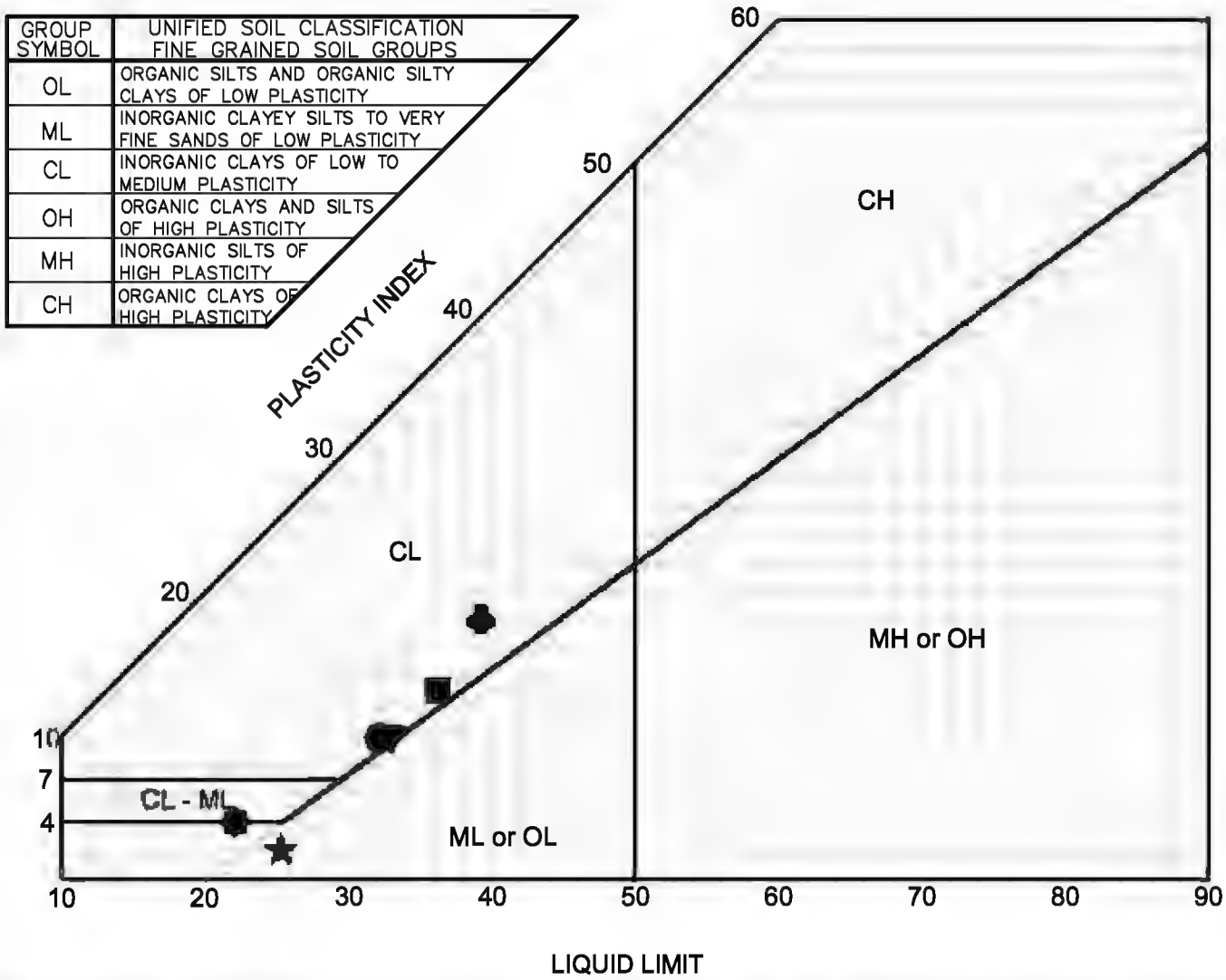

TEST SYMBOL	SAMPLE LOCATION	SAMPLE DEPTH	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTICITY INDEX	EXP. INDEX	CLASSIFICATION
■	TP–9	4'–6'	19.2	36	13	–	GC
▼	TP–10	11'–13'	10.9	33	10	–	GP–GC
●	TP–12	12'–14'	5.8	32	10	–	GP–GC
★	TP–13	1.5'–3'	49.9	25	2	–	ML
♣	TP–13	3'–7'	12.5	39	18	–	GC
✸	BH–1	5'–6.5'	18.8	22	4	–	SC–SM

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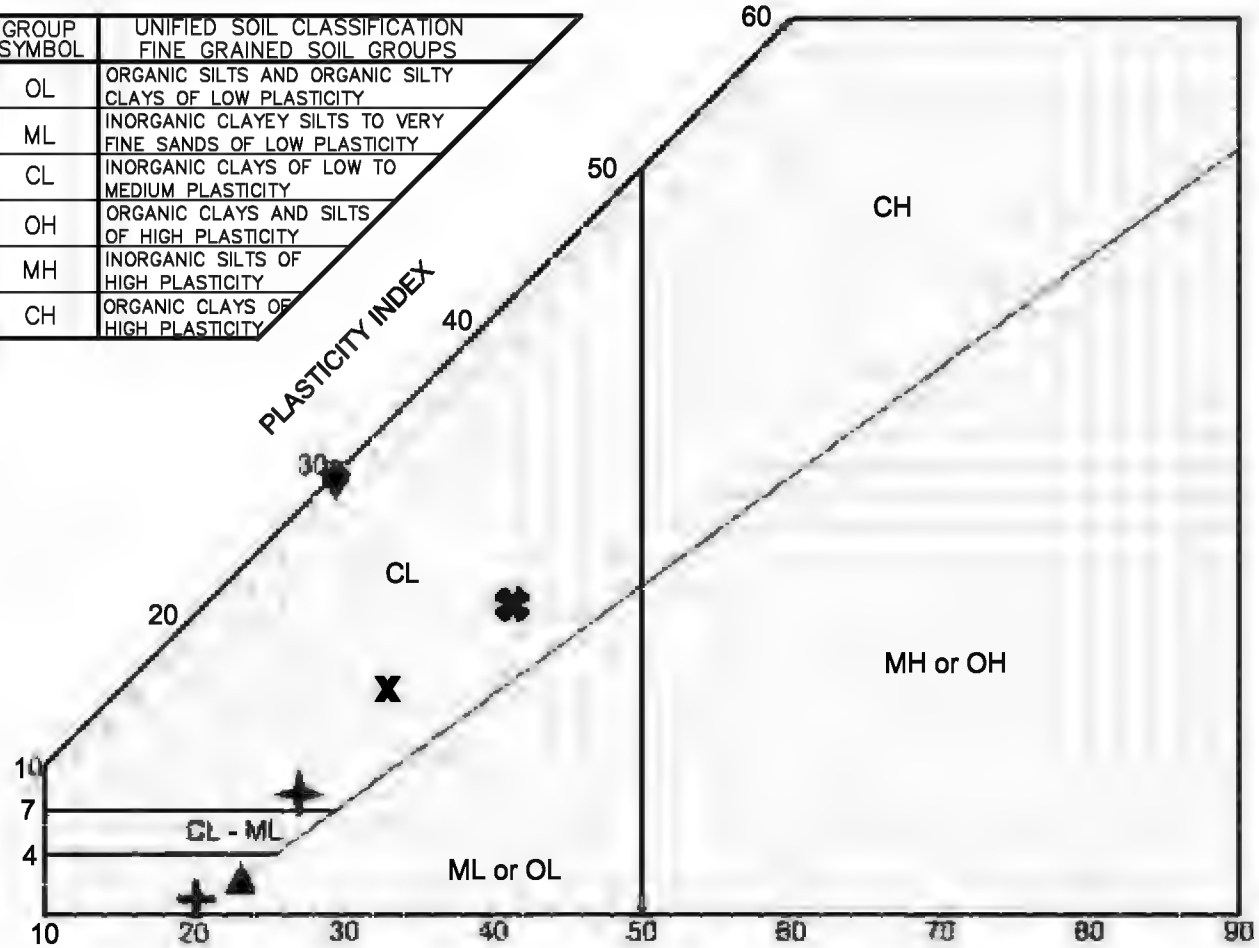
GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF LOW PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS AND SILTS OF HIGH PLASTICITY
MH	INORGANIC SILTS OF HIGH PLASTICITY
CH	ORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE LOCATION	SAMPLE DEPTH	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTICITY INDEX	EXP. INDEX	CLASSIFICATION
♥	BH–1	10'–11.5'	21.4	29	34	–	SC
✖	BH–1	12.5'–14'	15.8	33	15	–	GC
▲	BH–2	2.5'–4'	51.3	23	2	–	ML
✚	BH–2	30'–31.5'	15.9	20	1	–	SM
✤	BH–3	10'–11.5'	18.9	41	21	–	SC
✦	BH–4	15'–16.5'	13.6	27	8	–	SC

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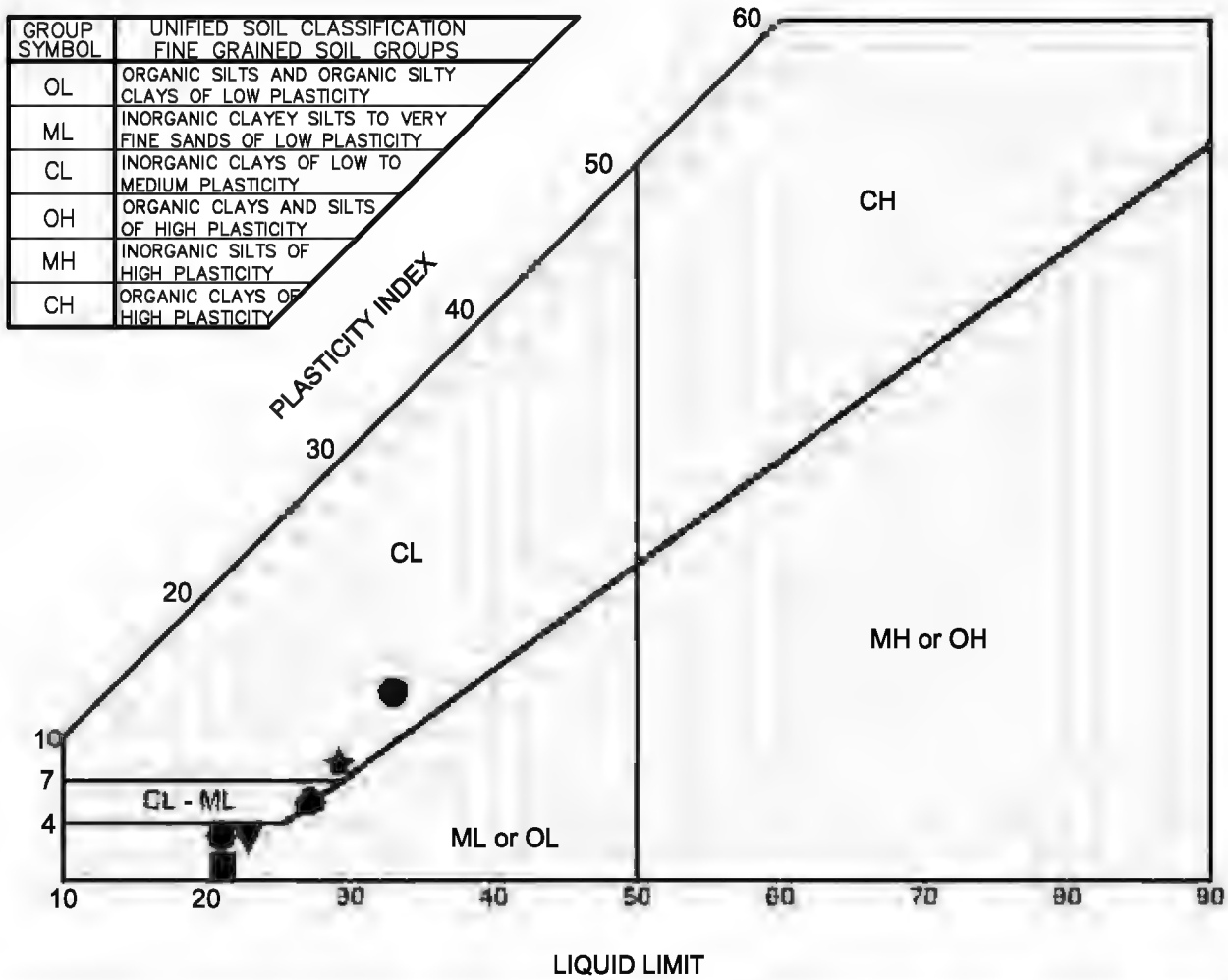

TEST SYMBOL	SAMPLE LOCATION	SAMPLE DEPTH	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTICITY INDEX	EXP. INDEX	CLASSIFICATION
■	BH–4	95'–96.5'	14.8	21	1	–	SM
▼	BH–5	2.5'–4'	15.9	23	3	–	SM
●	BH–5	7.5'–9'	49.1	33	13	–	SC
★	BH–6	15'–16.5	21.1	29	8	–	SC
♣	BH–7	2.5'–4'	36.4	27	6	–	SC–SM
✹	BH–7	45'–46.5'	18.3	21	3	–	SM

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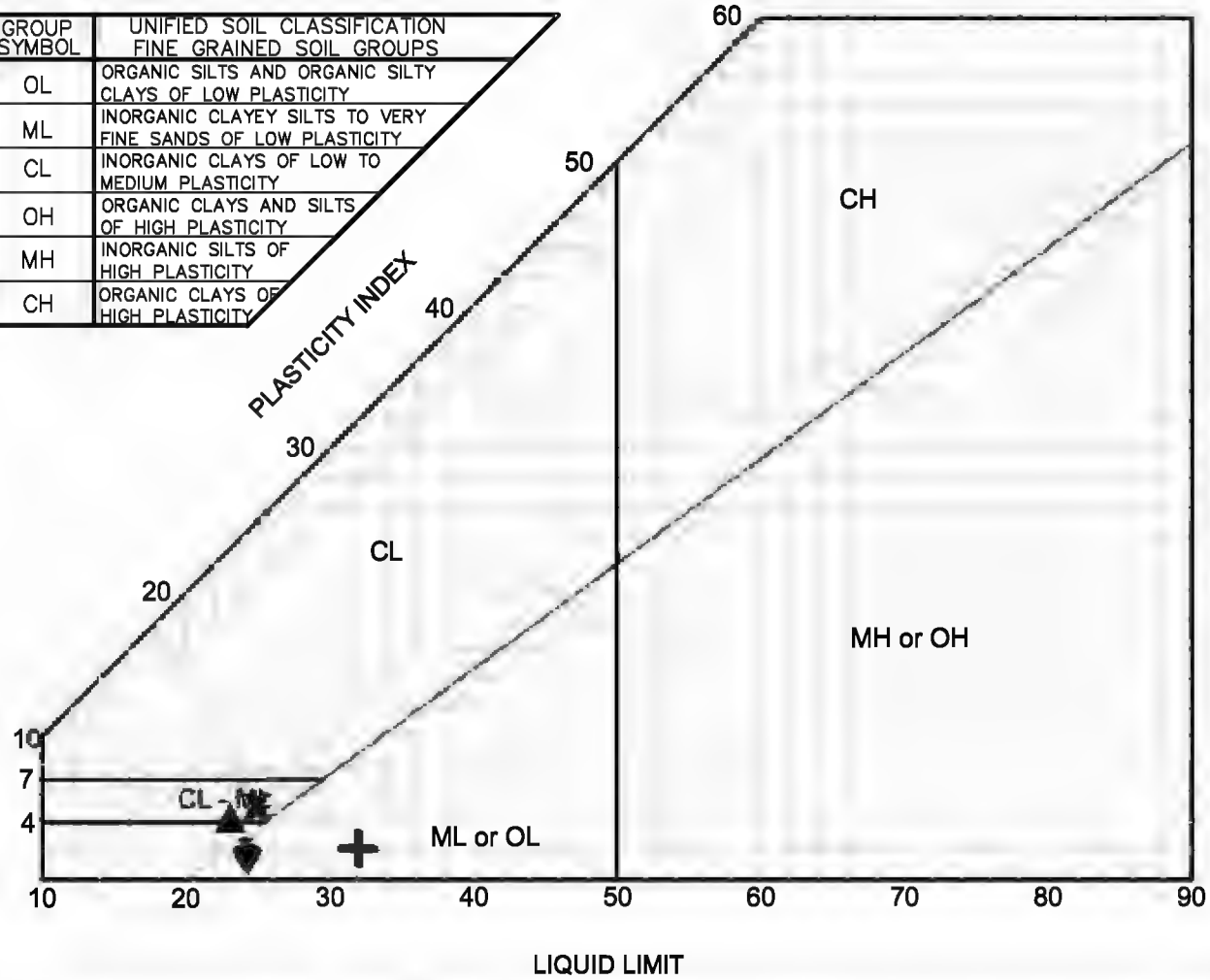
GROUP SYMBOL	UNIFIED SOIL CLASSIFICATION FINE GRAINED SOIL GROUPS
OL	ORGANIC SILTS AND ORGANIC SILTY CLAYS OF LOW PLASTICITY
ML	INORGANIC CLAYEY SILTS TO VERY FINE SANDS OF LOW PLASTICITY
CL	INORGANIC CLAYS OF LOW TO MEDIUM PLASTICITY
OH	ORGANIC CLAYS AND SILTS OF HIGH PLASTICITY
MH	INORGANIC SILTS OF HIGH PLASTICITY
CH	ORGANIC CLAYS OF HIGH PLASTICITY



TEST SYMBOL	SAMPLE LOCATION	SAMPLE DEPTH	% PASSING #200 SIEVE	LIQUID LIMIT	PLASTICITY INDEX	EXP. INDEX	CLASSIFICATION
♥	BH–8	5'–16.5'	25.4	24	2	–	SM
✖	BH–8	25'–30'	30.2	25	5	–	SC–SM
▲	BH–9	40'–41.5'	57.1	23	4	–	CL–ML
✚	BH–10	10'–11.5'	35.7	32	2	–	SM

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SilverState
Analytical Laboratories

LABORATORY REPORT

DATE: August 22, 2012

REPORT NUMBER: R12-0112

CLIENT: Summit Engineering
5405 Mae Anne Ave
Reno, NV 89523

PAGE: 1 of 1

CLIENT PROJECT: 29586

CLIENT PO #: 6768

Sampled By: Client
Date Sampled: --
Time Sampled: --

Date Received: 08/21/12
Time Received: 1630

Analyst: AM

Sample ID	Test	Result	Unit	Method
PMR TP-1 @ 2'-4'	Sulfate	1.75	%	SM4500E
PMR TP-4 @ 0'-2'	Sulfate	0.00	%	SM4500E
PMR TP-6 @ 0'-2'	Sulfate	0.04	%	SM4500E

Note: The results for each constituent denote the percentage (%) for that particular element which is soluble in a 1:5 (soil to water) extraction ratio and corrected for dilution.

REVIEWED BY:

John Sloan
Laboratory Director

SOLUBLE SULFATES
BARRICK GOLDSTRIKE
CRESENT VALLEY, NEVADA

JOB NO.: 29586
APPR: JKG
BY: KH

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CME CONSTRUCTION MATERIALS ENGINEERS, INC.

6980 Sierra Center Parkway, Suite 90
Reno, NV 89511

October 4, 2012
File: 1146

Joshua Sames, EI
SUMMIT ENGINEERING CORPORATION
5405 Mae Anne Avenue
Reno, NV 89523

RE: PMR Project

Dear Mr. Sames:

Per your request, we have performed California Bearing Ratio tests on samples received by our laboratory on September 7, 2012 from the PMR Project. Test results are as follows:

California Bearing Ratio (ASTM D1883)						
Source	Dry Density (pcf)	Moisture Content (%), before soak	Moisture Content (%), Top 1" after soak	Swell (%)	Bearing Ratio, soaked	Surcharge (lbs)
Test Pit 1 @ 0.0'-2.0'	95.4	15.3	32.6	4.5	1.5	10
Test Pit 3 @ 1.0'-3.0'	108.6	9.3	17.4	0.3	5.3	10
Test Pit 5 @ 0.0'-2.0'	105.6	11.7	22.5	1.1	3.1	10
Test Pit 7 @ 0.0'-2.0'	109.7	9.4	17.5	0.1	3.1	10
Test Pit 9 @ 0.0'-2.0'	113.8	7.7	14.3	0.2	4.0	10
Test Pit 13 @ 1.5'-3.0'	111.1	10.3	19.0	0.6	4.6	10

We appreciate this opportunity to provide our laboratory services. If you have any questions or require further information, please do not hesitate to contact us.

Sincerely,

CONSTRUCTION MATERIALS ENGINEERS, INC.

Steven L. Vineis
Laboratory Manager
svineis@cme-corp.com
Direct: 775-737-7568
Direct Fax: 775-737-7605
Mobile: 775-772-9921

Roger O. Corkill Jr., PE
Project Coordinator
RE Number 19868
Expiration Date 12-31-12
rcorkill@cme-corp.com
Direct: 775-737-7581
Direct Fax: 775-737-7611
Mobile: 775-722-5067

PROFESSIONAL ENGINEER - STATE OF NEVADA
ROGER O. CORKILL, JR.
Exp: 12/31/12
CIVIL
No. 19868
10/4/12

SLV:ROC:jy

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CBR RESULTS
BARRICK PMR PROJECT
CRESCENT VALLEY, NEVADA

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SHEET 51 OF 51

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APPENDIX 22-A

Container Specifications

Internal Memo

H340940

November 16, 2012

TO: J. Toepfer

FROM: D. Kluwak

cc: J. Chalmers
R. Fukuzawa
S. Sennik
M. Sucharda

Barrick Goldstrike Mines Inc.
Precious Metals Recovery Project

RCRA Permit Application - Specification of Containers

1. Introduction

The purpose of this memo is to standardize the dimensions and weights of the containers that will be used to store and manage mercury and mercury-bearing materials at the proposed TSF.

2. Containers

2.1 Calomel Drums

Calomel will arrive at the proposed TSF in 55 gallon polymer drums packed within 95 gallon polymer overpack drums (shown in Figure 2-1). After being inspected and received, but prior to treatment, the 55 gallon polymer drums containing calomel will be removed from the overpack drums.

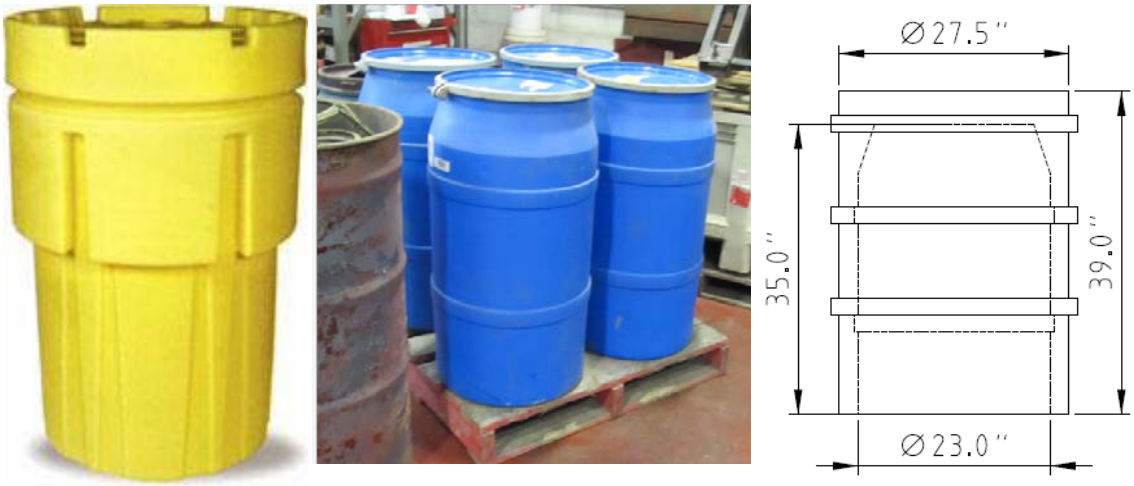

Figure 2-1: 95 Gallon Polymer Overpack Drum (Left) contains a 55 Gallon Polymer Drum (Middle)

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2.2 Spent Activated Carbon Drums

Spent activated carbon will arrive at the proposed TSF in 55 gallon steel drums (shown below in Figure 2-2). One cubic foot of spent activated carbon weighs approximately 35 to 40 lbs.

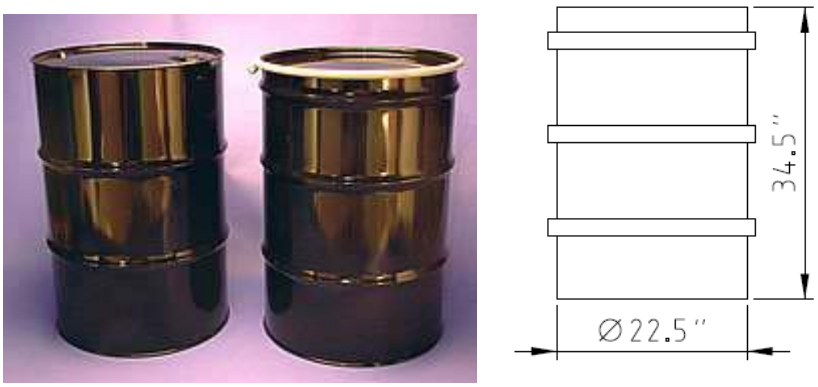

Figure 2-2: 55 Gallon Steel Drums Containing Spent Activated Carbon

2.3 Elemental Mercury Containers and Trays

Elemental mercury is stored in 1-metric tonne containers ("pigs") as shown below in Figure 2-3. C-channels on top of the containers allow for transport by forklift. Containers are manufactured of carbon steel.

The pigs will be stored on drip trays; eight pigs will be stored on each tray. Trays will be manufactured of carbon steel. The drip tray will have a lip height of 1.25 inches. With any given drip tray containing eight pigs, a lip height of 1.25 inches is sufficient to contain the entire volume of one 1-metric tonne container.

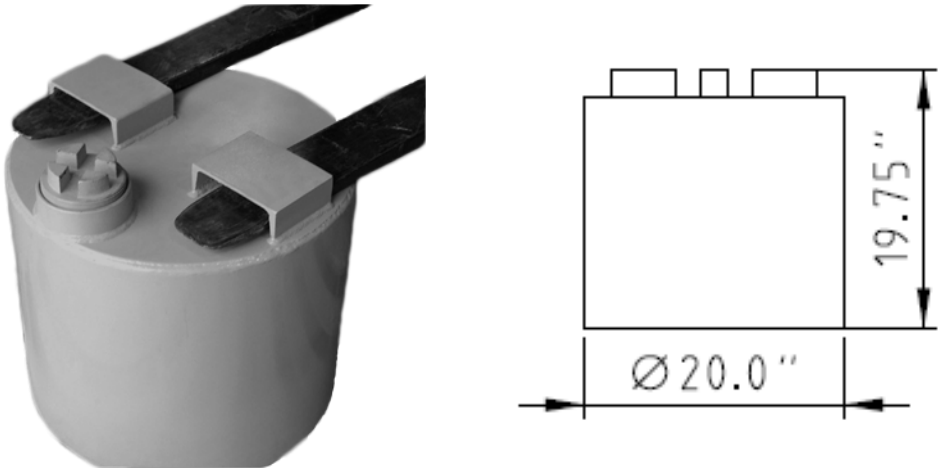

Figure 2-3: 1-Metric Tonne Elemental Mercury Container

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2.4 Damaged Elemental Mercury Containers

In the unlikely event that a pig containing elemental mercury arrives at the facility and has been damaged or punctured (i.e., damaged to the extent that a leak has occurred or is likely to occur), elemental mercury will not be poured into a new container.

The damaged pig will be placed directly into a specialized carbon steel container (Figure 2-4). The specialized carbon steel container (containing the damaged mercury pig) will be transported by forklift directly to the retort and retorted. As soon as the damaged mercury pig is in the specialized container, the appropriate spill response actions will be carried out immediately, if necessary.

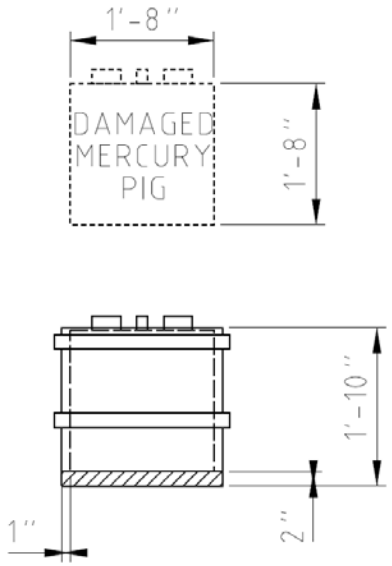

Figure 2-4: Transfer of a Damaged Elemental Mercury Pig

2.5 Dimensions and Weights

Container dimensions and weights are summarized in Table 2-1 below:

Table 2-1: Summary of Container Dimensions and Weights

Description	Diameter or Width (in)	Length (in)	Height (in)	Dry Weight (lbs)	Full Weight (lbs)
Overpack Calomel Drum	27-1/2	-	39	63	798
Calomel Drum	23	-	35	22	735
Activated Carbon Drum	22-1/2	-	34-1/2	48	300
Elemental Mercury Drum	20	-	19-3/4	220	2,420
Elemental Mercury Tray	60	120	1-1/4	-	-

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3. References

- http://www.fastenal.com/web/products/detail.ex?sku=0509832
- http://www.bayteccontainers.com/55galpolbar.html
- http://www.thecarycompany.com/containers/steel_drums.html
- http://www.vaporlokproducts.com/VLL-145%20Mercury%20Flask%20Cutsheet.pdf

D. Kluwak

DK:pp

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APPENDIX 22-B

Secondary Containment Sample Calculation

Tonne Containers		
Diameter (inches)		19.25
Diameter (feet)		1.60
Height (inches)		19.00
Height (feet)		1.58
Volume (ft^3)		3.20
Number in Tray		8.00
Total Volume in Tray (ft^3)		25.59
	10%	2.56
Tray Design Volume		3.20

Used Volume	
Diameter (inches)	20.00
Diameter (feet)	1.67
Height (inches)	1.00
Height (feet)	0.08
Volume (ft^3)	0.18
Number in Tray	8.00
Used Volume in Tray	1.45

Containment Tray	
Length (inches)	
Length (feet)	7.75
Width (inches)	
Width (feet)	5.00
Height (inches)	1.00
Height (feet)	0.08
Total Volume (ft^3)	3.23
Available Volume	1.78

55 Gallon Drum		
Diameter (inches)		22.50
Diameter (feet)		1.88
Height (inches)		34.50
Height (feet)		2.88
Volume (ft^3)		7.93
Number in Tray		6.00
Total Volume in Tray (ft^3)		47.61
	10%	4.76
Tray Volume Design		7.93

Used Volume	
Diameter (inches)	23.25
Diameter (feet)	1.94
Height (inches)	7.00
Height (feet)	0.58
Volume (ft^3)	1.72
Number in Tray	6.00
Used Volume in Tray	10.31

Containment Tray	
Length (inches)	
Length (feet)	8.00
Width (inches)	
Width (feet)	4.00
Height (inches)	7.00
Height (feet)	0.58
Total Volume (ft^3)	18.67
Available Volume	8.35

Tank	Diameter (ft)	Height (ft)	Volume (ft^3)	Use Volume (gal)
HCl Tank (# 1350-TK-008)	3.00	5.00	35.33	100
NaOH (# 1350-TK-002)	5.00	7.50	147.19	750
Waste Settling (# 1440-TK0116)	3.50	6.50	62.51	300
Waste Solution Collection (# 1440-TK-114)	5.00	6.00	117.75	400
Waste Solution Storage (# 1540-TK-012)	7.50	15.00	662.34	2500
Waste Solution Storage (# 1540-TK-035)	7.50	15.00	662.34	2500
Decomposition (# 1420-TK-033)	5.00	6.00	117.75	400
Waste Solution (# 1420-TK-037)	5.00	6.00	117.75	400
Oxidation Reactor (# 1410-TK-054)	3.00	3.00	21.20	100
Filter Press (#1420-FL-036)	2.00	1.35	5.40	40
Condensate (# 1410-TK-008)	1.88	2.88	7.99	55
Retort Domes (# 1410-MR-003)	18.5 X 6	12.50	1387.50	110
Total Tank Volume			3345.04	7655
10%			334.50	766
Largest Tank Volume			1387.50	2500
Sump Design Volume			1387.50	2500

Sump Collection Pit	
Length (inches)	
Length (feet)	2.00
Width (inches)	
Width (feet)	2.00
Height (inches)	
Height (feet)	4.00
Total Volume (ft^3)	16.00
Available Volume (ft^3)	16.00
Available Volume (gal)	119.68
Number of Sumps	1
Combined Volume (gal)	2538.99

Trench	
Length (inches)	
Length (feet)	258.75
Width (inches)	12.00
Width (feet)	1.00
Height (inches)	15.00
Height (feet)	1.25
Total Volume (ft^3)	323.44
Available Volume (ft^3)	323.44
Available Volume (gal)	2419.31

		Tank Dimension	Tank Volume (cubic feet)	Secondary Containmnet measurements	Secondary Containment Volume (cubic feet)	Height assumption	
Waste Storage Tank	1540-TK-015	11'Dx12'H	1140	17'x17'	1156	assume 4 ft high	
Decomposition Tank	1420-TK-033	5'Dx6'H	118	18'x8'	144	assume 1 ft high	Skid shared with 37
Waste Solution Tank	1420-TK-037	5'Dx6'H	118	"	144	assume 1 ft high	Skid shared with 33
Waste Solution Storage Tank	1540-TK-012	7'6"Dx15'H	662	20'x12'	720	assume 3 ft high	Skid shared with 35
Waste Solution Storage Tank	1540-TK-035	7'6"Dx15'H	662	"	720	assume 3 ft high	Skid shared with 12
Waste Solution Collection Tank	1440-TK-114	5'Dx6'H	118	6'x6'	126	assume 3.5 ft high	
Waste Solution Settling Tank	1440-TK-116	3'6"x6'6"	63	12'x6'	144	assume 2 ft high	subtract volume Water Polishing Columns
Caustic Soda Tank	1350-TK-002	5'Dx7'6"H	147	8'x8'	160	assume 2.5 ft high	
Oxidation Reactor	1410-TK-054	3'Dx3'H	21	12'x6'	72	assume 1 ft high	scrubber and oxidation skid
HCl Tank	1350-TK-008	3'Dx5'H	35	8'x8'	64	assume 1 ft high	

APPENDIX 30-A

Vendor Budget Quotes

Air Separation Technologies Inc.

336 Bronte Street South, Suite 222, Milton, ON L9T 7W6
T: 905.821.8860 F: 905.693.9401
www.astcanada.ca

Company:	Hatch Ltd	Quotation #	T13-047PB rev 1
Address:	2800 Speakman Drive Mississauga, ON L5K 2R7	Date:	6/28/2012
		Project Reference:	H340940
Attention:	Evan Crawford	Application:	
Phone:		Contaminant:	
Fax:		Market Sector:	
Email:		Flow Rate:	10,000 CFM

We are pleased to recommend the following Donaldson® Torit® equipment:

Description	Unit Price	Qty	Extended Price
DFO 3-36 Base Model THIS UNIT IS SUPPLIED WITH SPUN BOND ULTRA WEB CARTRIDGES 3240 SQ FT AT 2.8 :1 RATIO SEE ATTACHED SPEC SHEET, • FINISH COAT : STANDARD FINISH • HOPPER : STANDARD • HOPPER : ACCESS OPENING W/COVER • HOPPER : INSTALL COUPLING (UP TO 2" DIAMETER) (Qty 6) • LEGS : STANDARD • ELEMENTS : DEDUCT STANDARD ULTRA WEB FILTERS (Qty 36) • ELEMENTS : NEW FILTER SELECTION - ULTRA-WEB SB (Qty 36) • INLETS/ OUTLETS : ABRASION RESISTANT • INLETS/ OUTLETS : SIDE ACCESS ON CLEAN AIR PLENUM • SOLENOID ENCLOSURE : NEMA 4 • SOLENOID ENCLOSURE : MUFFLERS • SOLENOID ENCLOSURE : PREWIRED IN NEMA 4 ENCLOSURE • CONTROL BOX : DELTA P PLUS CONTROL W/TIMER • PRESSURE GAUGE : ADDITIONAL MAGNEHELIC • EXPLOSION EQUIPMENT OPTIONS : 34 x 46 (Price includes qty 3) • EXPLOSION EQUIPMENT OPTIONS : INDOOR EXP VENT ADDER FOR CUSTOM FLANGE - MANDATORY • EXPLOSION EQUIPMENT OPTIONS : INDOOR EXP VENT ADDER FOR WEATHER COVER ADAPTER • VENT WEATHER COVER : TOP MOUNTED • HOPPER OUTLET PACK : MATE TO CUSTOMER SPECIFIED AIRLOCK • ACCESSORIES : PLATFORM/LADDER • ACCESSORIES : SPARE PARTS KIT • ACCESSORIES : GROUND TEST DOCUMENTATION • ACCESSORIES : SPRINKLER PACK ASY WET SYSTEM		1	

- ACCESSORIES : SET OF EXTRA PRESSURE TAPS
- ACCESSORIES : STAINLESS STEEL NAMEPLATE (EA)
- ACCESSORIES : PAINT PLATFORM SAFETY YELLOW
- HOUSING FEATURES : REINFORCE COLLECTOR / HOPPER - OPERATING -30 "WG
- 6 ONLY LEVEL SWITCHES 2 IN EACH HOPPER CAPACITANCE LEVEL SWITCHES BIN MONITOR 3600.00
- HOUSING FEATURES : LINED CLEAN AIR PLENUM

One (1) only AUBURN® SYSTEMS TRIBO.dsp U3600 Remote Detector as generally described in the attached literature, with the following features: Unified DC impaction and AC induction for superior accuracy.

24VDC, 120 -240 volt power.

- Relay contact for alarm indication
- Isolated 4-20mA output for PLC input, (12-32 VDC).
- Can be powered by direct connection to any PLC capable of powering looped devices.
- NEMA 4/7/9 electronics enclosure. Operating temperature range -40ºF to 185ºF.
- Remote sensor assembly (NEMA 4X enclosure) 3” x 3 “ LED 4 color display, dual alarm, decade log or 0 – 100%, six digit display.
- 316 stainless steel probe 1/2 inch diameter, 18” long.
- Quick release fitting (ferrule, gasket and clamp with 1” BSP pipe connection, for easy removal of the unit for maintenance purposes.
- 30’ of Auburn coax cable and end kit, to connect the remote probe assembly to the electronics module (supplied loose for installation in the field by others).
- High resolution, no drift circuit for accurate measurement
- 32 bit floating point data processing for more accurate results
- Wide dynamic range with choices of 8 decades logarithmic range or 5 linear ranges.
- Sensitivity typically 0.0005gr/dscf (1mg/m3)
- Pressure range: 30 psi (2 bar) standard
- Designed intrinsically safe.
- One Installation/Operations/Maintenance Manual.

NEMA 4X CONTROL PANEL

Includes delta P plus controls with timer with contacts for broken bag detectors, 6 level indicators, rotary valve Zero speed switches, to suit buyers PCS motor stars not included 3 ROTARY VALVES I CI 8 x 8, 0.20 C.F.R. Rotary Airlock Valve complete as follows: • Cast Iron housing and endplates • Outboard bearings • Square inlet/outlet flanges • ACST-4 shaft seal assembly c/w air purge connections (plugged) • 8-vane open end AR 400 rotor assembly • Adjustable/replaceable polyurethane rotor tips • ¾ HP drive assembly including TEFC enclosure, 480 volt, 3 phase, 60 cycle gearmotor, chain drive, drive guard, and motor mount base, completely factory assembled. Final drive RPM is 20. Complete with local emergency stop button. • Zero Speed Switch assembly complete with Control Concepts AL 2120-10/B switch complete with mild steel mounting (primed and painted) bracket/target and guard completely factory assembled on valve. Switch is NEMA 4/4X rated. EXCEPTIONS This is our standard DF03-36 collector designed to -30" WG and is manufactured from 10 ga reinforced mild steel This unit is supplied with a high inlet The collector is designed to allow the hoppers to be fully loaded with dust. This collector should not be filled to the tube sheet level. We have not included an extra cost adder at this time to design the collector filled with dust to the tube sheet.			
TOTAL BUDGET PRICE CANADIAN FUNDS OR US FUNDS		**Total:**	**$130,000.00**

Lead time: Approximate weight:

FOB: BALDWIN WIS Freight: EXTRA

Standard Terms:

Orders <$5,000.00:	Orders >$5,000.00, <$10,000.00:	Orders >$10,000.00:
NET 30 days OAC	50% ARO	35% ARO
	50% NET 30 days OAC	35% Prior to Shipping
		30% NET 30 days OAC

Attachments: Terms & Conditions, Disclaimer, Limited Warranty
Attachments: Terms & Conditions, Disclaimer, Limited Warranty

CC:

Name: Peter Bassie

Title: Technical Sales Representative

Price does not include unit installation, motor starter, freight cost, taxes, electrical connections, ducting, and/or pneumatic connections unless stated above**. Credit terms are Net 30** (upon credit approval). Quotation is valid for 30 days from quotation date unless otherwise noted. Cancellation or changes to an order once a purchase order has been accepted by Donaldson may result in additional charges. Subject to Donaldson Company Inc. General Terms and Conditions.

HATCH™	EQUIPMENT DATA SHEET Dust Collector	H340940-PM010-50-107-0001

Item	Re	Title	Notes	UOM	Project Design Data	Supplier Data	Operation Data
IDENTIFICATION							
A1		Equipment name		text	Dust Collector		
A2		Equipment tag number		text	1400-DC-101		
A3		Equipment model number		text	By Seller		
A4		Required quantity		text	1		
REFERENCE DOCUMENTS							
B1		Specification		text	H340940-PM010-50-123-0001		
B2		General Arrangement Drawing		text	By Seller		
B3		P&ID		text	By Seller		
B4		Maintenance manual		text	By Seller - Later		
DUTY							
C1		Service description		text	Dust control on retort loading, material transfer, filter press and filter cake discharge pick-up points		
C2		Duty (continuous/intermittent/standby)		text	Continuous during day shift		
C3		Location (indoor/outdoor)		text	Indoor		
C4		Cleaning method		text	Pulse-jet		
C5		Online / offline cleaning		text	Online with the provision for off-line		
C6		Flow		acfm	9200		
C7		Gas Temperature		°F	60 - 70		
C8		Air to Cloth Ratio		fpm	< 4		
C9		Can Velocity		fpm	< 250		
C10		Maximum flange to flange pressure drop		psi(g)	0.9		
C11		Design outlet dust loading		gr/scf	0.02 (or 2 mg/Nm^3)		
C12		Gas Composition:					
C13		N_2		vol%	79		
C14		O_2		vol%	20		
C15		H_2O		vol%	1		
C16		Dust Source			Mainly sulphonated activated carbon, and small quantities of HgO and Hg2Cl2		
C17		Dust Composition:					
C18		C		wt%	49 – 85		
C19		S		wt%	7.8 – 15		
C20		HgS		wt%	0 – 23.2		
C21		H_2O		wt%	0 – 20		
C22		Other		wt%	Trace		
C23		Apparent Density		lb/ft^3	35 – 100		
C24		Dust generated per material transfer event		lb	< 22 (based on 5% entrainment)		
C25		Material transfer events per year		#/yr	450		
C26		Duration per event		min	10		
C27		Operating Factor			0.23		
C28		Average inlet dust loading		gr/scf	< 5		
DUST COLLECTOR DETAILS							
D1		**Housing and Hopper**					
D2		No. of modules		#	By Seller	1	
D3		Inlet duct size		inch	By Seller	TBD	
D4		Outlet duct size		inch	By Seller	TBD	
D5		Dust Collector platforms, hand railings and ladders		text	Yes, as required	YES	
D6		Access door location & dimension		text	By Seller	INCLUGED BOLTED	
D7		Hopper inspection/cleanout door location & dimension		text	By Seller	BOLTED 12X12	
D8		Local air receiver included		Yes / No	Yes	YES	
D10		Hopper type		text	Pyramidal	YES 3 REQUIRES	
D11		Hopper capacity		ft^3	By Seller	WILL ADVISE	
D12		Hopper wall angle		degree	70 minimum	60 DEGREE	
D13		Hopper dimensions (width, length and height)		inch	By Seller	SEE DRAWING	
D15		Dust Collector overall dimensions (W x L x H)		ft	By Seller	SEE DRAWING	
D16		**Filter Elements**					
D17		Filter elements Seller's standard design		Yes / No	Yes	YES	
D18		Filter elements type		text	By Seller	ULTRA WEB SPUN BOND	
D19		Filter elements fabric material		text	By Seller	POLYESTER	
D20		Number of pleats per filter, if pleated		#	By Seller	171	
D21		Fabric permeability		text	By Seller	20 ft/min	
D22		Filter elements nominal dusty weight capacity		lb/ft^2	By Seller	40	
D23		Filter elements length		ft	By Seller	26"	
D24		Filter elements diameter		inch	By Seller	11.4X14.4	
D25		Filter elements weight		lbs	By Seller	17.7	
D26		Maximum continuous operating temperature		°F	By Seller	180F	
D27		Broken element detector		Y/N	Yes	YES	
D28		Total cloth area		ft^2	By Seller	3240 SQFT	
D29		Effective surface area per filter element		ft^2	By Seller	90	
D30		Number of filter elements		#	By Seller	36	
D31		Number of rows		#	By Seller	6	
D34		Filter elements installation/removal require special tools		Yes / No	No	NO	
D35		**Pulse Jet Cleaning System**					
D36		Source of air supply		text	Buyer-supplied instrument air		
D37		Air requirements with 2 years old bags		cfm	By Seller	18 -20 SCFM	
D38		Air required minimum and maximum pressure		psi(g)	By Seller	90 to 100 PSIG	
D39		Air average instantaneous flow rate per cleaning pulse		cfm	By Seller	1.7CFM	
D40		Approximate duration of each cleaning pulse		seconds	By Seller	.10TH SEC	
D41		Air consumption per cleaning pulse		cfm	By Seller	1.7	
D42		Number of cleaning pulses required per hour			By Seller	8	

HATCH™	EQUIPMENT DATA SHEET Dust Collector	H340940-PM010-50-107-0001

Item	Re	Title	Notes	UOM	Project Design Data	Supplier Data	Operation Data
D43		Air total normal consumption per hour		cfm	By Seller	1080	
D44		Air total maximum consumption per hour		cfm	By Seller	2000	
D57		**Rotary Valve (1400-FE-111)**					
D58		Number of rotor blades		#	Minimum 6	8	
D59		Rated rotor speed		rpm	By Seller	20	
D60		Maximum rotor speed		rpm	25	25	
D61		Maimum differential pressure		psi(g)	0.6	2PSI	
D62		Gas-tight		Yes / No	Yes	YES	
D63		Dimensions (width, length and height)		inch	By Seller	8X8X10	
D64		Weight		lbs	By Seller	400	
ELECTRICAL							
E1		Voltage / phase / frequency		V / ph / Hz	480 / 3 / 60		
E2		Manufacturer		text	By Seller	WEG	
E3		Quantity of motors required		number	1	3	
E4		**Rotary Valve (1400-FE-111)**					
E5		Model		text	By Seller	ACS MODEL 8X8CI	
E6		Rated power		kW	By Seller	.75 HP	
E7		Rated motor speed		rpm	By Seller	20	
E8		Drive type		text	By Seller	CHAIN	
E9		Variable frequency drive required		Yes / No	No	-	
INSTRUMENTATION							
F1		Instrument voltage for on/off signal		VDC	24	SPEED SWITCH	
F2		Instrument voltage for analog signal		VDC	24	NO	
F3		Analog field inputs and outputs		text	4-20mA with HART	NO	
F4		Seller to list instrumentation & manufacturer		text	by Seller	SE ATTACHED DRAWING	
F5		UPS power supply for Instrumentation		V / ph / Hz	120 / 1 / 60		
F6		…		text	by Seller		
F7		…		text	by Seller		
F8		…		text	by Seller		
F9		…		text	by Seller		
DIMENSIONS AND WEIGHTS							
G1		Total shipping weight		lbs	By Seller	5000	
G2		Heaviest item to ship		lbs	By Seller	5000	
G3		Heaviest item for maintenance		lbs	By Seller		
G4		Largest item dimensions		inch	By Seller	125X85X80	
MATERIALS OF CONSTRUCTION							
H1		Dust Collector material of construction		text	Carbon Steel	YES	
H2		Dust Collector hopper liner materials of construction		text	By Seller	NA	
H3		Dust Collector housing and hopper material thickness		inch	¼" (minimum)	10 GA REINFORCED	
H5		Rotary valve		text	By Seller	CAST	
NOTES							
1							
2							
3							
4							

Revision	Issue Status	Prepared By / Date	Checked By / Date	Approved By / Date	
A	Internal Review	D. Kluwak / 03-07-2012	R. Fukuzawa / 05-07-2012	S. Sennik / 05-07-2012	
B	Budget Enquiry	D. Kluwak / 06-07-2012	R. Fukuzawa / 06-07-2012	S. Sennik / 06-07-2012	

HATCH™	EQUIPMENT DATA SHEET Dust Collector	H340940-PM010-50-107-0001

Item	Re	Title	Notes	UOM	Project Design Data	Supplier Data	Operation Data
IDENTIFICATION							
A1		Equipment name		text	Dust Collector		
A2		Equipment tag number		text	1400-DC-101		
A3		Equipment model number		text	By Seller		
A4		Required quantity		text	1		
REFERENCE DOCUMENTS							
B1		Specification		text	H340940-PM010-50-123-0001		
B2		General Arrangement Drawing		text	By Seller		
B3		P&ID		text	By Seller		
B4		Maintenance manual		text	By Seller - Later		
DUTY							
C1		Service description		text	Dust control on retort loading, material transfer, filter press and filter cake discharge pick-up points		
C2		Duty (continuous/intermittent/standby)		text	Continuous during day shift		
C3		Location (indoor/outdoor)		text	Indoor		
C4		Cleaning method		text	Pulse-jet		
C5		Online / offline cleaning		text	Online with the provision for off-line		
C6		Flow		acfm	9200		
C7		Gas Temperature		°F	60 - 70		
C8		Air to Cloth Ratio		fpm	< 4		
C9		Can Velocity		fpm	< 250		
C10		Maximum flange to flange pressure drop		psi(g)	0.9		
C11		Design outlet dust loading		gr/scf	0.02 (or 2 mg/Nm^3)		
C12		Gas Composition:					
C13		N_2		vol%	79		
C14		O_2		vol%	20		
C15		H_2O		vol%	1		
C16		Dust Source			Mainly sulphonated activated carbon, and small quantities of HgO and Hg2Cl2		
C17		Dust Composition:					
C18		C		wt%	49 – 85		
C19		S		wt%	7.8 – 15		
C20		HgS		wt%	0 – 23.2		
C21		H_2O		wt%	0 – 20		
C22		Other		wt%	Trace		
C23		Apparent Density		lb/ft^3	35 – 100		
C24		Dust generated per material transfer event		lb	< 22 (based on 5% entrainment)		
C25		Material transfer events per year		#/yr	450		
C26		Duration per event		min	10		
C27		Operating Factor			0.23		
C28		Average inlet dust loading		gr/scf	< 5		
DUST COLLECTOR DETAILS							
D1		**Housing and Hopper**					
D2		No. of modules		#	By Seller	1	
D3		Inlet duct size		inch	By Seller	TBD	
D4		Outlet duct size		inch	By Seller	TBD	
D5		Dust Collector platforms, hand railings and ladders		text	Yes, as required	YES	
D6		Access door location & dimension		text	By Seller	INCLUGED BOLTED	
D7		Hopper inspection/cleanout door location & dimension		text	By Seller	BOLTED 12X12	
D8		Local air receiver included		Yes / No	Yes	YES	
D10		Hopper type		text	Pyramidal	YES 3 REQUIRES	
D11		Hopper capacity		ft^3	By Seller	WILL ADVISE	
D12		Hopper wall angle		degree	70 minimum	60 DEGREE	
D13		Hopper dimensions (width, length and height)		inch	By Seller	SEE DRAWING	
D15		Dust Collector overall dimensions (W x L x H)		ft	By Seller	SEE DRAWING	
D16		**Filter Elements**					
D17		Filter elements Seller's standard design		Yes / No	Yes	YES	
D18		Filter elements type		text	By Seller	ULTRA WEB SPUN BOND	
D19		Filter elements fabric material		text	By Seller	POLYESTER	
D20		Number of pleats per filter, if pleated		#	By Seller	171	
D21		Fabric permeability		text	By Seller	20 ft/min	
D22		Filter elements nominal dusty weight capacity		lb/ft^2	By Seller	40	
D23		Filter elements length		ft	By Seller	26"	
D24		Filter elements diameter		inch	By Seller	11.4X14.4	
D25		Filter elements weight		lbs	By Seller	17.7	
D26		Maximum continuous operating temperature		°F	By Seller	180F	
D27		Broken element detector		Y/N	Yes	YES	
D28		Total cloth area		ft^2	By Seller	3240 SQFT	
D29		Effective surface area per filter element		ft^2	By Seller	90	
D30		Number of filter elements		#	By Seller	36	
D31		Number of rows		#	By Seller	6	
D34		Filter elements installation/removal require special tools		Yes / No	No	NO	
D35		**Pulse Jet Cleaning System**					
D36		Source of air supply		text	Buyer-supplied instrument air		
D37		Air requirements with 2 years old bags		cfm	By Seller	18 -20 SCFM	
D38		Air required minimum and maximum pressure		psi(g)	By Seller	90 to 100 PSIG	
D39		Air average instantaneous flow rate per cleaning pulse		cfm	By Seller	1.7CFM	
D40		Approximate duration of each cleaning pulse		seconds	By Seller	.10TH SEC	
D41		Air consumption per cleaning pulse		cfm	By Seller	1.7	
D42		Number of cleaning pulses required per hour			By Seller	8	

HATCH™	EQUIPMENT DATA SHEET Dust Collector	H340940-PM010-50-107-0001

Item	Re	Title	Notes	UOM	Project Design Data	Supplier Data	Operation Data
D43		Air total normal consumption per hour		cfm	By Seller	1080	
D44		Air total maximum consumption per hour		cfm	By Seller	2000	
D57		**Rotary Valve (1400-FE-111)**					
D58		Number of rotor blades		#	Minimum 6	8	
D59		Rated rotor speed		rpm	By Seller	20	
D60		Maximum rotor speed		rpm	25	25	
D61		Maimum differential pressure		psi(g)	0.6	2PSI	
D62		Gas-tight		Yes / No	Yes	YES	
D63		Dimensions (width, length and height)		inch	By Seller	8X8X10	
D64		Weight		lbs	By Seller	400	
ELECTRICAL							
E1		Voltage / phase / frequency		V / ph / Hz	480 / 3 / 60		
E2		Manufacturer		text	By Seller	WEG	
E3		Quantity of motors required		number	1	3	
E4		**Rotary Valve (1400-FE-111)**					
E5		Model		text	By Seller	ACS MODEL 8X8CI	
E6		Rated power		kW	By Seller	.75 HP	
E7		Rated motor speed		rpm	By Seller	20	
E8		Drive type		text	By Seller	CHAIN	
E9		Variable frequency drive required		Yes / No	No	-	
INSTRUMENTATION							
F1		Instrument voltage for on/off signal		VDC	24	SPEED SWITCH	
F2		Instrument voltage for analog signal		VDC	24	NO	
F3		Analog field inputs and outputs		text	4-20mA with HART	NO	
F4		Seller to list instrumentation & manufacturer		text	by Seller	SE ATTACHED DRAWING	
F5		UPS power supply for Instrumentation		V / ph / Hz	120 / 1 / 60		
F6		…		text	by Seller		
F7		…		text	by Seller		
F8		…		text	by Seller		
F9		…		text	by Seller		
DIMENSIONS AND WEIGHTS							
G1		Total shipping weight		lbs	By Seller	5000	
G2		Heaviest item to ship		lbs	By Seller	5000	
G3		Heaviest item for maintenance		lbs	By Seller		
G4		Largest item dimensions		inch	By Seller	125X85X80	
MATERIALS OF CONSTRUCTION							
H1		Dust Collector material of construction		text	Carbon Steel	YES	
H2		Dust Collector hopper liner materials of construction		text	By Seller	NA	
H3		Dust Collector housing and hopper material thickness		inch	¼" (minimum)	10 GA REINFORCED	
H5		Rotary valve		text	By Seller	CAST	
NOTES							
1							
2							
3							
4							

Revision	Issue Status	Prepared By / Date	Checked By / Date	Approved By / Date	
A	Internal Review	D. Kluwak / 03-07-2012	R. Fukuzawa / 05-07-2012	S. Sennik / 05-07-2012	
B	Budget Enquiry	D. Kluwak / 06-07-2012	R. Fukuzawa / 06-07-2012	S. Sennik / 06-07-2012	

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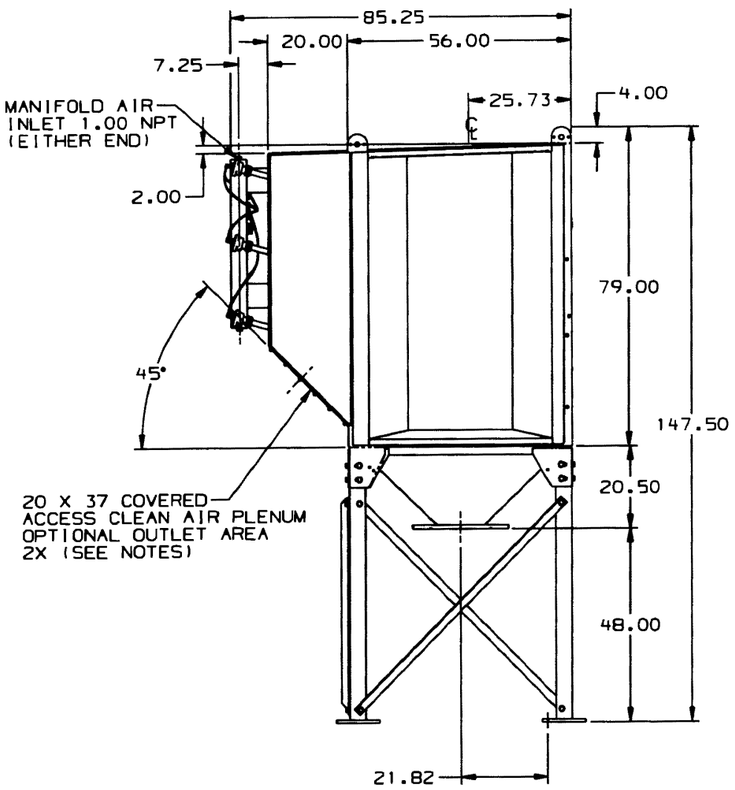
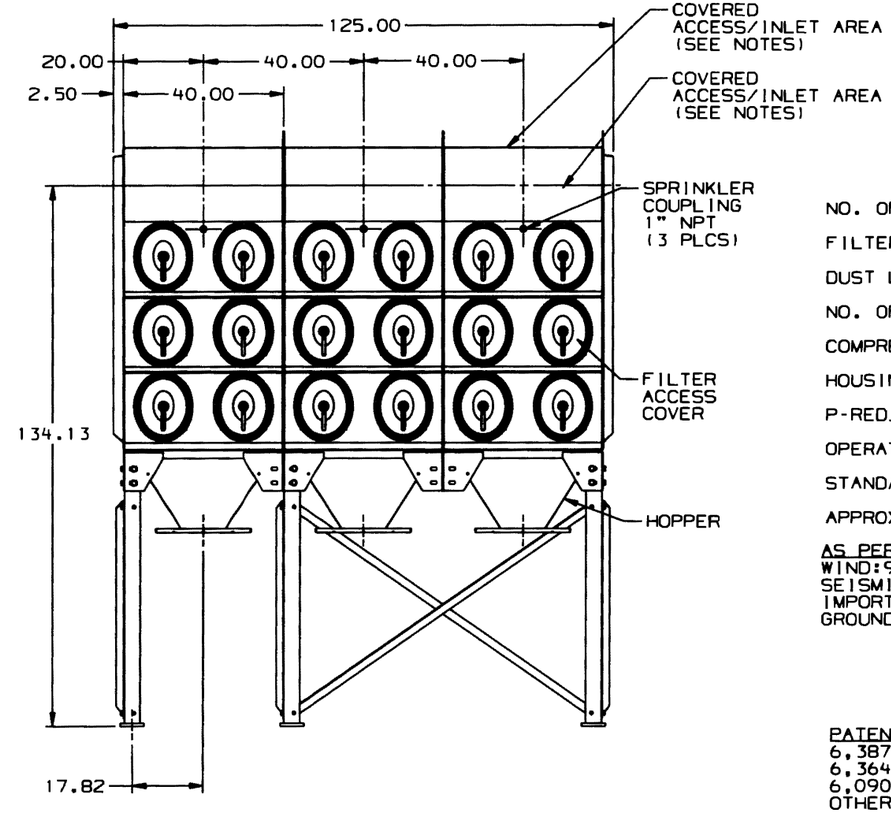
DWG NO.			
REV	ZONE	REVISION DESCRIPTION	APPROVAL/DATE
6		REVISED PICTORIALLY, REVISED MULTIPLE SPECS 2009A6128	JAS MAR 12, 2009



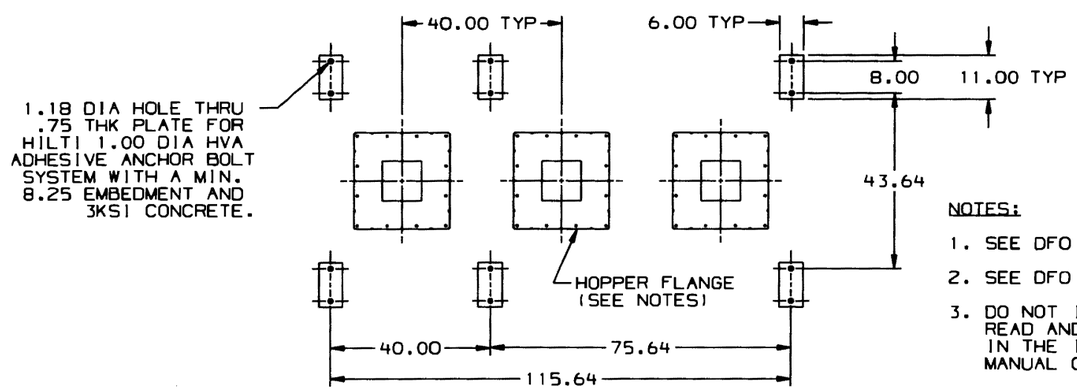


SPECIFICATIONS
MODEL DFO 3-36

NO. OF FILTERS	36
FILTER DIMENSIONS	11.4 x 14.4 OVAL X 26 LG.
DUST LOAD	40 LB PER CARTRIDGE DFO
NO. OF VALVES	18
COMPRESSED AIR REQUIRED	18 SCFM @ 90-100 PSIG
HOUSING RATING	-20" WG
P-RED	.40 BAR
OPERATING TEMP.	150°F MAX.
STANDARD FINISH	BLUE
APPROX WT	6060 LB.

AS PER IBC 2006 SPECIFICATIONS:
WIND: 90 MPH EXPOSURE C
SEISMIC SPECTRAL ACCELERATION, Ss=1.5 & S,=0.6
IMPORTANCE FACTOR, I=1.0
GROUND SNOW LOAD, Pg=40 PSF

PATENT NUMBERS
6,387,162 6,488,746
6,364,921 6,368,388
6,090,173 5,562,746
OTHER PATENTS PENDING



ANCHOR BOLT PLAN

NOTES:

1. SEE DFO 9337401 FOR INLET / OUTLET OPTIONS.
2. SEE DFO 9337301 FOR OPTIONS AND ACCESSORIES.
3. DO NOT INSTALL OR OPERATE THIS EQUIPMENT UNTIL HAVING READ AND UNDERSTOOD THE INSTRUCTIONS AND WARNINGS IN THE INSTALLATION AND OPERATION MANUAL. FOR A REPLACEMENT MANUAL CONTACT DONALDSON COMPANY, INC. (800) 365-1331.

THIS DOCUMENT IS NOT CERTIFIED FOR CONSTRUCTION PURPOSES AND IS SUBJECT TO CHANGE WITHOUT NOTICE.

MATERIAL	RELEASE NO. 2000A7012	TITLE DFO 3-36 DUST COLLECTOR WITH HOPPER AND LEGS	Donaldson Co., Inc. Minneapolis, MN USA
	DATE JUN 2000		
	EXP DATE		
	DWN DN GAWBOY	NUMBER DFO 9329805	
REFERENCE	DATE DEC 21, 1999		
	CHK R. BICK		
	DATE DEC, 1999	SCALE NONE / SHEET 1 OF 1 / REVISION	
PREVIOUS DRAWING NO.	APVD R. BICK	C/C UG/CADD / 6	
DO NOT SCALE / TOLERANCES UNLESS OTHERWISE SPECIFIED 2 PL ± 3 PL ± ANGLES ± °	DATE DEC, 1999	SECTIONAL SIZE / OUTLINE SIZE	1 AF
	THIRD ANGLE PROJECTION	DESIGN CONTROL A004 / DWG LOCATION A101	VERSION A

COPYRIGHT © DONALDSON COMPANY, INC.

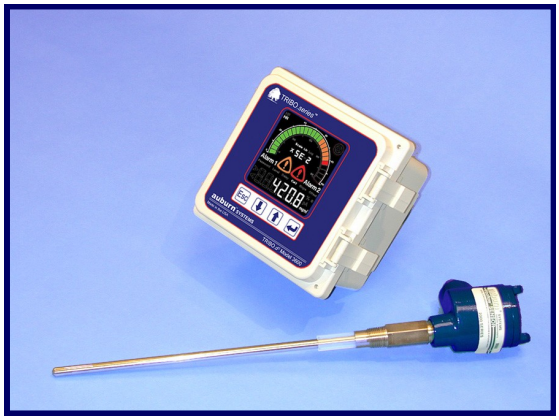
TORIT DOWNFLO OVAL

Mar 3/6/09

Part: 9329805_A_s_9329805_A_SECT_6 Date: 12-Mar-09 Time: 13:33

TRIBO.*dsp* U3600

TRIBO.*dsp* U3600 is an innovative, self checking, particulate monitor ideal for dust collector compliance and maintenance applications. The advanced *unified* DC/AC design, with flexible scaling and alarm features, also allows the U3600 to be used for process particulate flow applications.



The U3600 provides a 4-20mA output and two independent SPDT relay contacts for alarm purposes. The easy-to-read, four color screen for real-time emission levels and alarm status is continuously on display. An optional digital output (Ethernet/IP, Modbus TCP) is available for direct connection to plant network systems (PLC's etc.) or bag leak detection systems managed by TRIBO.vision software.

Easy-to-Read Screen

TRIBO.*dsp* U3600 Features:

- Wide dynamic range, used to monitor flow or emissions applications
- Continuous 4-20 mA output
- Two (2) independent relays for alarm purposes
- Signal can be calibrated to display mg/m^3
- No zero or drift adjustments required
- Automatic probe contamination check
- Password protection

About TRIBO.*dsp* Technology

The **TRIBO.*dsp* U3000** series includes an advanced operating platform, which incorporates more than a quarter century of Auburn's electrostatic particulate measurement experience. The TRIBO.*dsp* series unifies DC impaction (triboelectric) *and* AC (induction) flow signals for superior accuracy, reliability, and repeatability. This proprietary platform has proven to be more stable and accurate than AC-only, induction, and electrodynamic detectors.

TRIBO.*dsp* Technology

- Unified AC/DC signal processing is more accurate
- Superior signal filtering eliminates electrical noise interference for stable measurement
- Widest dynamic range and highest resolution for more process applications

Competition's Technology

- Isolated AC or DC only signal processing is less accurate
- Inferior signal filtering creates instability due to factory floor electrical noise
- Limited dynamic range and resolution is un-suitable for many process applications

© 2011 Auburn Systems, LLC

TRIBO.*dsp* U3600™

U3600 ELECTRONICS SPECIFICATIONS	
Electronic Enclosure	Polyester NEMA 4X with 3 or 4 3/4" conduit fittings
Power	85 to 260 VAC (12 VDC or 24 VDC optional)
Power Consumption	5 watts maximum load
Operating Temperature	-22° - 185° F (-30° - 85° C)
Humidity Range	0 - 95% non-condensing
Hazardous Rating	Designed intrinsically safe
Dynamic Range	1 pA - 10,000,000 pA - Standard; 0.1 pA – 1,000,000 pA - Optional
Resolution/Precision (pA)	1 pA Standard; 0.1 pA Optional
Sensitivity Range	Typical .0005gr/dscf (1mg/m^3) concentration detectable
Output	2 SPDT relay 5 amp @ 28 VDC or 250 VAC 100VA 2 independent alarm set points, high or low (0 -100%) 2 independent alarm time delays (0 - 999 sec.) Isolated 4-20mA compatible loop or self-powered network, with user selectable scaling Industrial Ethernet/IP and Modbus TCP optional
Display	3"x3" 4-color LCD, 8 decade log or 0 - 100% analog gauge, 6-digit display, dual alarm indicators
Other Features	Password protection for user settings, user selectable calibrated (mg/m^3) mode Automatic contamination check, Unlimited scaling options
U3600 SENSOR SPECIFICATIONS	
Remote Sensor Enclosure	NEMA 4
Sensor Probe	Probe - 316 stainless steel (standard); other materials available
Wetted Metal Parts	All others - 303 stainless steel minimum grade
Insulation	Extended High Performance (PFA)- standard, -40° - 475°F (-40° - 240°C) Ceramic (High Temperature or Pressure) -40° - 1000°F (-40° - 540°C) Consult factory or your local representative for proper recommendations
Probe Insertion Length	Standard probe lengths: 3, 6, 12, 18, 30, 36 inch (7.6, 15.2, 30.5, 45.7, 76.2, 91.4 cm) (specify to reach approximately mid-duct or further)
Installation	Weld the supplied fitting into the pipe or duct and insert sensor
Remote Sensor Cable	Special coaxial cable; temperature range: -60° - 400°F (-50° - 200°C) Maximum distance: contact factory
Wiring Connections	¾ inch NPT female conduit fitting
Pipe/Duct Connections	½ inch NPT male fitting or 1" quick release ferrule
Options	Wire rope sensors; In-line ring sensors; Venturi (fugitive) dust sensors

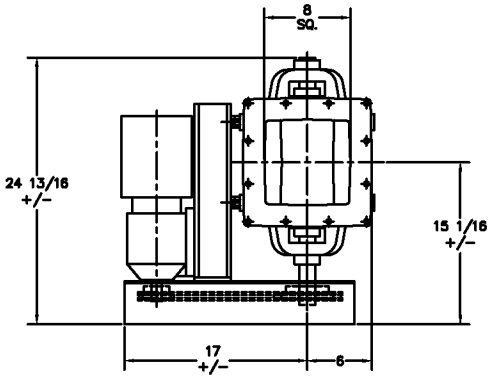
We are confident we can satisfy your monitoring application or technical support needs. For additional information or to request a quote, please contact us or visit ***www.auburnsys.com.***

Emissions Monitoring

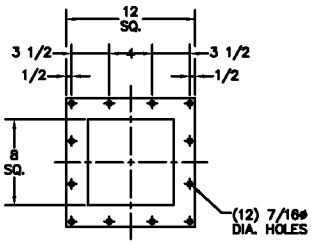
- Bag Leak Detection
- Dust Collector Maintenance
- Product Loss Prevention
- Maintenance Reduction
- Equipment Protection

Process Applications

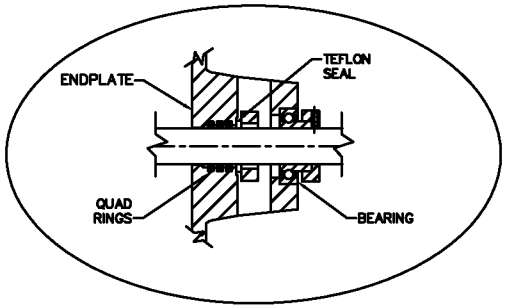
- Process Optimization
- Particle Flow Velocity
- Gravity Feed
- Injection Flow
- Material Flow Control



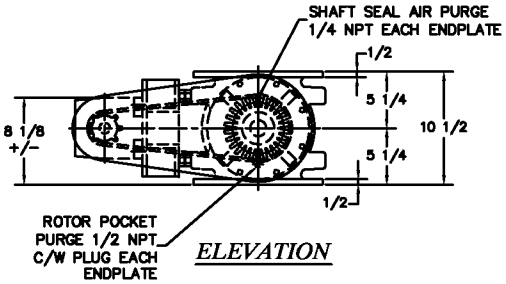
PLAN



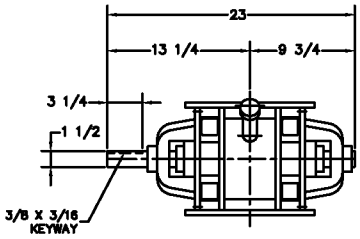
FLANGE DETAIL



ACST-4 SEAL DETAIL



ELEVATION



ELEVATION
(DRIVE NOT SHOWN)

VALVE INFORMATION					
HOUSING	END PLATE	ROTOR	BLADE TIP		
MAT'L	MAT'L	MAT'L	TYPE	MAT'L	CLEARANCE
C.I.	C.I.	M.S.	T.B.D.	M.S.	.004–.007

MOTOR						
MFG.	H.P	VOLTAGE	ENCLOSURE	CL & DIV.	FRAME SIZE	R.P.M.
INLINE GEARMOTOR	3/4	T.B.A.	TEFC	STD. EFF.	T.B.D.	1800

REDUCER			
MFG.	FRAME	SIZE	R.P.M.
INLINE GEARMOTOR	T.B.D.	T.B.D.	APPOX. 45

CHAIN DRIVE				OPERATING CONDITIONS	
DRIVE		DRIVEN		TEMP.	SEALS
SIZE	BORE	SIZE	BORE		
60B12	T.B.D.	60B26	1 1/2ø	AMBIENT	ACST–4

CONVEYING INFORMATION	
PRODUCT HANDLED	
PRODUCT DENSITY	
DISPLACEMENT/ REV 100%	.20
VALVE SPEED	FINAL RPM 20
CONVEY RATE	

NOTES

1) ALL DIMENSIONS IN INCHES
2) CONSTRUCTION: CAST GREY IRON HOUSING AND ENDPLATES (CL.40,217 BRINELL) , FABRICATED CARBON STEEL ROTOR, OPEN END FIXED WITH RELIEVED TIPS (1/8" LAND) CLOSE TOLERANCE. C.C.W. ROTATION LOOKING AT THE DRIVE END.
3) BOTTOM FLANGE BOLT PATTERN MATCHES TOP FLANGE BOLT PATTERN
4) PAINT: STANDARD METAL PREPARATION, EXTERIOR PRIMED AND ONE COAT FINISH ENAMEL – ACS BLUE, DRIVE GUARD IS HI–VISIBILITY YELLOW, MOTOR/GEAR MOTOR IS MANUFATURERS STANDARD FINISH.
5) ACST–4 SHAFT SEAL (SEE DETAIL)
6) OPTIONS:
   - ROTOR: ADJUSTABLE TIPS (HARDENED STEEL OR (STAINLESS STEEL)
   - 304 STAINLESS STEEL ROTOR
   - CLOSED END ROTOR
   - 10 VANE ROTOR
   - SHALLOW POCKET REDUCED VOLUME ROTORS
   - HOUSING: HARD CHROME INTERIOR BORE
   - ENDPLATE: HARD CHROME INTERIOR
   - WEAR RESISTANT EXTENDED LIFE DESIGN CONSISTING OF CERAMIC LINED BORE TUNSTEN CARBIDE EDGES (PLASMA SPRAY)
   - SHAFT SEAL AIR PURGE 1/4 NPT EACH ENDPLATE
   - ROTOR POCKET PURGE 1/2 NPT C/W PLUG EACH ENDPLATE
   - HIGH TEMPERATURE DESIGN (200–450 DEG. F)
   - REMOVABLE INSPECTION PANEL

ANCASTER CONVEYING SYSTEMS LTD.
611 ARGYLE ST. N CALEDONIA ONTARIO N3W–1M1
TEL. (905) 765–2004 FAX. (905) 765–4491

TITLE: ACS MODEL 8 X 8 C.I. ROTARY VALVE, GENERAL ARRANGEMENT

FOR: GENERAL USE ONLY

P.O: QUOTE

ISSUE	DATE	REVISION	BY	SCALE: 1"=12"	DRAWN BY: G.T	B-2250
				DATE: MAY/04/04	CHECKED:	

F.F.P. Systems Inc.
2542 Wharton Glen Avenue, Mississauga, Ont. L4X 2A9
Phone: 905-270-9872 Fax: 905-270-9475

Quotation No. Q-1020

June 27, 2012

Mr. Duncan Kluwak
PDG Mechanical
Hatch
2800 Speakman Drive
Mississauga, Ontario, L5K 2R7

Tel: 905-403-4200 ext 3062
Fax: 905-855-8270

Email: dkluwak@hatch.ca

Dear Mr. Kluwak,

We are pleased to submit our budgetary quote # Q-1020 for your filter press inquiry for your H340940-PM006 filter press project:

One (1) only – F.F.P. Systems Inc. Model: S-AO-630-08-17/25-32G-0.153/0.225 Filter Press.
Size: 630mm sq. x 17 chambers and expandable to 25 chamber plate pack, sidebar design skeleton complete with air/oil double acting hydraulic cylinder. Filter press designed for 100 PSI operation. Filter plate pack is the recess gasketed (CGR) style of molded high density polypropylene construction, center feed, to provide 32mm (1.26") cake, complete with handles. Filter press volume – 0.153m^3 expandable to 0.225m^3.

The filter press package is complete with the following:

- Mechanized Air/Oil hydraulic closure using a double acting hydraulic cylinder.
- One – Set of polypropylene filter plates as described above.
- One – Set of polypropylene filter cloths (CGR) installed on filter plates.
- One – Set of extension shaft.
- Epoxy coated carbon steel filter press skeleton.
- One – Set of Filter Press electrical control panel complete with PLC, push buttons, pilot lights. Programming for automatic filter press functioning with locked manual override for local control and adjustment of timing and pressures and for maintenance requirements

- One – Set of pneumatic operated bomb bay style drip trays constructed of epoxy painted carbon steel skeleton and polypropylene trays with PVC launder.

- One – Set of feed inlet and filtrate outlet piping manifolds constructed of PFA lined carbon steel, arranged for filtration, cake air blow, cake wash and core blow. All valves are automatic PFA lined plug valve complete with pneumatic double acting actuator, solenoid valve and limit switch.

- One – Set of mechanized pneumatic motor driven filter plate shifter complete with Plate Shaker system which separates the filter plates one at a time and automatically remove the filter cake without manual operator intervention.

- One – Set of Light Curtains on operator's side of filter press.

- One – Set of Wire Mesh Guard on non-operator's side of filter press.

- Two – Sets of Pull Cord Switches on both sides of press.

- One – Set of carbon steel Cake Discharge Chute complete with polypropylene liner on the inside of chute.

- Two – Operating & Maintenance manuals.

PRICE …… $146,850.00 / each

Option:

Although the specification requests an air/oil pumping system, an electrohydraulic system may be more appropriate for this application. The electrohydraulic system is a closed loop system and is not prone to failure due to atmospheric conditions as may be the case with pneumatic parts that have breathers. All other design and functioning of the filter press will remain the same.

Price adder……..$14,350.00 each

All applicable taxes and duties are extra.
F.O.B.: FFP Systems Inc. Mississauga, Ontario
Payable in Canadian dollars.
Prices are firm for 30 days.

Terms of Payment
40% with receipt of order
50% with readiness for shipping
10% hold back upon start up or 90 days whichever comes first

Not included in quote
- Unloading of equipment
- Installation and Erection
- Field painting (touch-up)
- Interconnecting piping.

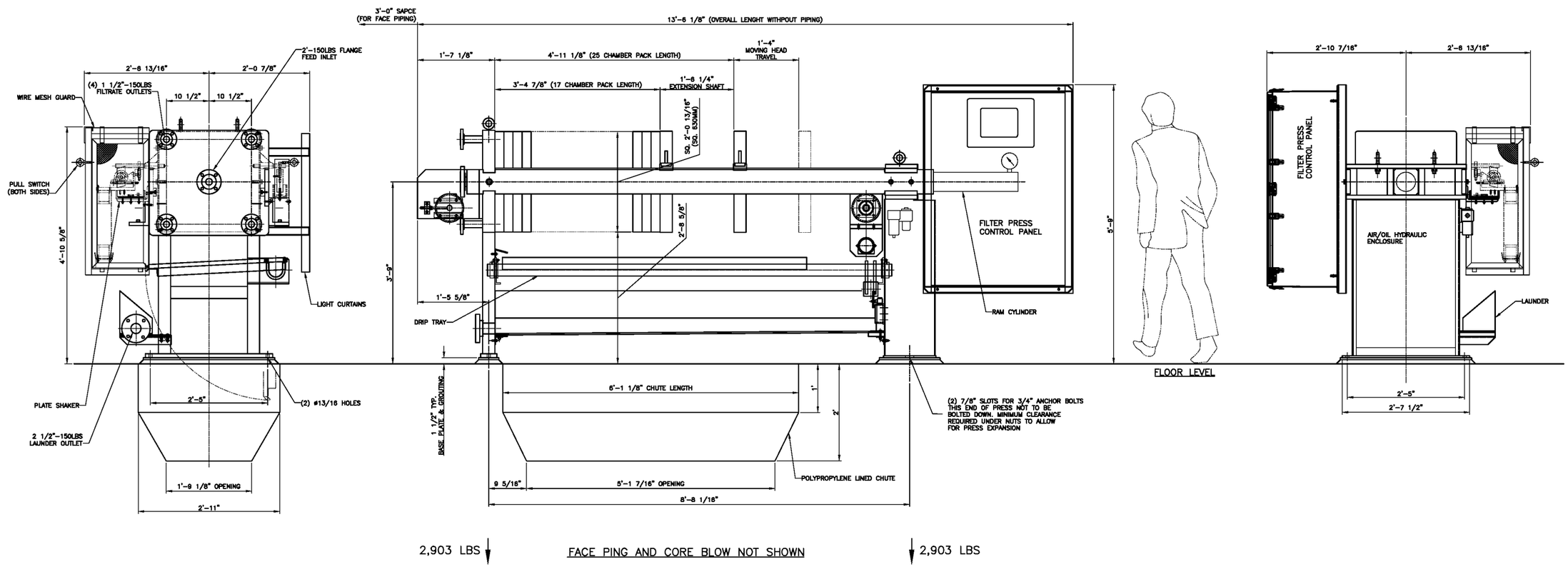
Drawing submittal and delivery
Drawing submittal: Approximately 2 weeks after receipt of order.
Delivery: Approximately 18 weeks after receipt of approved submittal drawings.

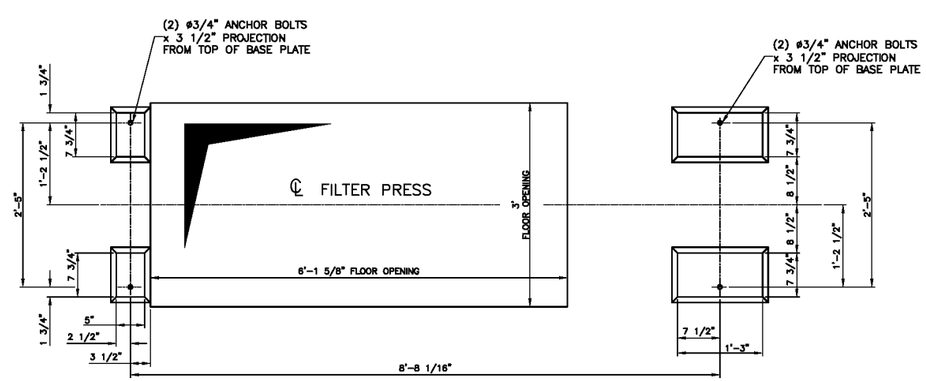
If you have any questions, please do not hesitate to contact this office.

Best regards,

Damir Fox.
President
FFP Systems Inc.
E-mail: dfox@foxfluidpower.com

REVISIONS					
ZONE	REV	DESCRIPTION	DATE	DWN	APRVD
	△				





OPERATOR'S SIDE

FOUNDATION PLAN
(CHUTE MOUNTING NOT SHOWN)

NOTES:

1. EMPTY WEIGHT 25 CHAMBERS 4,566 LBS.
   FULL WEIGHT 25 CHAMBERS 5,806 LBS,
   (BASED ON CAKE WEIGHT 1,240 LBS)
2. PRESS TO BE HANDED AS SHOWN UNLESS OTHERWISE SPECIFIED.
3. ALL ANCHOR BOLTS TO BE SUPPLIED BY OTHERS.
4. CAKE THICKNESS = 32mm (1.26").
5. PLATE MATERIAL = POLYPROPYLENE.
6. FILTER PRESS IS INITIALLY SET UP FOR 17 CHAMBERS AND IS EXPANDABLE TO 25 CHAMBERS.
7. (1) UNIT REQUIRED.
8. MAX. OPERATING PRESSURE 100 PSI (7 BAR).
9. FILTER CAKE VOLUME: 17 CHAMBERS -- 0.153 CU.M.
   25 CHAMBERS -- 0.225 CU.M.
10. PAINT: 2 PART EPOXY COATING. COLOUR: SAFETY BLUE.

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UNLESS OTHERWISE SPECIFIED, TOLERANCES ON:
FRACTIONS ±1/16"
1 DECIMALS ±0.08"
2 DECIMALS ±0.03"
3 DECIMALS ±0.01"
√ FINISHED MACHINE 125 µin.
BREAK ALL SHARP EDGES.

F.F.P. Systems Inc.
2542 Wharton Glen Avenue, Mississauga, Ontario, L4X 2A9

TITLE: 630mm SIDEBAR FILTER PRESS, GA HATCH
MODEL: S-A0-630-08-17/25-32N-0.153/0.225

DWN BY:	DATE:	REF. NO:	THIRD ANGLE PROJECTION:
L.Z.	28/06/12		
CHK'D BY:	DATE:	SCALE: NTS	REVISION 0
APPR'D BY:	DATE:	JOB NO: SALES	DWG NO: SALES-Q-1020-GA
			SHEET: 1 OF 1

FILTER PRESS FUNCTION	V1 (NO)	V2 (NC)	V3 (NC)	V6 (NO)	V7 (NO)	V8 (NO)	V9 (NO)	V10 (NC)	V11 (NC)	V12 (NC)	FEED PUMP	CYCLE CONTROL	CYCLE RANGE
FILTRATION		●	●		●	●	●				●	PRESSURE / FLOW	0–100 PSI / LOW FLOW
THOROUGH CAKE WASH		●								●		TIME	0–20 MIN.
THOROUGH CAKE BLOW	●							●				TIME	0–15 MIN.
CORE BLOW				●					●	●		TIME	0–1 MIN.
DRAIN/FILTRATE DRIP	●			●	●	●	●					TIME	0–3 MIN.
STANDBY	●			●	●	●	●						

* ● – INDICATES VALVE OPEN & PUMP ON
NO – VALVE NORMALLY OPEN IN 'STANDBY MODE'
NC – VALVE NORMALLY CLOSED IN 'STANDBY MODE'

VALVE DESCRIPTIONS:

V1 -- DRAIN/AIR OUT VALVE
V2 -- FILTRATION OUT VAVLE
V3 -- FEED IN VALVE
V6 -- CORE RELIEF VALVE
V7 -- ISOLATION VAVLE
V8 -- ISOLATION VALVE
V9 -- ISOLATION VALVE
V10 -- CAKE BLOW VALVE
V11 -- CORE BLOW VALVE
V12 -- CAKE WASH VALVE

REVISIONS					
ZONE	REV	DESCRIPTION	DATE	DWN	APRVD
	1				

LEGEND:

-- AUTOMATIC BALL VALVE (BY FFP SYSTEMS) WITH FLANGE CONNECTION

-- AUTOMATIC BALL VALVE (BY FFP SYSTEMS) WITH NPT CONNECTION

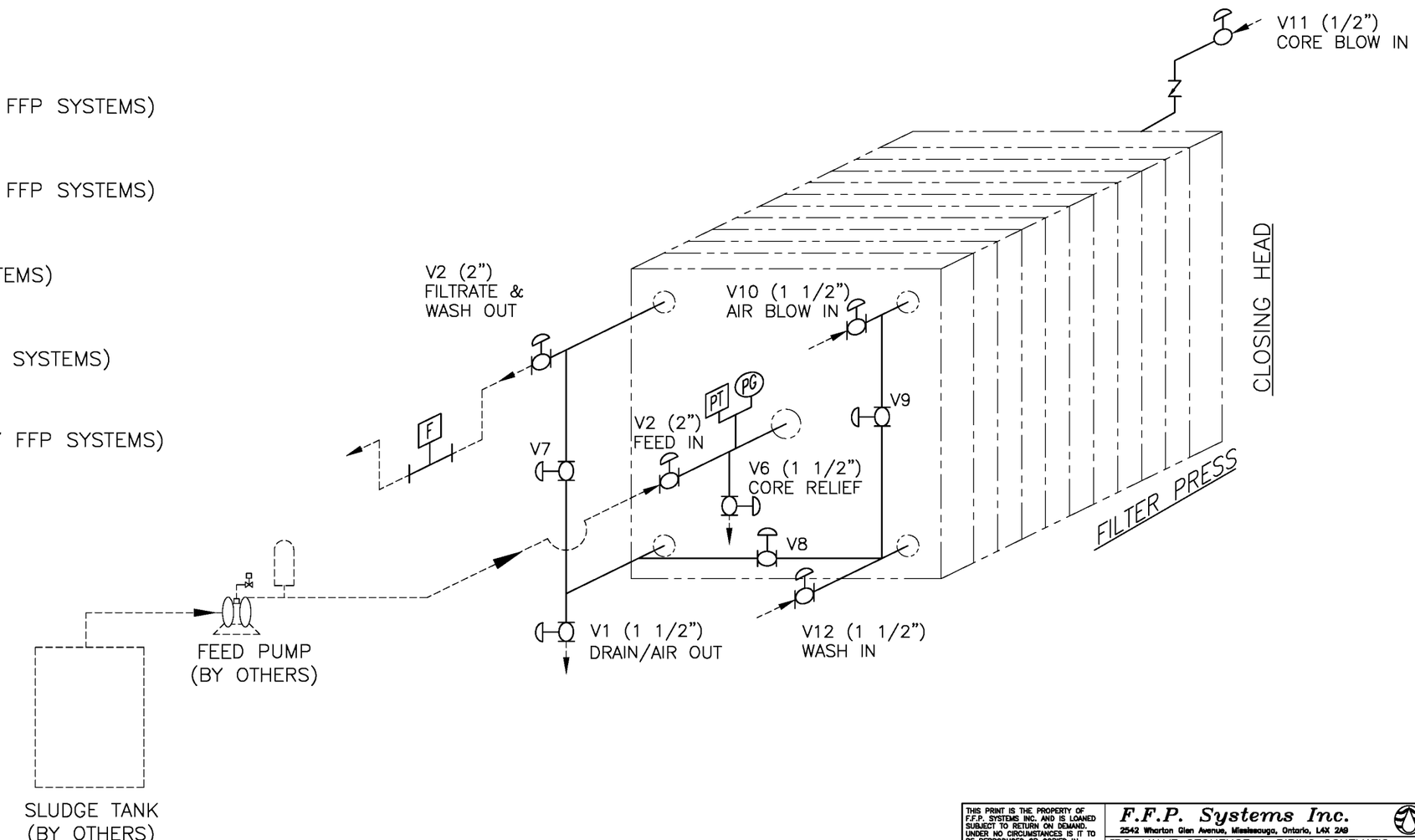
-- CHECK VALVE (BY FFP SYSTEMS)

-- FLOW TRANSMITTER (BY FFP SYSTEMS)

-- PRESSURE TRANSMITTER (BY FFP SYSTEMS)

-- PIPING (BY FFP SYSTEMS)

-- PIPING (BY OTHERS)



NOTE: FEED PUMP SUPPLIED AND CONTROLLED BY OTHERS.

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UNLESS OTHERWISE SPECIFIED, TOLERANCES ON:
FRACTIONS ±1/16"
1 DECIMALS ±0.08"
2 DECIMALS ±0.03"
3 DECIMALS ±0.01"
√ FINISHED MACHINE 125 µin.
BREAK ALL SHARP EDGES.

F.F.P. Systems Inc.
2542 Wharton Glen Avenue, Mississauga, Ontario, L4X 2A9

TITLE: VALVE SEQUENCE & PIPING SCHEMATIC
HATCH
MODEL: S–AO–630–08–17/25–32N–0.153/0.225

DWN BY:	DATE:	REF. NO:	THIRD ANGLE PROJECTION:	
L.Z.	29/06/12			
CHK'D BY:	DATE:	SCALE: NTS	DWG NO: SALES–Q–1020–P&ID	REVISION 0
APPR'D BY:	DATE:	JOB NO: SALES		SHEET: 1 OF 1

QUOTATION

Batch Process Distiller 2 x 200

No. 12584

2011-04-19

For

Via

Eric Uram, Headwater

This quotation is valid for 60 days from quotation date.

MRT System International AB converts hazardous waste into non-hazardous clean and marketable by-products.

Welcome to MRT System International AB

At MRT we are committed to delivering user-friendly, high quality products, and we know that a good business relationship is a matter of trust.

It is a well known fact that that the use of mercury has led to local, regional and global pollution. Wind, rain and snow carry airborne mercury long distances before it is deposited on land and in water. The pollution is causing severe damage to our eco system, so we must treat the mercury contaminated waste in a responsible way. MRTs' recycling technology solves the problem with mercury contaminated waste. After processing the material, the by-products can either be safely landfilled or reused in new applications.
The mercury distiller was invented by us already in 1979 and we have since then designed and built lamp recycling equipment focusing on all kinds of requirements and demands. Our experience and know-how has resulted in nearly 300 installations worldwide.

Some references:

Manufacturers: GE Lighting, Xiamen Top Star Lighting, Philips Lighting, Zhejiang Yankon Group, OSRAM, Foshan Electric & Lighting, Panasonic, China Electric, Saes Advanced Technologies

Recyclers: Veolia, Indaver, Vaersa, AmbiCare, Nike, Relight, Wiser, CMA Eco Cycle, Perfect Recycling, ADNOC, Fluorecycle

A full reference list is attached in Appendix F.

We have the pleasure to submit our proposal for one (1) Batch Process Distiller BPD 2 x 200 as per the technical part of quotation on the conditions in the commercial part of quotation:

Technical Part of Quotation

1. Scope of Supply & Technical Description

Supply of the following equipments and services

- One (1) Batch Process Distiller BPD 2 x 200
- Installation, commissioning and training

2. Scope of Services

2.1 Factory Acceptance Test (FAT)

To confirm the mechanical and electrical functionality, the equipment is tested in your presence at our workshop prior to dispatch.
Four (4) weeks prior to the FAT an invitation to witness the FAT at your own expense will be sent to you. The results of the FAT will be documented in a FAT protocol issued by us and is to be signed by both parties.

2.2 Transport

Transport of the equipment to CIF US port according to Incoterms 2000.

2.3 Installation, Commissioning and Training

The installation, commissioning and training of your personnel will be carried out during day-time shifts for 10 consecutive days (excluding official holidays and weekends).

Should the installation, commissioning and training require more time and this is due to reasons outside our control, you will be charged the extra time and cost spent.

Training material such as pamphlets, manuals etc. will be written in English.

<u>Installation Preparations</u>

Prior to installation, you will, at your own cost, carry out the preparation work for the installation according to our requirements. We will provide specifications defining these requirements.

Installation

Upon arrival of the equipment at your site, we will provide 1 technician to supervise and execute the installation. You will provide 2 personnel and required tools and facilities for the installation work.

Commissioning

After completion of the installation the equipment will be commissioned.

Training and Training Certificate

During installation and commissioning we will train your personnel in the operation and maintenance of the equipment, as well as inform about the risk of handling mercury. The training will be carried out in English. If required you shall provide interpretation at your own cost. The training should comprise at least 3 full days. If the installation and commissioning is delayed outside our control such that the required 2 days training cannot be completed within the total number of days stated above, the additional time needed to ensure proper training must be compensated for by you.

Each employee who completes the training will be given a certificate as to his/her ability to operate the equipment.

Take Over Protocol

After completed installation and commissioning, we will issue a take over protocol to be signed by both parties.

The protocol confirms that:

A. The equipment supplied complies with the scope of supply and the specifications
B. That the installation, commissioning and training have been carried out accordingly.

A sample take over protocol is enclosed in Appendix D

2.4 Manuals and Instructions

We will provide operation and maintenance manuals describing how the equipment should be operated and maintained. They also describe replacement intervals for wear parts. These manuals are written in English.

Routine service, repair and preventive maintenance on the equipment must always be executed only by personnel that have been trained by us or by our own service personnel or by persons authorised by us to do such work

2.5. Warranty Test

Prior to expiry of the warranty period you will notify us of a suitable time for carrying out a warranty test. We will carry out the warranty test free of charge.
The purpose of a warranty test is to make sure that the equipment is working properly and to correct any warranty issues should such occur. We will issue a certificate at completion of the warranty test.

2.6 After Sales Service

Our ambition is to develop a long term relation with our clients and to support them throughout the life time of the equipment. We therefore offer after sales services and supply of spare parts/wear parts at discounted rates under a separate service agreement. The purpose of the service agreement is to maintain the high availability, productivity, quality and safety of the equipment.

See sample in Appendix E

3. Project Management

At contract award the parties will appoint their respective project managers.

Commercial Part of Quotation:

4. Prices:

All prices exclude taxes, wages and fees payable outside Sweden.

Denomination	Price (US $)
One (1) Batch Process Distiller BPD 2 x 100	645 000
One (1) set of spare parts/wear parts for BPD 2 x 100	included
Transport to US port (Estimated)	4000
Installation, commissioning and training	15 000
Total:	664 000

Currency clause:
At receipt of the advance payment we will secure the exchange rate USD to SEK for the remaining payments. Therefore it is essential that the advance payment is received in our account within 10 days from confirmed contract award/purchase order. Should the payment be delayed for whatever reason we reserve the right to compensate ourselves for currency losses beyond 2% of the value of the remaining payments.

5. Delivery Time:

The equipment will be ready for dispatch approx. 6-8 months from receipt of order and the advance payment.

Completion of installation, commissioning and training will require approx.10-12 days.

6. Terms of Delivery:

CIF US port according to Incoterms 2000.

7. Terms of Payment:

40% at contract award by telegraphic transfer to the Contractor's SWIFT account invoice and an advance payment guarantee covering the same amount, issued by the Contractor's bank and valid until dispatch.

60% against shipping documents under a documentary credit at the day of dispatch.

The Contractor undertakes in connection with the advance payment to transfer to the Purchaser a bank guarantee covering the same amount as the advance payment. The bank guarantee will be terminated at the day of dispatch. The Purchaser undertakes to open an irrevocable documentary credit in favour of the Contractor, covering in total 60% of the contract value. The documentary credit shall be opened by Swift wire transfer by a first class bank, which is acceptable to the Contractor's bank, payable at sight and confirmed by the Contractor's bank against presentation of the following documents:

1. Commercial invoice for the shipped goods in 3 copies for the amount drawable.
2. Full set of Bill of Lading or CMR.
3. Packing list in 3 copies.

The documentary credit shall be opened immediately after signing of the contract and the validity time shall be 12 months from the opening date. The Contractor will bear all confirmation charges in Sweden and the Purchaser will bear all costs related to the documentary credit in the country of the Purchaser.

Please also see "Basic terms for Letter of Credit" in Appendix C, "Terms and Conditions ".

8. Terms and Conditions:

According to Appendix C

MRT have more than 30 years experience in supplying the lamp manufacturing and recycling industries and have carried our nearly 300 installations worldwide. MRT have a solid reputation for high quality products, delivery on time and efficient after sales service.

We hope that you find our quotation interesting and we look forward to discussing the project with you at your earliest convenience.

Yours faithfully,

MRT System International AB

Claes Rydén

Appendices:

A. Technical specification
C. Terms and conditions
D. Sample take over protocol
E. Sample service agreement
F. Reference List

DRAFT

BATCH PROCESS DISTILLER 2x200L (BPD-2x200)

For recovery of mercury from fluorescent powder, tube ends from fluorescent tubes, arc tubes from high pressure mercury vapour lamps, mercury button cell batteries, thermometers, electrical switches and rectifiers, dental amalgam, etc.

Capacity:

2 domes, each by 4x50 l/batch
For limitations, health and safety and environmental protection provisions, see operations manual.

Process time:

2x200 l/batch of crushed lamps and tube ends.
Process time: approx. 12 hours.

2x200 l/batch of fluorescent powder.
Process time: approx. 20 hours.

2x200 l/batch of arc tubes from high pressure mercury vapour lamps.
Process time: approx. 15 hours.

2x200 l/batch of button cell batteries.
Process time: approx. 32 hours.

Process time varies depending on material composition and moisture content.

Media:

Electrical connection:	400V, 50Hz, 5-core cable max. 75 kW 125 A
Compressed air:	Maximum 500 m^3 per batch.
Supply pressure:	6 bar dry (dew point +3°C) oil free. Maximum flow 500 l/minute Connection pipe 0.5 inch hose nipple or ¼ inch thread.
Oxygen:	20-3m^3 per batch.
Supply pressure:	5 bar ± 5 % dry. Maximum flow 2000 Nl/h* Connection pipe 6mm hose nipple or ¼ inch thread.
Nitrogen:	25-30m^3 per batch.
Supply pressure:	5 bar ± 5 % dry. Maximum flow 4000 Nl/h. Connection pipe 6mm hose nipple or ¼ inch thread.

Dimensions:

Length: 4500 mm
Height: 3800 mm
Width: 3000 mm

Hg emission to the atmosphere:

Working area:	max 0.020 mg/m^3
Exhaust:	max 0.020 mg/m^3

The working area has to be ventilated by fresh air not less than 3 exchanges/h. The Hg concentration is mainly depending on how waste is handled in the working area and how maintenance work on the equipment is executed. The distiller itself generates only negligible amounts of mercury concentration in the working area during operation.

* Nl = normal litre at atmosphere pressure

Exhaust:

Exhaust flow: max.500 m^3/h
Exhaust duct: ø125 mm

The process air is discharged through series connected carbon filters.
Hg exhaust to be confirmed by using a mercury analyzer in stationary air.

Hg content after distillation

Hg concentration: max. 0.1 mg/l

Hg content values have to be confirmed by using Leachate procedure in accordance with SS-EN 12457-2.

The purchase will include the following components:

2 pc dome
1 pc combustion chamber
2 pc condenser
1 pc vacuum system
1 pc fan
3 pcs carbon filters
1 pc control system
1 pc crane pillar and telpher
1 pc cooling unit
8 pcs distiller barrels (60L)

Options:

Remote process monitoring and service
Extra distiller barrels
UPS unit
Transformer for alternative electrical connection

EEC Conformity

The equipment is manufactured in accordance with:
EEC Directive on Machinery (2006/42/EG)
EEC Directive on Low Voltage (2006/95/EG)
EEC Directive on Electromagnetic Compatibility, EMC (2004/108/EG)

Terms and Conditions

Chapter 1 Amendment to General Conditions, Orgalime SE-01

Chapter 2 Advanced Payment Guarantee

Chapter 3 Basic Terms of LC

Chapter 4 Orgalime SE-01

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info@mrtsystem.com www.mrtsystem.com

Amendments to the General Conditions (May 2010 Ed 3)

The General Conditions for the Supply and Erection of Mechanical, Electrical and Electronic Products ORGALIME SE 01 issued in Brussels, September 2001 are amended as follows:

1. Validity of the Terms & Conditions

Unless otherwise specifically agreed in writing, these terms and conditions shall apply to any quotation or order placed by the Contractor or Purchaser. In the event of any inconsistency between these terms and conditions and any other terms and conditions printed or written upon any other document(s) passing between the parties, these terms and conditions will prevail.

2. Conditions for the operation

It is the Purchaser's sole responsibility to apply for all necessary permits for the operation of the plant as required by any local, state or federal laws in the country of operation. The Purchaser agrees to indemnify and hold the Contractor harmless against any liability, costs and expenses based on the Purchaser's failure to obtain and maintain such approvals.

3. Localisation

The Purchaser is solely responsible for the location of the equipment. The Contractor will provide recommendation on how to prepare the facility before installation. It is of importance that the Contractor's instructions are followed in order to secure emission values and performance in accordance with the specification.

4. Storage

At arrival on site and prior to the installation the Purchaser will make sure that the equipment is properly stored.

5. Disturbance in operation

A. Service related disturbances:

If any disturbance in the process will occur such as unusual noise, unusual temperatures, leakage, high mercury emission values or bad quality of processed materials with regards to mercury contents, dust problem, etc. or other incidents that might cause discontinuance of the process, the Purchaser shall immediately inform the Contractor. The Purchaser and the Contractor will then try to solve the problem by phone and /or e-mail correspondence where the Contractor will give all possible advice and instructions.
If these disturbances emanate from operational or maintenance related causes, the Contractor can support the Purchaser by sending a service engineer. Such support requires a separate service agreement/order.

B. Warranty related disturbances:

If the problem can not be solved as described above and if it is a confirmed warranty issue, the Contractor undertakes to visit the Purchaser's plant and provide assistance and repair work free of charge, during and limited to the warranty period.
The warranty period will elapse from the date of signed take over protocol, final payment or issuance of a Warranty Guarantee, whichever comes first. The warranty period will expire after 12 months according to Clause 52 in Orgalime SE 01 or after the equipment has been in operation for 1800 hours, whichever comes first. The Contractor undertakes to start the repair work as soon as possible after the need was reported and both parties have come to the conclusion that a visit will be needed. Replacement of wear parts will not be an issue or reason for the Contractor to visit the Purchaser within the warranty period.

If the problem occurs due to reasons caused by the Purchaser as mentioned under par.7, Warranty Conditions, all expenses for the Contractor to send its specialist shall be borne by the Purchaser.
If problems occur after the warranty period is terminated, the Contractor will charge the Purchaser a fixed rate/hour per person plus travel expenses accommodation and per diem.

6. Warranty on Spare Parts (SP) and Wear Parts (WP)

Warranty applies on spare parts listed as SP in the WP/SP list. Components listed as WP (Wear Parts) plus active carbon, oil and oil filters, seals or other parts that are understood to be consumable wear parts, will not be warranted against normal wear in use during the twelve months warranty period. Those wear parts are only warranted against initial defective materials and workmanship.
The Purchaser must carry out normal maintenance on the equipment in accordance with the operation and maintenance manuals provided by the Contractor. Routine service, repair and preventive maintenance on the equipment must always be executed only by the Purchaser's personnel that have been trained by the Contractor or by the Contractor's own service personnel or by persons authorised by the Contractor to do such work.

7. Warranty Conditions

The warranty applies conditioned to that:
- The equipment is installed, operated and maintained in accordance with the instructions and documentation provided by the Contractor by trained and certified personnel.
- The operational conditions are within temperature range (+10°-35°C) and that the relative humidity is not exceeding 60%.
- The waste to be processed in the equipment must be dry, without dirt and of such kind and condition as is intended and expected for the application of the equipment.
- There is no evidence of mishandling, negligence, accidental damage, modification or repair work done.
- No use of parts other that the Contractor approved parts.
- The equipment remains in its original location unless relocation is first approved in writing by the Contractor and conditioned to that the Contractor's instructions are followed for such relocation.

If the Purchaser should move the plant and install it different to what is stated in the Contractor instructions, all warranties or guarantees express or implied will be null and void, unless the Contractor assists the re-location. If any suit is brought against the Contractor, by a third party, as a result of moving the equipment, the Purchaser should hold the Contractor harmless from any legal fees or costs incurred related thereto. This limited warranty is provided by the Contractor and contains the only express warranty provided to the Purchaser.

The Contractor disclaims any express warranty not provided herein or any implied warranties, or guarantees for any particular purpose, performance, quality and/or for absence of hidden defects.

8. Hg Content Guarantee

The Contractor guarantees, for the duration of the warranty period, that:
The max Hg emission values as stated in the specifications are not exceeded, and further that the Hg concentration value does not exceed the presented max leachate value stated in the specifications. The Purchaser will bear the cost for the laboratory test of the residue.

9. Limitation of Liability

The total liability in respect of any and all claims for delays, damages, and losses which may arise in connection with the performance or non-performance under this Agreement shall not in any case exceed an amount equal to the Contract price.

This limitation of liability shall apply to the extent consistent with mandatory law and regardless of whether the liability claim is based on breach of contract, breach of warranty, negligence, strict liability, tort or legal theory and shall also apply for the benefit of employees, agents and subcontractors.

In case of wilful misconduct the liability shall be unlimited.

In no event shall the Contractor be liable for any indirect and/or consequential loss or damage, including but not limited to loss of production, loss of profit, loss of interest or of contract.

10. Product Liability Insurance

The Purchaser shall procure and maintain product liability insurance with sufficient coverage. The Purchaser shall immediately inform the Contractor of any injury and/or damage caused by the Equipment.

11 Remedies

The parties agree that there are no other remedies available than those mentioned in this contract and in Orgalime SE01.

12. Trademarks, signs and confidentiality

The Purchaser agrees not to manufacture, promote and compete with equipment of the same or similar nature as provided by the Contractor. Confidentiality between the parties shall apply with regards to technology, equipment, know-how and marketing which has not become generally known or released to the public.

The Purchaser will not be permitted to distribute any other of the Contractor's technical documentation, except for general promotion material and for documentation provided by the Contractor specifically for the Purchaser's environmental applications to the appropriate Authorities in the Purchaser's country. The Contractor's sign and logo stating the Contractor as the manufacturer, must always be used in the Purchaser's own introduction and marketing of its recycling plant.

13. Disputes

Any dispute, which may arise in connection with this contract, the parties should try to settle on an amicable way. If there is no way to find an agreement in an amicable way, the dispute arising out of the contract shall be finally settled, in accordance with the Rules of conciliation and Arbitration of the International Chamber of Commerce, by one or more arbitrators designated in conformity with those rules. If the Purchaser finds reason to start an arbitration process, such shall take place in Sweden. If the Contractor finds reasons to start an arbitration process, such shall take place in the country of the Purchaser. The decision by the arbitrators shall be final and binding for both parties.

ADVANCE PAYMENT GUARANTEE NO. .....

NAME AND ADDRESS OF THE BENEFICIARY

Principal: MRT System International AB, Lumavägen, 371 47 KARLSKRONA, Sweden

Beneficiary:

Contract: No ……. dated ……., for the supply of …….. [*description of goods/services*]

Guarantee amount: …… (say: ……..)

Expiry Date:

We have been informed that the Principal has entered into the Contract with you.

Furthermore, we understand that, according to the conditions of the Contract, an advance payment in the sum of ……. [representing ...% of the amount of the Contract] is to be made against an advance payment guarantee.

At the request of the Principal we, Nordea Bank Finland Plc through Nordea Bank AB (publ), hereby irrevocably guarantee towards you, as for our own debt, the due and punctual fulfilment of the obligations assumed by the Principal to repay, in whole or in part, the above advance payment in accordance with the provisions of the Contract. However, we shall not by reason of this guarantee be liable to pay to you more in aggregate than the Guarantee Amount.

This guarantee shall expire on the Expiry Date at the latest.

Any demand for payment under this guarantee must be received by us in writing at our address Nordea Bank Finland Plc, c/o Nordea Bank AB (publ), Trade Finance, SE-405 09 Göteborg, Sweden on or before the Expiry Date. The original of this guarantee shall be returned to us upon expiry. However, after payment of the whole of the Guarantee Amount or the Expiry Date, whichever comes first, this guarantee will become null and void, whether returned to us or not.

This guarantee shall be governed by and construed in accordance with Swedish law and shall be subject to the jurisdiction of Swedish courts with Stockholms tingsrätt as the court of first instance.

Basic terms of the LC

Please request your bankers to issue a Documentary Credit subject to the specifications stated below in writing and/or marked with [X] as appropriate:

Beneficiary's name and address MRT System International AB Lumavägen 371 47 Karlskrona	Applicant's name and address
Advising bank **Nordea Bank AB (publ)** **Gothenburg, SWEDEN** **SWIFT: NDEASEGG**	

Method of issuing by SWIFT	
Form of credit X Confirmed by Nordea	
Currency code and amount	Tolerance
Availability X The credit is available with Nordea Bank AB (publ) by sight payment ☐ The credit is available with Nordea Bank AB (publ) by negotiation	☐ The credit is available with Nordea Bank AB (publ) by deferred payment at ☐ The credit is available with Nordea Bank AB (publ) as follows:
Date and place of expiry XXXX-XX-XX, Sweden	Latest date of shipment
Transportation details	
Place of receipt (field 44A)	Port of discharge (field 44F)
Port of loading (field 44E)	Place of delivery (field 44B)
By ☐ Sea ☐ Air ☐ Other means, i.e.	
Partial shipments are ☐ Allowed	X Not allowed
Transhipment is X Allowed	☐ Not allowed
Trade terms	
Description of goods	
Documents required X Signed Commercial Invoice ☐ Air Transport Document ☐ Rail Transport Document ☐ Insurance Policy or Certificate ☐ ☐	X Marine / Ocean Bill of Lading ☐ Road Transport Document ☐ Multimodal Transport Document X Packing List ☐ ☐

☐ ☐	☐ ☐
Commissions and charges ☐ All commissions and charges outside the issuing bank are for Beneficiary's account ☐ Extension charges due to a late issuance of the credit or amendment charges due to an unacceptable form of the credit will be payable by the Applicant	☐ All commissions and charges are for Applicant's account ☐ All commissions and charges of eventual intermediary bank are for Applicant's account and not to be charged from the Beneficiary.
Additional instructions	

X Documents must be presented not later than 25 days after the date of shipment, however, within validity of the credit.
X Documents must be presented within validity of the credit.

Reimbursement bank should be nominated.

Issuance of this Documentary Credit should be at the Beneficiary's disposal and in acceptable form to the Beneficiary at the latest 90 days before the stipulated shipment date.

The Documentary Credit to be issued based on the above mentioned specifications will be subject to the International Chamber of Commerce's Uniform Customs and Practice for Documentary Credits (UCP 600) 2007 revision.

This request forms an integral part of the contract(s) and all its terms must be complied with.

ORGALIME SE 01 (Ed3)

GENERAL CONDITIONS FOR THE SUPPLY AND ERECTION

OF MECHANICAL, ELECTRICAL AND ELECTRONIC PRODUCTS

Brussels, September 2001

PREAMBLE

1. These General Conditions shall apply when the parties agree In Writing or otherwise thereto. When the General Conditions apply to a specific contract, modifications of or deviations from them must be agreed In Writing.

DEFINITIONS

2. In these General Conditions the following terms shall have the meanings herein assigned to them :

- **"Contract"** shall mean the written agreement between the parties concerning performance of the Works, and all appendices, including agreed amendments and additions to the said documents.
- **"Contract Price"** shall mean the payment to be made for the Works. If erection is to be carried out on a time basis and has not been completed, the Contract Price for the purposes of Clauses 17, 40, 41 and 47 shall be the price for the Plant with the addition of 10 per cent or of any other percentage that may have been agreed by the parties.
- **"Gross Negligence"** shall mean an act or omission implying either a failure to pay due regard to serious consequences, which a conscientious contracting party would normally foresee as likely to ensue, or a deliberate disregard of the consequences of such act or omission.
- **"In Writing"** shall mean communication by document signed by the parties, or by letter, fax, electronic mail and by such other means as are agreed by the parties.
- **"Plant"** shall mean all machinery, apparatus, materials and articles to be supplied by the Contractor under the Contract.
- **"Site"** shall mean the place where the Plant is to be erected, including as much of the surrounding area as is necessary for unloading, storage and internal transport of the Plant and erection equipment.
- **"Works"** shall mean the Plant including the erection and other work to be carried out by the Contractor under the Contract. If the Works according to the Contract shall be taken over by separate sections intended to be used independently from each other, these Conditions shall apply to each section separately. The term "Works" shall then refer to the section in question.

PRODUCT INFORMATION

3. All information and data contained in general product documentation and price lists, whether in electronic or any other form, are binding only to the extent that they are by reference expressly included in the Contract.

DRAWINGS AND DESCRIPTIONS

4. All drawings and technical documents relating to the Works submitted by one party to the other prior or subsequent to the formation of the Contract shall remain the property of the submitting party.

Drawings, technical documents or other technical information received by one party shall not, without the consent of the other party, be used for any other purpose than that for which they were provided. They may not, without the consent of the submitting party, otherwise be used or copied, reproduced, transmitted or communicated to a third party.

5. The Contractor shall, not later than at the date of taking-over, provide free of charge information and drawings which are necessary to permit the Purchaser to commission, operate and maintain the Works. Such information and drawings shall be supplied in the number of copies agreed upon or at least one copy of each. The Contractor shall not be obliged to provide manufacturing drawings for the Plant or for spare parts.

TESTS BEFORE SHIPMENT

6. If tests before shipment are provided for in the Contract they shall, unless otherwise agreed, be carried out at the place of manufacture during normal working hours.

If the Contract does not specify the technical requirements, the tests shall be carried out in accordance with general practice in the appropriate branch of industry concerned in the country of manufacture.

7. The Contractor shall notify the Purchaser In Writing of these tests in sufficient time to permit the Purchaser to be represented at the tests. If the Purchaser is not represented, the test report shall be sent to the Purchaser and shall be accepted as accurate.

8. If the tests show the Plant not to be in accordance with the Contract, the Contractor shall without delay remedy any deficiencies in order to ensure that the Plant complies with the Contract. New tests shall then be carried out at the Purchaser's request, unless the deficiency was insignificant.

9. The Contractor shall bear all costs for tests carried out at the place of manufacture. The Purchaser shall however bear all travelling and living expenses for his representatives in connection with such tests.

PREPARATORY WORK AND WORKING CONDITIONS

10. The Contractor shall provide in good time drawings showing the manner in which the Plant is to be erected, together with all information required for preparing suitable foundations, for providing access for the Plant and any necessary equipment to the point where the Plant is to be erected, and for making all necessary connections to the Works.

11. The Purchaser shall provide in good time all installations, and ensure that the conditions necessary for the erection of the Plant and for the correct operation of the Works are fulfilled. This shall not apply to preparatory work which according to the Contract shall be performed by the Contractor.

12. The preparatory work shall be carried out by the Purchaser in accordance with the drawings and information provided by the Contractor under Clause 10. The work shall be completed in good time. In any case the Purchaser shall ensure that the foundations are structurally sound. If the Purchaser is responsible for transporting the Plant to the Site, he shall ensure that the Plant is on the Site in good time.

13. If an error or omission in the drawings or information referred to in Clause 10 is discovered by the Contractor or notified to him In Writing before expiry of the period referred to in Clause 52, the cost of any necessary remedial work shall be borne by the Contractor.

14. The Purchaser shall ensure that:

a) the Contractor's personnel are able to start work in accordance with the agreed time schedule and to work during normal working hours. Provided that the Purchaser has been given notice In Writing in reasonable time, work may be performed outside normal working hours to the extent deemed necessary by the Contractor.

b) he has, in good time before erection is started, informed the Contractor In Writing of all relevant safety regulations in force at the Site. The erection shall not be carried out in unhealthy or dangerous surroundings. All the necessary safety and precautionary measures shall have been taken before erection is started and shall be maintained.

c) the Contractor's personnel are able to obtain suitable and convenient board and lodging in the neighbourhood of the Site and have access to internationally acceptable hygiene facilities and medical services.

d) he has made available to the Contractor free of charge at the proper time on the Site all necessary cranes, lifting equipment and equipment for transport on the Site, auxiliary tools, machinery, materials and supplies (including fuel, oils, grease and other materials, gas, water, electricity, steam, compressed air, heating, lighting, etc...), as well as the measuring and testing instruments of the Purchaser available on the Site. The Contractor shall specify In Writing his requirements concerning such cranes, lifting equipment, measuring and testing instruments and equipment for transport on the Site at the latest one month before the start of the erection.

e) he has made available to the Contractor free of charge necessary storage facilities, providing protection against theft and deterioration of the Plant, the tools and equipment required for erection, and the personal effects of the Contractor's personnel.

f) the access routes to the Site are suitable for the required transport of the Plant and the Contractor's equipment.

PURCHASER'S DEFAULT

15. If the Purchaser anticipates that he will be unable to carry out in time his obligations necessary for completion of the Works, including complying with the conditions specified in Clauses 11, 12 and 14, he shall forthwith notify the Contractor In Writing, stating the reason and, if possible, the time when he will be able to comply with his obligations.

16. Without prejudice to the Contractor's rights under Clause 17, if the Purchaser fails to fulfil, correctly and in time, his obligations necessary for completion of the Works, including to comply with the conditions specified in Clauses 11, 12 and 14, the following shall apply:

a) the Contractor may at his own discretion choose to carry out or employ a third party to carry out the Purchaser's obligations, or otherwise take such measures as under the circumstances are appropriate in order to avoid or alleviate the effects of the Purchaser's default.

b) the Contractor may suspend in whole or in part his performance of the Contract. He shall forthwith notify the Purchaser In Writing of the suspension.

c) if the Plant has not been delivered to the Site, the Contractor shall arrange for storage of the Plant at the Purchaser's risk. The Contractor shall also, if the Purchaser so requires, insure the Plant.

d) if performance of the Contract is delayed by the Purchaser's default, he shall nevertheless pay any part of the Contract Price which, but for such delay, had become due.

e) the Purchaser shall reimburse the Contractor for any costs not covered by Clause 44 or 45, which are reasonably incurred by the Contractor as a result of measures under a), b) or c) of this Clause.

17. If completion of the Works is prevented by the Purchaser's default as referred to in Clause 16, and this is not due to any such circumstance as mentioned in Clause 67, the Contractor may also by notice In Writing require the Purchaser to remedy his default within a final reasonable period.

If, for any reason for which the Contractor is not responsible, the Purchaser fails to remedy his default within such period, the Contractor may by notice In Writing terminate the Contract.

The Contractor shall then be entitled to compensation for the loss he suffers because of the Purchaser's default. The compensation shall not exceed the Contract Price.

LOCAL LAWS AND REGULATIONS

18. The Contractor shall ensure that the Works are carried out and are in accordance with any laws, regulations and rules which are applicable to the Works. If required by the Contractor, the Purchaser shall provide the relevant information on these laws, regulations and rules In Writing.

19. The Contractor shall carry out any variation work caused by changes in laws, regulations and rules referred to in Clause 18, or in their generally accepted interpretation, occurring between the dates of submission of the tender and taking-over. The Purchaser shall bear the extra costs and other consequences resulting from such changes, including variation work.

20. If the parties are unable to agree on the extra costs and other consequences of changes in laws, regulations and rules, referred to in Clause 18, the Contractor shall be compensated on a time basis for any variation work until the dispute has been settled in accordance with Clause 72.

VARIATIONS

21. Subject to the provisions of Clause 25, the Purchaser is entitled to require variations to the scope, design and construction of the Works until the Works have been taken over. The Contractor may suggest such variations In Writing.

22. Requests for variations shall be submitted to the Contractor In Writing and shall contain an exact description of the variation required.

23. As soon as possible after receipt of a request for a variation or after having himself made a proposal for a variation, the Contractor shall notify the Purchaser In Writing whether and how the variation can be carried out, stating the resulting alteration to the Contract Price, the time for completion and other terms of the Contract.

The Contractor shall also give such notice to the Purchaser when variations are required as a result of changes in laws, regulations and rules referred to in Clause 18.

24. If completion of the Works is delayed as a result of disagreement between the parties on the consequences of variations, the Purchaser shall pay any part of the Contract Price which would have become due if the Works had not been delayed.

25. Save as provided in Clause 19, the Contractor shall not be obliged to carry out variations required by the Purchaser until either the parties have agreed on how the variations will affect the Contract Price, the time for completion and other terms of the Contract, or the dispute has been settled in accordance with Clause 72.

PASSING OF RISK

26. The risk of loss of or damage to the Plant shall pass to the Purchaser in accordance with any agreed trade term, which shall be construed in accordance with the INCOTERMS in force at the date of formation of the Contract.

If no trade term is specifically agreed, delivery of the Plant shall be Ex works (EXW).

Any risk of loss or damage to the Works not covered by the first paragraph of this Clause shall pass to the Purchaser on taking-over of the Works.

Any loss or damage to the Plant and Works after the risk has passed to the Purchaser shall be at the risk of the Purchaser, unless such loss or damage results from the Contractor's negligence.

TAKING-OVER TESTS

27. When erection has been completed taking-over tests shall, unless otherwise agreed, be carried out to determine whether the Works are as required for taking-over according to the Contract.

The Contractor shall notify the Purchaser In Writing that the Works are ready for taking-over. He shall in this notice give a date for taking-over tests, giving the Purchaser sufficient time to prepare for and be represented at these tests.

The Purchaser shall bear all costs of taking-over tests. The Contractor shall, however, bear all costs relating to his personnel and his other representatives.

28. The Purchaser shall provide free of charge any power, lubricants, water, fuel, raw materials and other materials required for the taking-over tests and for final adjustments in preparing for these tests. He shall also install free of charge any equipment and provide any labour or other assistance necessary for carrying out the taking-over tests.

29. If, after having been notified in accordance with Clause 27, the Purchaser fails to fulfil his obligations under Clause 28 or otherwise prevents the taking-over tests from being carried out, the tests shall be regarded as having been satisfactorily completed at the date for taking-over tests stated in the Contractor's notice.

30. The taking-over tests shall be carried out during normal working hours. If the Contract does not specify the technical requirements, the tests shall be carried out in accordance with general practice in the appropriate branch of industry concerned in the Purchaser's country.

31. The Contractor shall prepare a test-report of the taking-over tests. This report shall be sent to the Purchaser. If the Purchaser has not been represented at the taking-over tests after having been notified in accordance with Clause 27, the test report shall be accepted as accurate.

32. If the taking-over tests show the Works not to be in accordance with the Contract, the Contractor shall without delay remedy the deficiencies. If the Purchaser so requires In Writing without undue delay, new tests shall be carried out in accordance with Clauses 27-31. This shall not apply when the deficiency was insignificant.

TAKING-OVER

33. Taking-over of the Works takes place :

a) when the taking-over tests have been satisfactorily completed or are regarded under Clause 29 as having been satisfactorily completed, or

b) where the parties have agreed not to carry out taking-over tests, when the Purchaser has received a Contractor's notice In Writing that the Works have been completed, provided that the Works are as required for taking-over according to the Contract.

Minor deficiencies which do not affect the efficiency of the Works shall not prevent taking-over.

34. The Purchaser is not entitled to use the Works or any part thereof before taking-over. If the Purchaser does so without the Contractor's consent In Writing, he shall be deemed to have taken over the Works. The Contractor shall then be relieved of his duty to carry out taking -over tests.

35. As soon as the Works have been taken over in accordance with Clause 33 or 34, the period, referred to in Clause 52, shall start to run. The Purchaser shall, at the Contractor's request In Writing, issue a certificate stipulating when the Works have been taken over. The Purchaser's failure to issue a certificate shall not affect taking-over according to Clauses 33 and 34.

COMPLETION. CONTRACTOR'S DELAY

36. The Works shall be considered as completed when they are taken over in accordance with Clause 33 or 34.

37. If the parties instead of specifying the date for completion, have specified a period of time on the expiry of which taking-over shall take place, such period shall start to run as soon as the Contract is entered into, all official formalities have been completed, payments due at the formation of the Contract have been made, any agreed securities have been given and any other preconditions have been fulfilled.

38. If the Contractor anticipates that he will not be able to comply with his obligations within the times specified in the Contract, he shall forthwith notify the Purchaser thereof In Writing, stating the reason, and, if possible, when compliance can be expected. If the Contractor fails to give such notice, the Purchaser shall be entitled to compensation for any additional costs which he incurs and which he could have avoided had he received such notice.

39. The Contractor shall be entitled to an extension of the time for completion if delay occurs :

a) because of any of the circumstances referred to in Clause 67, or

b) as a result of variation work under Clause 19, or

c) as a result of variations under Clauses 21-25, or

d) as a result of suspension under Clauses 16, 47 or 70, or

e) by an act or omission on the part of the Purchaser.

The extension shall be reasonable having regard to all the circumstances. This provision applies regardless of whether the reason for the delay occurs before or after the agreed time for completion.

40. The Contractor is in delay when the Works are not completed at the time for completion as defined in Clauses 36, 37 and 39. The Contractor's delay entitles the Purchaser to liquidated damages from the date on which the Works should have been completed.

The liquidated damages shall be payable at a rate of 0.5 per cent of the Contract Price for each completed week of delay. The liquidated damages shall not exceed 7.5 per cent of the Contract Price.

If only part of the Works is delayed, the liquidated damages shall be calculated on that part of the Contract Price, which is attributable to such part of the Works as cannot in consequence of the delay be used as intended by the parties.

The liquidated damages become due at the Purchaser's request In Writing but not before taking-over or termination of the Contract under Clause 41.

The Purchaser shall forfeit his right to liquidated damages if he has not lodged a claim In Writing for such damages within six months after the time when completion should have taken place.

41. If the Contractor's delay is such that the Purchaser has become entitled to the maximum liquidated damages under Clause 40 and the Works are still not completed, the Purchaser may demand In Writing completion within a final reasonable period which shall not be less than one week.

If the Contractor does not complete the Works within such final period and this is not due to any circumstance for which the Purchaser is responsible, then the Purchaser may by notice In Writing to the Contractor terminate the Contract in respect of such part of the Works which, due to the Contractor's failure, cannot be used as intended by the parties.

If the Purchaser terminates the Contract he shall be entitled to compensation for the loss he has suffered as a result of the Contractor's delay. The total compensation, including the liquidated damages which are payable under Clause 40, shall not exceed 15 per cent of that part of the Contract Price which is attributable to the part of the Works in respect of which the Contract is terminated.

The Purchaser shall also have the right to terminate the Contract by notice In Writing to the Contractor, if it is clear from the circumstances that there will occur a delay in completion of the Works which, under Clause 40 would entitle the Purchaser to maximum liquidated damages.

In case of termination on this ground, the Purchaser shall be entitled to maximum liquidated damages and compensation under the third paragraph of this Clause 41.

42. Liquidated damages under Clause 40 and termination of the Contract with limited compensation under Clause 41 are the only remedies available to the Purchaser in case of delay on the part of the Contractor. All other claims against the Contractor based on such delay shall be excluded, except where the Contractor has been guilty of Gross Negligence.

PAYMENT

43. Unless otherwise agreed, payment shall be made within 30 days from the date of the invoice as follows:

a) when erection is carried out on a time basis :
- one third of the agreed price for the Plant at the formation of the Contract,
- one third when the Contractor notifies the Purchaser that the Plant, or the essential part of it, is ready for dispatch from the place of manufacture and
- the final third on arrival of the Plant at the Site.

Payment for erection shall be made against monthly invoices

b) when erection is included in the lump sum Contract Price :
- 30 per cent of the Contract Price at the formation of the Contract,
- 30 per cent when the Contractor notifies the Purchaser that the Plant, or the essential part of it, is ready for dispatch from the place of manufacture,
- 30 per cent on arrival of the Plant at the Site,
- the remaining part of the Contract Price on taking-over.

44. When erection is carried out on a time basis the following items shall be separately charged :

a) all travelling expenses incurred by the Contractor in respect of his personnel and the transport of their equipment and personal effects (within reasonable limits) in accordance with the specified method and class of travel where these are specified in the Contract.

b) cost of board and lodging and other living expenses, including any appropriate allowances, of the Contractor's personnel for each day's absence from their homes, including non-working days and holidays.

c) the time worked, which shall be calculated by reference to the number of hours certified as worked in the time-sheets signed by the Purchaser. Overtime and work on Sundays, holidays and at night will be charged at special rates. The rates shall be as agreed in the Contract, or, failing agreement, as normally charged by the Contractor. Save as otherwise provided, the hourly rates cover the wear and tear of the Contractor's tools and light equipment.

d) time necessarily spent on :
- preparation and formalities incidental to the outward and homeward journeys,
- the outward and homeward journeys and other journeys to which the personnel are entitled in accordance with current law, regulations or collective agreements in the Contractor's country,
- daily travel between lodgings and the Site, if it exceeds half an hour each way and there are no suitable lodgings closer to the Site,
- waiting when work is prevented by circumstances for which the Contractor is not responsible under the Contract,

all at the same rates as referred to in c).

e) any expenses incurred by the Contractor in accordance with the Contract, in connection with the provision of equipment by him, including where appropriate a charge for the use of the Contractor's own heavy equipment.

f) any taxes or dues levied on the invoice and payable by the Contractor in the country where erection takes place.

45. When erection is to be carried out for a lump sum, the quoted price shall be deemed to include all the items mentioned in Clause 44, a) through e). If the erection is delayed due to a cause for which the responsibility rests with the Purchaser or any of his contractors other than the Contractor, the Purchaser shall compensate the Contractor for :

a) waiting time and time spent on extra journeys.

b) costs and extra work resulting from the delay, including removing, securing and setting up erection equipment.

c) additional costs, including costs as a result of the Contractor having to keep his equipment at the Site for a longer time than expected.

d) additional costs for journeys and board and lodging for the Contractor's personnel.

e) additional financing costs and costs of insurance.

f) other documented costs incurred by the Contractor as a result of changes in the erection programme.

46. Whatever the means of payment used, payment shall not be deemed to have been effected before the Contractor's account has been fully and irrevocably credited.

47. If the Purchaser fails to pay by a stipulated date, the Contractor shall be entitled to interest from the day on which payment was due. The rate of interest shall be as agreed between the parties. If the parties have not agreed on the rate of interest, it shall be 8 percentage points above the rate of the main refinancing facility of the European Central Bank in force on the due date of payment.

In case of late payment the Contractor may, after having notified the Purchaser In Writing, suspend his performance of the Contract until he receives payment.

If the Purchaser has not paid the amount due within three months, the Contractor shall be entitled to terminate the Contract by notice In Writing to the Purchaser and to claim compensation for the loss he has incurred. The compensation shall not exceed the Contract Price.

RETENTION OF TITLE

48. The Plant shall remain the property of the Contractor until paid for in full, including payment for the erection of the Plant, to the extent that such retention of title is valid under the applicable law.

The Purchaser shall at the request of the Contractor assist him in taking any measures necessary to protect the Contractor's title to the Plant in the country concerned.

The retention of title shall not affect the passing of risk under Clause 26.

LIABILITY FOR DAMAGE TO PROPERTY BEFORE TAKING-OVER

49. The Contractor shall be liable for any damage to the Works which occurs before the risk has passed to the Purchaser. This applies irrespective of the cause of the damage, unless the damage has been caused by the Purchaser or anyone for whom he is responsible in connection with performance of the Contract. Even if the Contractor is not liable for the damage to the Works in accordance with this Clause, the Purchaser may require the Contractor to remedy the damage at the Purchaser's cost.

50. The Contractor shall be liable for damage to the Purchaser's property occurring before taking-over of the Works only if it is proved that such damage was caused by negligence on the part of the Contractor or anyone for whom he is responsible in connection with the performance of the Contract. The Contractor shall however under no circumstances be liable for loss of production, loss of profit or any other consequential economic loss.

LIABILITY FOR DEFECTS

51. Pursuant to the provisions of Clauses 52-65 inclusive, the Contractor shall remedy any defect or non-conformity (hereinafter termed defect(s))in the Works resulting from faulty design, materials or workmanship.

52. The Contractor's liability is limited to defects in the Works which appear within a period of one year from taking-over. If the daily use of the Works exceeds that which is agreed, this period shall be reduced proportionately. If taking-over has been delayed for reasons for which the Purchaser is responsible, the Contractor's liability for defects shall not, except as stated in Clause 53, be extended beyond 18 months after delivery of the Plant.

53. When a defect in a part of the Works has been remedied, the Contractor shall be liable for defects in the repaired or replaced part under the same terms and conditions as those applicable to the original Works for a period of one year. For the remaining parts of the Works the period mentioned in Clause 52 shall be extended only by a period equal to the period during which the Works have been out of operation as a result of the defect.

54. The Purchaser shall without undue delay notify the Contractor In Writing of any defect which appears. Such notice shall under no circumstance be given later than two weeks after the expiry of the period given in Clause 52.

The notice shall contain a description of the defect.

If the Purchaser fails to notify the Contractor In Writing of a defect within the time-limits set forth in this Clause, he loses his right to have the defect remedied.

Where the defect is such that it may cause damage, the Purchaser shall immediately inform the Contractor In Writing. The Purchaser shall bear the risk of damage resulting from his failure so to notify.

55. On receipt of the notice under Clause 54, the Contractor shall remedy the defect without undue delay and at his own cost as stipulated in Clauses 51-65 inclusive.

Repair shall be carried out at the Site, unless the Contractor deems it appropriate that the defective part or the Plant is returned to him for repair or replacement.

Where remedial work is carried out at the Site, Clauses 14 and 50 shall apply correspondingly.

The Contractor is obliged to dismantle the Works to the extent necessary and to re-assemble the Works if this requires special knowledge. If such special knowledge is not required, the Contractor has fulfilled his obligations in respect of the defect when he delivers to the Purchaser a duly repaired or replaced part.

56. If the Purchaser has given such notice as mentioned in Clause 54, and no defect is found for which the Contractor is liable, the Contractor shall be entitled to compensation for the costs he has incurred as a result of the notice.

57. The Purchaser shall at his own expense arrange for any dismantling and reassembly of equipment other than the Works, to the extent that this is necessary to remedy the defect.

58. Unless otherwise agreed, necessary transport of the Plant and/or parts thereof to and from the Contractor in connection with the remedying of defects for which the Contractor is liable shall be at the risk and expense of the Contractor. The Purchaser shall follow the Contractor's instructions regarding such transport.

If the Works are not at the Site, the Purchaser shall bear any resulting additional costs incurred by the Contractor when remedying defects.

59. Defective parts which have been replaced shall be made available to the Contractor and shall be his property.

60. If, within a reasonable time, the Contractor does not fulfil his obligations under Clause 55, the Purchaser may, by notice In Writing, fix a final time for completion of the Contractor's obligations.

If the Contractor fails to fulfil his obligations within such final time, the Purchaser may himself undertake or employ a third party to undertake necessary remedial works at the risk and expense of the Contractor.

Where successful remedial works have been undertaken by the Purchaser or a third party, reimbursement by the Contractor of reasonable costs incurred by the Purchaser shall be in full settlement of the Contractor's liabilities for the said defect.

61. Where the defect has not been successfully remedied as stipulated under Clause 60 :

a) the Purchaser is entitled to a reduction of the Contract Price in proportion to the reduced value of the Works, provided that under no circumstance shall such reduction exceed 15 per cent of the Contract Price, or

b) where the defect is so substantial as to significantly deprive the Purchaser of the benefit of the Contract, the Purchaser may terminate the Contract by notice In Writing to the Contractor. The Purchaser is then entitled to compensation for the loss he has suffered up to a maximum of 15 per cent of the Contract Price.

62. The Contractor is not liable for defects arising out of materials provided, or a design stipulated or specified by the Purchaser.

63. The Contractor is liable only for defects which appear under the conditions of operation provided for in the Contract and under proper use of the Works.

The Contractor's liability does not cover defects which are caused by faulty maintenance or faulty repair by the Purchaser, or by alterations carried out without the Contractor's consent In Writing.

Finally the Contractor's liability does not cover normal wear and tear or deterioration.

64. Notwithstanding the provisions of Clauses 51-65 the Contractor shall not be liable for defects in any part of the Works for more than two years from taking-over. If taking over has been delayed for reasons for which the Purchaser is responsible, the Contractor's liability for defects shall not be extended beyond 30 months after delivery of the Plant.

65. Save as stipulated in Clauses 51-64, the Contractor shall not be liable for defects. This applies to any loss the defect may cause including loss of production, loss of profit and other indirect loss.

This limitation of the Contractor's liability shall not apply if he has been guilty of Gross Negligence.

ALLOCATION OF LIABILITY FOR DAMAGE CAUSED BY THE WORKS

66. The Contractor shall not be liable for any damage to property caused by the Works after completion and whilst in the possession of the Purchaser. Nor shall the Contractor be liable for any damage to products manufactured by the Purchaser, or to products of which the Purchaser's products form a part.

If the Contractor incurs liability towards any third party for such damage to property as described in the preceding paragraph, the Purchaser shall indemnify, defend and hold the Contractor harmless.

If a claim for damage as described in this Clause is lodged by a third party against one of the parties, the latter party shall forthwith inform the other party thereof In Writing.

The Contractor and the Purchaser shall be mutually obliged to let themselves be summoned to the court or arbitral tribunal examining claims for damages lodged against one of them on the basis of damage allegedly caused by the Works.

The limitation of the Contractor's liability in the first paragraph of this Clause shall not apply where the Contractor has been guilty of Gross Negligence.

FORCE MAJEURE

67. Either party shall be entitled to suspend performance of his obligations under the Contract to the extent that such performance is impeded or made unreasonably onerous by any of the following circumstances: industrial disputes and any other circumstance beyond the control of the parties such as fire, war, extensive military mobilization, insurrection, requisition, seizure, embargo, restrictions in the use of power and defects or delays in deliveries by sub-contractors caused by any such circumstance as referred to in this Clause.

A circumstance referred to in this Clause, whether occurring prior to or after the formation of the Contract, shall give a right to suspension only if its effect on the performance of the Contract could not be foreseen at the time of the formation of the Contract.

68. The party claiming to be affected by Force Majeure shall notify the other party In Writing without delay on the intervention and on the cessation of such circumstance.

If Force Majeure prevents the Purchaser from fulfilling his obligations, he shall compensate the Contractor for expenses incurred in securing and protecting the Works.

69. Regardless of what might otherwise follow from these General Conditions, either party shall be entitled to terminate the Contract by notice In Writing to the other party if performance of the Contract is suspended under Clause 67 for more than six months.

ANTICIPATED NON-PERFORMANCE

70. Notwithstanding other provisions in these General Conditions regarding suspension, each party shall be entitled to suspend the performance of his obligations under the Contract, where it is clear from the circumstances that the other party will not be able to perform his obligations. A party suspending his performance of the Contract shall forthwith notify the other party thereof In Writing.

CONSEQUENTIAL LOSSES

71. Save as otherwise stated in these General Conditions there shall be no liability for either party towards the other party for loss of production, loss of profit, loss of use, loss of contracts or for any other consequential or indirect loss whatsoever.

DISPUTES AND APPLICABLE LAW

72. All disputes arising out of or in connection with the Contract shall be finally settled under the Rules of Arbitration of the International Chamber of Commerce by one or more arbitrators appointed in accordance with the said rules.

73. The Contract shall be governed by the substantive law of the Contractor's country.

This is an Orgalime publication. Orgalime groups the central trade federations of the mechanical, electrical, electronic and metalworking industries in twenty-one European countries and provides liaison between these organisations in the legal, technical and economic fields.

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Appendix D (Ed 3)

Sample Take Over Protocol

Equipment: xxxxxxxxx
Letter of Credit No: xxxxxxx

Date:_____

We the undersigned the Purchaser

1. Have received and accepted the referenced equipment according to the specifications in the equipment supply contract no xxxxx dated xxxx-xx-xx between xxxxxxxxxxxxxxxx and MRT System International AB.

and accepted the

2. Installation, commissioning, training and the full technical documentation including manuals

On behalf of the Purchaser:

xxxxxxxxxxxxxxxxxxxx
xxxxxxxxxxxxxxxxxxxxxx
xxxxxxxxxxxxx
xxxxxxxxxxxxx

_____

On behalf of the Contractor:

MRT System International AB
Lumavägen
371 47 Karlskrona
Sweden

_____

Sample
Service Agreement (May 2010)

Entered into by

The Purchaser: xxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxxx

and

The Contractor: MRT System International AB, Lumavägen, 371 47 KARLSKRONA, Sweden

The overall philosophy regarding maintenance of the MRT Equipment is that:

The Purchaser performs operation related preventive maintenance, replacement of wear parts and spare parts according to the programs and training provided by the Contractor in the original purchase of the Equipment.
The Contractor provides telephone and E-mail support as required.

The Contractor performs a more comprehensive inspection and maintenance annually in order to maintain high availability, capacity and safety of the Equipment.

The Contractor from time to time performs corrective maintenance, repairs and up-grading services specifically ordered by the Purchaser.

The Purchaser buys Wear and Spare Parts from the Contractor.

The agreement is valid from the date of Take Over or expiry of the Warranty Period at the latest and onwards until terminated by either Party.

The Purchaser agrees to order one service per calendar year or per 1800 hours of operation whichever occurs first at a fixed rate + expenses to be carried out at a time agreeable to both parties:
By doing so, The Purchaser in addition to extended warranty, higher availability, higher capacity and safer operation also receives the option to purchase corrective maintenance, repair and up-grading services as well as supply of spare parts and wear parts on short notice at agreed fixed and discounted rates. The Purchaser also receives free phone and/or E-mail access to The Contractor's service engineers to support in operation and maintenance related matters.

SAMPLE

The agreement covers

The Equipment:
Yyyyyyyyyyyyyyyyyyyyyyyyyyy supplied under a contract signed in zzzzzzzzzzzzzzz.

Scope of Supply:
- Mobilisation/demobilisation of the Contractor's service personnel and tools to the Purchaser's premises

- Annual inspection and maintenance of the Equipment according to the "Checklist-Standard Service", appendix 1.

- Supply of wear parts and spare parts as defined in "Standard Service Kit" as listed in appendix 2 unless already available in the Buyer´s stock.

- Inspection and maintenance report and recommendations.

- Telephone and E-mail support.

Options:
Additional service work not covered by the Scope of Supply that the Purchaser may request or the parties may agree upon based on the Contractor´s assessment of the condition or anticipated condition of the equipment.
Training of additional engineers/operators/maintenance personnel
Corrective maintenance, repairs and up-grading services.
Supply of additional spare parts and wear parts

Price for annual inspection, preventive maintenance and telephone support:

Service charge*	EUR
Standard Service Kit (complete)	EUR
Travel, transport costs, expenses and accom.	at cost
Travel time during normal working hours	EUR 80/h
Travel time outside normal working hours	EUR 0/h

* Per diem is included in the Service charge.

Price for Options/additional services:

Hourly rate**, Service technician	EUR 90/h
Hourly rate**, Software specialist	EUR 100/h
Additional overtime charge***	EUR 60/hour
Additional Wear parts and Spare parts (other than those in app.2)	Valid price list less 5% discount

Travel, transport costs, expenses and accomodation at cost

SAMPLE

Travel time during normal working hours	EUR 80/h
Travel time outside normal working hours	EUR 0/h

** Per diem is included in the hourly rate.
*** For hours in excess of 8 working hours per week-day, Saturdays, Sundays and holidays.

Validity of prices:
The prices are valid for work carried out or parts being supplied during the calendar year 2009.
From 2010 and onwards the Contractor will issue new price lists valid for 1 calendar year at a time and send it to the Purchaser in the month of October the year before.
There will be no service charge during the warranty period.

Time:
Both parties shall agree on a suitable time for the maintenance service well in advance.
For corrective maintenance and repairs The Contractor commits to mobilising his service technician(s) within xx hours from written notice subject to availability of Spare/Wear parts.

Extended warranty:
According to the equipment supply contract the warranty expires 12 months from take over. This warranty is extended to 2000 operational hours or 15 months which ever occurs last.

Preparations:
Well in advance of the service the Purchaser shall check his stock of spare/wear parts against those recommended in the Standard Service Kit appendix 2 and order the balance from the Contractor.
The Contractor shall based upon the operational and maintenance history of the Equipment give recommendations to the Purchaser regarding anticipated additional work and replacement parts for an up-coming service.
The Purchaser shall prepare the site and plant prior to arrival of the Contractors personnel. Should the Purchaser fail to do so the Contractor has the right to carry out the site preparation at cost.
The Buyer assists the Contractor's personnel with internal transport, handling, general tools and support labour free of charge.

Confirmation of executed inspection and maintenance work
The Contractor's engineer shall issue an inspection and maintenance report stating what work has been carried out, during which period and what parts have been replaced. The protocol shall be countersigned by the Purchaser.

SAMPLE

Confirmation of training
If the Contractor's engineer has carried out training of the Purchaser's personnel a training certificate should be issued stating that the training has taken place and during what time. The certificate shall also be signed by the Purchaser. The Contractor will also issue a Training Certificate for each participator who has fulfilled the training.

Terms of payment:
50% of the service charge to be paid 30 days prior to the execution of the service by Swift Transfer against invoice.
Balance by Swift transfer within 30 days from completion and date of invoice.

Validity
This agreement will come in force upon signing by both parties and shall be valid for a period of three years thereafter with 3 months termination notice by either party. After that period the agreement is automatically prolonged by 12 months at a time unless terminated by either party no later than 3 months prior to the expiry date.

Should a party seriously fail to comply with its obligations under this agreement the other party has the right to terminate the agreement with one month's written notice.

Disputes
Any dispute which may arise in connection with this agreement should be settled following the rules in the original contract.

Applicable Law
The agreement shall be governed by the law of which the original equipment supply contract(s) mentioned above was governed.

Language
All communication under this agreement as well as the service, training and documentation will be conducted in the English language.

Other conditions
As per the original equipment supply contract as mentioned above.

SAMPLE

Confirmation of agreement
Both parties hereby confirm the validity of the Service Agreement in accordance with the conditions stated above.

The agreement has been made in two originals of which both parties have taken one each.

Place and date	Place and date
……	……
On behalf of The Purchaser:	On behalf of The Contractor:
Company name	Company name
…….	……..
……..	……..
Signature	Signature
……..	……
Print name	Print name

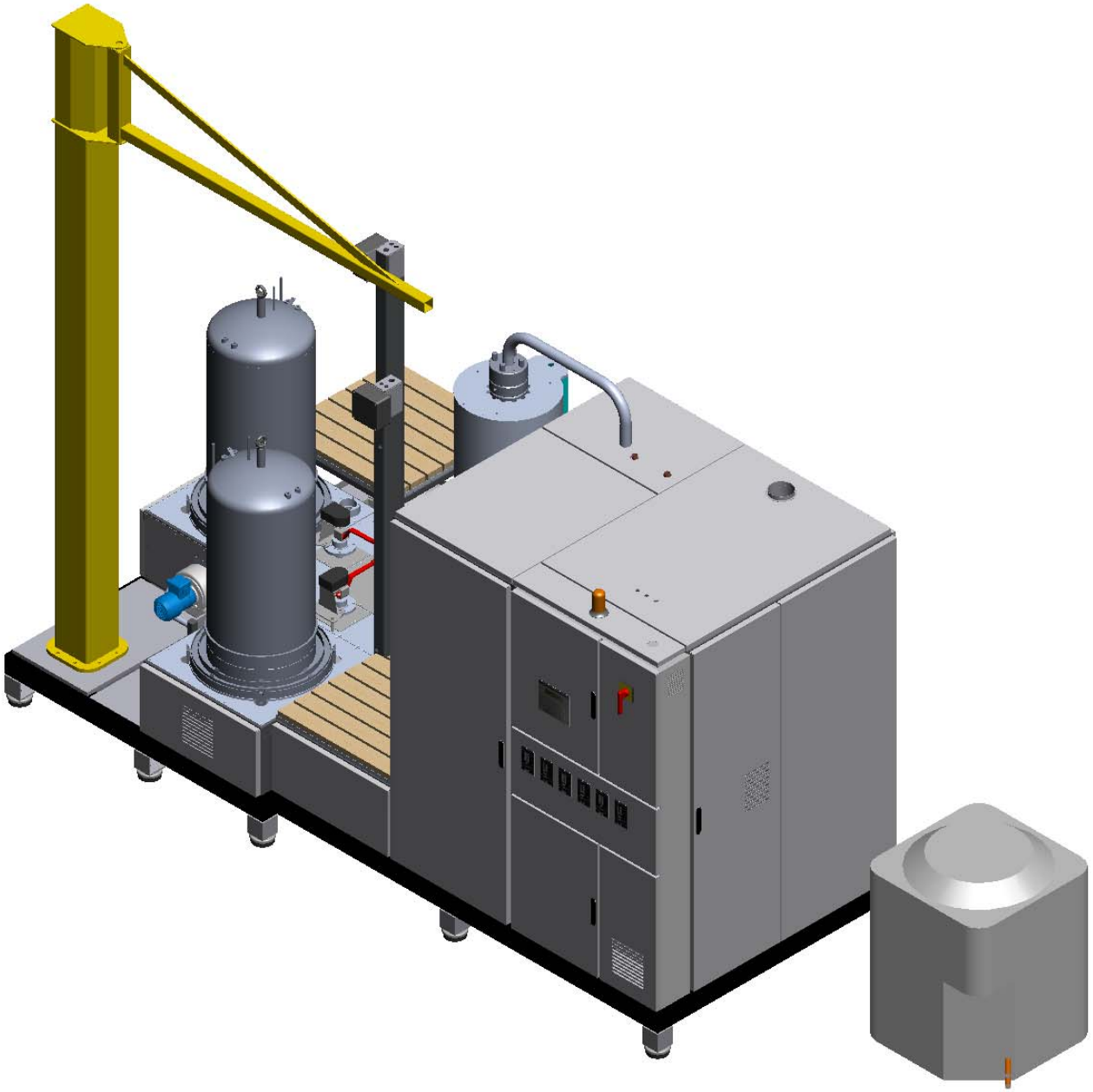
SAMPLE

Reference list - MRT System International

App F

Country	STD Distiller	SUP Distiller	SPEC Distiller	End Cut Machine	Crusher	Crush and Sieve plant	CCS	CFL	CFL pre-treat.	HID Processor	CRT	Comb. plant
Africa												
Nigeria	2				1							
Asia												
China	2		7	1			2	7				
Hong Kong	1				1		1					
India	1						1					
Indonesia	2						1					
Japan	4	1		4	3		1					
Korea	1					1		1		1		
Philippines	1						1					
Taiwan	1		4	1				3				2
Europe												
Belgium			1	1								
Bulgaria		1		1						1		
Czech Rep.	1				1							
Denmark				1	1							
Finland	2			1	1							
France		1		2	1		1					
Germany	8	3	1		4							
Hungary	4					1	1					
Italy	2		4		4		10		7		1	
Netherlands	1			1	2							
Poland	7			1	1	2	2	1				
Portugal		1			1		1		1	1		
Rep. Ireland											2	
Romania							1		1		2	
Russia		1					1					
Slovak Rep.		1					1		1	1		
Spain	4	2		3	3	1	2	1	2	2	2	
Sweden	4			1	12	1		1				
Switzerland	1			1	1		1					
UK	2	1	2	1	2	1	4	1	1	1	2	

Country	STD Distiller	SUP Distiller	SPEC Distiller	End Cut Machine	Crusher	Crush and Sieve plant	CCS	CFL	CFL pre-treat.	HID Processor	CRT	Comb. plant
Middle East												
U.A.E			1		1							
North America												
Canada			1									1
Mexico	1						1					
USA	7	2	2	1	5	2	4					
Oceania												
Australia	1	2	1		10		1					
South America												
Brasil			1				1					
Total:	60	16	25	21	55	9	39	15	13	7	9	3



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MRT System AB

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MRT System AB

Rev.	Revision note/Beskrivning	Date/Datum	Appr./ Godk.

Drawn/Date Ritad/Datum	FA/2008-04-03	Tolerance unless spec. acc. to SS-ISO 2768-1 Tolerans där ej annat anges SS-ISO 2768-1	Scale - Skala 1:15 / State - Status New
Check./Date Kontr./Datum	/	Fin Fine ☐ Medel Medium [X] Grov Coarse ☐ Mycket grov Very coarse ☐	Size Format A2
Appr./Date Godk./Datum	/	SS-EN ISO 13920 Class Klass A-D ☐ Class Klass E-H ☐	Project No. - Projekt nr.
		BPD6	Dwg. No. - Ritn. nr. 504209 / Rev.

MRT SYSTEM

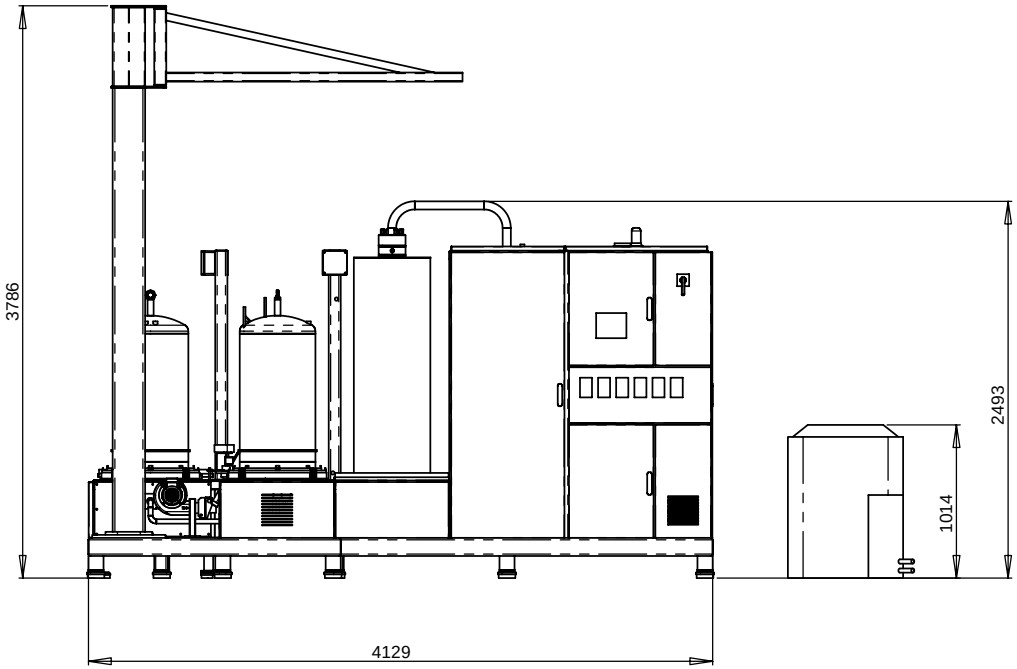
MEDIA:
Power supply: 400V, 50Hz, 125A
5 core cable

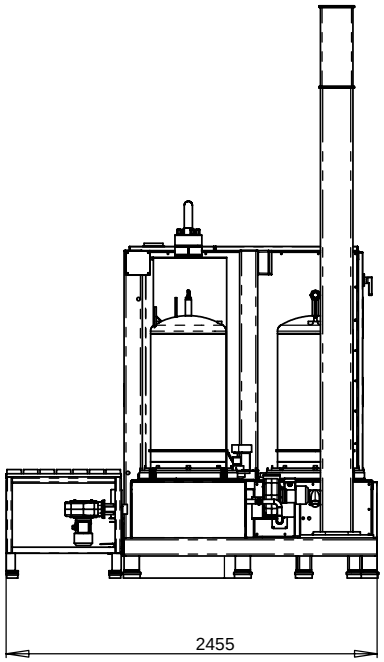
Compressed air: 6bar, 500l/min,dry oil free
dew point +3ºC
connection pipe 0,5inch hose nipple
or 1/4 inch thread

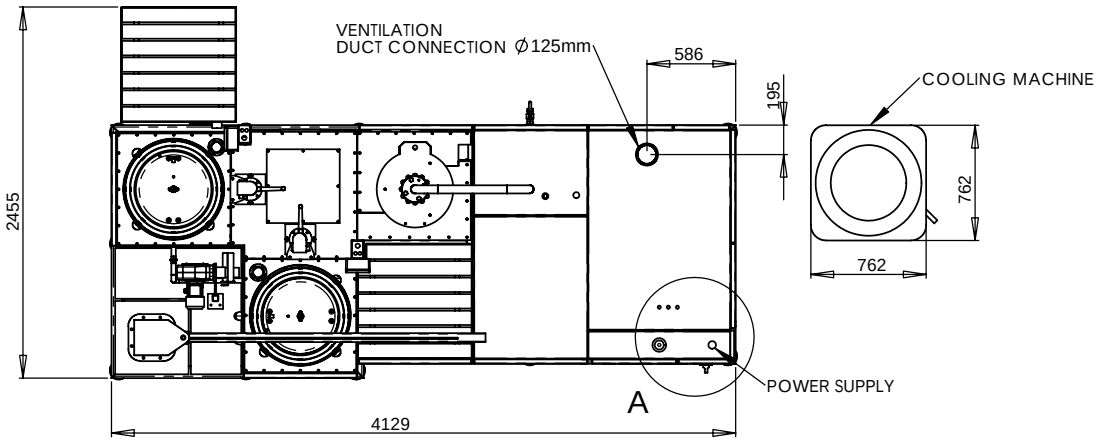
Nitrogen: 5bar, 4000Nl/h
connection pipe outer diameter 10mm

Oxygen: 5bar, 4000Nl/h
connection pipe 6mm hose nipple or 1/4inch
thread

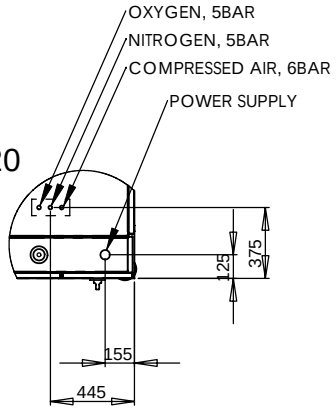
INFORMATION:
Cooling machine should be place as close to the destiller as possible, maximum distance is 10m







DETAIL A
SCALE 1 : 20



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MRT System AB

Technical Specification and Pricing
Vertical Packed Bed Scrubber System
Model V/F-012-096

Prepared for:

HATCH

Attention: Duncan Kluwak
Phone: 905-403-4200 ▪ E-mail: dkluwak@hatch.ca

Prepared by:

Tri-Mer Corporation
1400 E Monroe Street
Owosso MI, 48867
989-723-7838

Sales Engineer
Todd R. Ainsworth
989-723-7838 ext. 307
tainsworth@tri-mer.com

July 25, 2012

Tri-Mer Proposal P-12.527

I. Design Parameters

A. Process Description ..... SO_2 emissions from batch retorting process

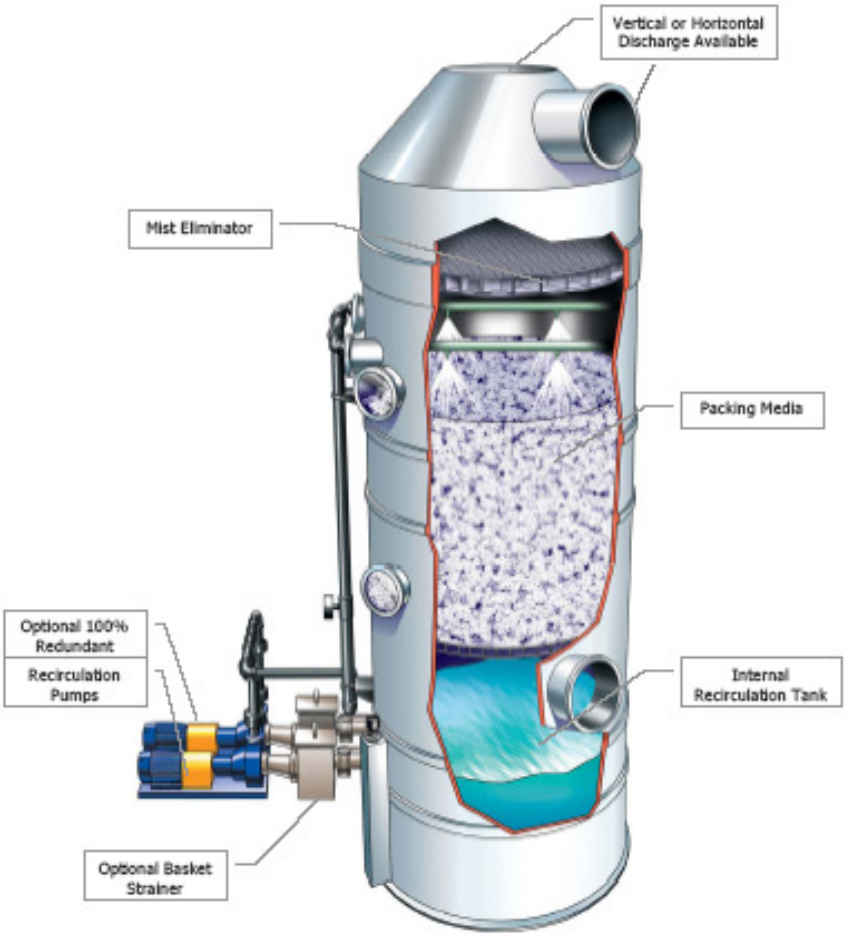
B. Process Outlet Flow, scfm @ 50°F 300

II. Typical System Configuration

The V/F unit is a vertical system starting with the recirculation sump mounted integrally with the scrubber, a packed bed section with high efficiency TRI-PACKS® packing, moisture elimination section using a polypropylene chevron blade style mist eliminator designed to be 99% efficient on 15 micron droplets, and the fan section top mounted to the scrubber.

These packages are very efficient and come equipped to handle a wide variety of air pollution control problems all the way from metal finishing operations through gas and odor control systems of lighter duty emission rates.

They can be interfaced with automatic pH control systems, chemical addition systems, and can be designed to handle most input loads to include some combustion processes.



SPECIFICATION

III. Component Specifications

A. V/F Vertical Packed Bed Scrubber

1. Scrubber Model V/F-012-096
2. Scrubber Diameter ..... 12"Ø
3. Scrubber Material of Construction ..... Polypropylene
4. Packing Depth ..... 8'-0"
5. Packing Style ..... 1"Ø TRI-PACKS
6. Packing Material of Construction ..... Polypropylene
7. Mist Eliminator Style ..... ☐ Munters Chevron Blade ☒ Woven Mesh
8. Mist Eliminator Material ..... Polypropylene
9. Scrubber Recirculation Rate, ... 10 GPM
10. Distribution Method ..... Spray Nozzle
11. Pump Style ..... March Horizontal
12. Pump HP 3
13. Pump Quantity ..... (1)
14. Recirculation Tank ..... Internal
15. External Piping Material ..... Schedule 80 PVC
16. Inline Strainer ..... Yes ☐ No ☒

B. Exhaust Fan Assembly

1. Fan Model ..... FRP Centrifugal Blower #RFE-315
2. Air Flow Rate, ... 300 CFM
3. Static Pressure, ... 11.0"
4. Speed, RPM 3336
5. Brake Horsepower (BHP) 2.23
6. Rotation ..... Clockwise
7. Discharge ..... Upblast
8. Housing Material ..... FRP
9. Impeller Design ..... Paddle Wheel
10. Impeller Construction ..... Fiberglass
11. Impeller Diameter, ... 14"Ø
12. Motor Style ..... TEFC Type
13. Motor Size ..... 5 HP
14. Electrical 480V/3pH/60Hz
15. Base Construction ..... Mild Steel with Epoxy Corrosion Resistant Coating
16. Outlet Connection ..... Flanged
17. Inlet Connection ..... Flanged
18. Inspection Port ..... Included
19. Drain at Low Point in Housing
20. OSHA Approved Shaft and Bearing Guard ..... Included

SPECIFICATION

C. Electrical Controls and Instrumentation

Tri-Mer® Corporation designs and builds all electrical devices and control devices per the National Electric Code (NEC). Other local codes or company electrical codes are not included in the quotation or pricing.

1. Enclosure Type NEMA 4 (Water and Dust Tight)
2. NEMA 4 J-Box
3. Panel is Powder Coated Steel Type
4. Main Panel Disconnect
5. Electrical Input 460V/60Cy/3pH
6. Transformer to provide control power at 120V/1pH/60Hz
7. Selector Switches
8. Indicator Lights and Alarms
9. AB PLC or Contact and Relay Control
10. Pump Motor Starter ..... (1) 3 HP
11. Fan Motor Starter ..... (1) 5 HP
12. Internal components are prewired
13. Terminal blocks are provided for external connections
14. Liquid Level Control .....Four (4) GEMS Level Switches
15. Liquid Flow Measurement ..... Signet Line Mounted Type
16. Scrubber Pressure Measurement..... Manual Magnehelic Gauge by Dwyer
17. Liquid Pressure Gages .....By Ashcroft
18. Solenoid Valves .....By ASCO
19. pH Probe & Controller ..... Signet
20. Chemical Feed Pumps are electrically driven diaphragm type systems designed to interface with pH control to feed on demand.

Note: Chemical supply NaOH by others.

Note: All field wiring to and from J-Boxes, Panels and Local Instruments is by others.

IV. Performance Guarantee

Removal Efficiency 99%

Note: (NaOH required)

V. Consumables (TBD)

A. 50% NaOH ..... Up to 36 gph

B. Purge/Blowdown .....350 gph

C. Water quality to each system should have a hardness level ≤ 100 mg/l as calcium carbonate.

VI. Items Not Included

A. Building Permit

B. Air Permit

C. Any PE Stamps

D. Mounting Platform or Concrete Pad

E. Support or Catwalk Assemblies

F. Any Utilities, Power, Water, and Drain

G. Integral and Interconnecting Ductwork Not Specified Above
H. Freight to Jobsite
I. Export Crating
J. Oxidation Reactor

VII. Warranty

TRI-MER® CORPORATION (hereinafter referred to as "Tri-Mer®") warrants each of their products, manufactured by Tri-Mer®, against manufacturing defects within one year from date of startup or eighteen (18) months from shipment whichever occurs first. During the first year, a product, or any part thereof deemed defective by the user, may, upon prior approval by Tri-Mer®, be returned to 1400 Monroe Street, Owosso, Michigan 48867.

VIII. System Component Pricing (US Currency)

V/F Vertical Packed Bed Scrubber.....$17,100.00
Exhaust Fan..... $5,460.00
Electrical controls and Instrumentation.....$13,700.00

IX. Start-Up Assistance at Site

A. $1,200.00 per man/day plus expenses for all jobsite days

X. Terms and Conditions (See Attachment)

A. Prices Firm.....30 Days
B. Delivery.....6-8 Weeks from Drawing Approval
C. Drawings .....3-5 Days after Receipt of Purchase Order
D. Terms.....30% with Purchase Order
30% with Approval Drawings
30% before Shipment
Balance Net 30 Days
E. Freight.....FOB – Owosso, Michigan, by Common Carrier (Freight Collect)

Please Note: Per company policy Tri-Mer Corporation does not ship equipment via rail.

XI. Installation

A. Installation by Others.

SPECIFICATION

TERMS AND CONDITIONS

By Acceptance of this Offer the Buyer Expressly Agrees:

1. **AGREEMENT**. This offer is expressly limited to the acceptance of the exact terms and conditions contained herein and any acceptance by Buyer shall be deemed an acceptance of each and every said term and condition. This Offer contains a final and exclusive statement of the terms and conditions of the contract between Tri-Mer Corporation (hereinafter "Tri-Mer") and Buyer relative to this sale of products, materials and/or services described or referred to on the front side hereof. All prior undertakings, writings, and oral representations between the parties hereto shall be superseded by this Agreement. No prior dealings between the parties, no usage of trade, and no industry practice shall be relevant to supplement or explain any term used in this agreement.
2. **ACCEPTANCE.** This Offer may be accepted in writing, or by Buyer's return of this document to Tri-Mer acknowledging acceptance. This offer shall expire on midnight on the thirteenth day after the date shown on front side hereof, unless it is sooner revoked by oral or written notice from Tri-Mer. Buyer understands and agrees that the goods are specially manufactured for Buyer, and are not suitable for sale to others in the ordinary course of Tri-Mer's business.
3. **MODIFICATION.** The terms and conditions contained herein can only be modified or waived by a separate written agreement signed by a duly authorized representative of Tri-Mer.
4. **RESCISION.** This Agreement can only be rescinded by a separate written agreement signed by a duly authorized representative of Tri-Mer.
5. **WAIVER.** Waiver by Tri-Mer of any term, provision, or condition hereof shall not be construed as a waiver of any other term, provision or condition, nor shall waiver be deemed a waiver of subsequent breach of the same term, condition or provision.
6. **CONTINGENCIES.** Tri-Mer shall not be held liable if prevented from performing any of its obligations of the Agreement due to causes beyond its reasonable control, including, but not limited to, events such as fire, flood, drought, earthquake, acts of God, war, riot, strikes, differences with workmen, lockouts, epidemics, quarantines, delays in transportation, shortage of vehicles, fuel, supplies, labor or materials, embargo, governmental orders or legal actions.
7. **TAXES.** Listed prices referred to on the front side hereof do not include sales, purchase use, excise delivery, storage transportation, consumption or other taxes payable to any governmental authority in respect to the sale of Tri-Mer's products, materials and/or services. Instead, taxes are to be added to the listed purchase price of such products, materials and/or services and shall be fully paid by Buyer within thirty (30) days of demand by Tri-Mer.
8. **PRICE.**
   a. Prices are F.O.B. point of shipment (unless otherwise agreed to).
   b. Oral and written quotations are subject to acceptance within thirty (30) days from date.
   c. Prices on equipment of Seller's manufacture are firm, provided it is shipped within the quoted and agreed upon shipment schedule. If Buyer causes shipment to be delayed, Seller reserves the right to invoice at Seller's price effective at time of shipment.
   d. Prices on equipment of other manufacturers are subject to escalator clause of Seller's supplier, if any.
   e. Any excise, sales, use taxes or other taxes imposed by Federal, State, or municipal authority and incurred by Seller applicable to the material sold, shall be to Buyer's account and are in addition to the prices quoted, unless Buyer provides Seller with a proper tax-exemption certificate. Buyer hereby agrees to indemnify, defend and hold harmless Seller from any taxes, fines, penalties and costs, including attorneys' fees, incurred or paid by Seller arising out of any such claim of exemption. This defense and indemnity requirement shall survive this contract and any releases resulting from same.
9. **TERMS.**
   Refer to quotation under Terms and Conditions for terms of payment; please note that there are no discounts, unless otherwise specified. Seller may invoice on an installment basis where the Contract Goods are so delivered. For late payment, Buyer is subject to a late charge of eighteen percent (18%) of the unpaid fees per annum (1.5% per month) or the maximum allowed by law, whichever is less. If Seller does not receive payment in full for the Contract Goods and any monies otherwise due by the due date, then Seller may, at its option at any time while the whole or any part of the monies due remain outstanding, take possession of the Contract Goods, or any part, delay or stop future deliveries, and terminate this Agreement, in which case Seller is entitled to recover any loss, including loss of profit, which loss will carry interest under paragraph 2 of this Section. Pro rata retainage fees or backcharges will not be accepted by Seller. Buyer will be responsible for all expenses incurred from any collection proceedings.
10. **DELIVERY AND SHIPMENT.** Any indicated dates of delivery are approximate only. Please note: Per company policy Tri-Mer Corporation does not ship equipment via rail.
11. **GRANT OF SECURITY INTEREST.** As security for the payment in full for the Contract Goods, as a condition of the passage of title to Buyer for the Contract Goods as provided for hereunder, Buyer grants to seller a first priority security interest in the Contract Goods, whenever located, together with all Accounts, Products and Proceeds of any and all of the Contract Goods (as such terms are defined by the Uniform Commercial Code as from time to time in effect in any applicable jurisdiction). Upon default in payment by Buyer, Seller may exercise all rights of a Secured Party as provided for by the Uniform Commercial Code.
12. **DUTY TO INSPECT.** Upon Buyer's receipt of products and materials, and upon completion of Tri-Mer's workmanship, Buyer shall immediately inspect such products, materials and/or workmanship. Notice of nonconforming products, materials and/or workmanship shall be given to Tri-Mer within fourteen (14) days after Buyer's receipt of goods, unless workmanship is provided whereupon notice shall be given within fourteen (14) days of completion of workmanship. Failure to provide notice within fourteen (14) days after date of receipt of products, materials and/or workmanship shall constitute a waiver of Buyer's remedies.
13. **WARRANTY.** Tri-Mer warrants to Buyer that, subject to Sections Nine (9) and Eleven (11) hereof, and/or including any specifications so incorporated. Tri-Mer warrants all of its manufactured products against defects in material and workmanship for a period of one (1) year from the date the Tri-Mer product is received at customer's premises. Tri-Mer will provide on a pass-through basis the standard manufacturer's warranty on any components and/or equipment supplied by Tri-Mer. No additional warranties are extended by Tri-Mer. In no event will Tri-Mer be liable for removal or reinstallation of any defective parts without prior written consent. No allowance will be made for repairs or alterations unless specifically authorized in writing by Tri-Mer. Removal and reinstallation of defective parts shall be the responsibility of the Buyer. NO CLAIM WILL BE ALLOWED FOR DAMAGES OR DELAYS CAUSED BY DEFECTIVE MATERIALS, OR OPERATIONS FAILURES INCLUDING DELAYS IN ANY EQUIPMENT, OR ANY CONSEQUENTIAL DAMAGE OR BUSINESS LOSS INCURRED BY BUYER. THIS WARRANTY DOES NOT APPLY TO OPERATIONAL WEAR AND TEAR, MISUSE, IMPROPER SERVICE, FIELD ALTERATIONS OF PRODUCTS, DAMAGE DUE

TO LACK OF MAINTENANCE OR IMPROPER STOARGE, NEGLECT, ACCIDENT, SABOTAGE, OR FOR DAMAGE FROM USE UNINTENDED OR UNANTICIPATED BY TRI-MER.

14. **GENERAL CONDITIONS.**
    a. Non-stock Contract Goods made specifically to order are not subject to return for credit. Any portion of non-stock Contract Goods in process of manufacture is not subject to cancellation. Any charges after manufacture has started could necessitate additional charges for work done and material consumed.
    b. Quotations are merely negotiations to trade and not offers to contract.
    c. Seller reserves the right to correct any factory, engineering, clerical and/or stenographic errors or omissions.
    d. Changes in design are made at Seller's discretion. Seller has no obligation to incorporate these changes in units manufactured prior to change.
    e. It is expressly understood that any and all drawings, instructions, and/or technical and engineering services, which Seller may furnish with reference to the installation or use of its Contract Goods, are furnished solely for the review and approval of Buyer and its engineers. Seller makes no representation or warranty with respect to the accuracy or sufficiency of any such information and assumes no obligation or liability for results obtained.
    f. Waiver by Seller of a breach of any of these Terms and Conditions shall not be construed as a waiver of any other breach.
    g. To combat corrosion, abrasion, or erosion, or operation at elevated temperatures, any such recommendations will be based on the best available experience of Seller and the supplier of the material, BUT WILL NOT CONSTITUTE A GUARANTEE AGAINST THESE EFFECTS.
    h. All drawings, patterns, specifications and information included in Seller's proposal or contract, and all other information otherwise supplied by Seller to design, manufacture, erect, operate and maintain the Contract Goods shall be the propriety and confidential property of the Seller and shall be returned to Seller at its request. Buyer shall have no rights in Seller's proprietary and confidential property and shall not disclose such proprietary and confidential property to others or allow others to use such property, except as required for the Buyer to obtain service, maintenance, and installation for the Contract Goods purchased from Seller. This clause shall survive the termination of this contract and be in effect as long as the Buyer has possession of any of the Seller's proprietary or confidential property. Ownership of said information shall remain with Seller, and Buyer shall have the right to use said information only for the use and maintenance of the Contract Goods.
15. **PERMISSIBLE VARIATIONS.** Unless otherwise specified and agreed upon, all products, materials and/or workmanship shall be furnished subject to Tri-Mer's standard practices, tolerances and variations. Tri-Mer reserves the right to ship overages and underages of weight, length, size and/or quality in accordance of Tri-Mer's standard practices.
16. **LAWS, REGULATIONS, AND STANDARDS.** Tri-Mer makes no representation that its products, materials and/or workmanship conform(s) to local, state, federal, and/or foreign laws, ordinances, regulations and/or codes, or that the Tri-Mer products, materials and/or workmanship selected by Buyer will cause Buyer's operations to comply with any local, state, federal and/or foreign laws ordinances, regulations and/or codes. It is the sole responsibility of the Buyer to select the appropriate Tri-Mer products, materials and/or services to meet with such requirements. Buyer understands that Tri-Mer does not provide advice or consultation. All Tri-Mer equipment is designed to meet the standards of S.P.I. and the American Conference of Governmental Industrial Hygienists; Tri-Mer makes no representation that its products and services conform to any other standards, except as may be otherwise agreed in writing and signed by a duly authorized representative of Tri-Mer.
17. **PERMITS.** Buyer is solely responsible for obtaining any and all governmental permits, authorizations, documents, and/or any other related forms of any nature.
18. **LIMITATION OF DAMAGES.** In the event of a breach of this Agreement by Tri-Mer, the rights of the Buyer are limited to a recovery of the amount paid to Tri-Mer for said goods and services. Tri-Mer shall in no event be liable for incidental, consequential, special and/or punitive damages resulting from its breach of any terms of the Agreement; nor shall Tri-Mer be liable for improper selection of goods and/or services, or for matters concerning counseling and/or advice. No action for breach of any of the provisions of this Agreement may be maintained by Buyer against Tri-Mer unless commenced within one (1) year of the date of the accrual of such cause of action.
19. **ASSIGNMENT.** This Agreement may not be assigned by Buyer without prior written consent from a duly authorized representative of Tri-Mer.
20. **CHOICE OF LAW AND FORUM.** This Agreement shall be governed and construed in accordance with the laws of the State of Michigan. Any civil litigation arising out of, or relating to, this Agreement shall be commended and maintained in the State of Michigan.
21. **SURVIVABILITY.** If any provision of this Agreement shall be invalid or unenforceable under any applicable law, such provisions shall not apply in such instance, but the remaining provisions shall be given their full effect in accordance with their terms.
22. **INDEMNIFICATION.** Buyer shall defend, indemnify and hold harmless Tri-Mer against any and all losses claims, demands, actions, damages, attorney's fees and costs, however characterized, including but not limited to those involving personal injury, wrongful death, toxic tort, environmental impairment, property damage or diminution of value, business damage or diminution of value, or any other liabilities of any other liabilities of any nature as a result of Tri-Mer's products, materials, representations (both implicit and explicit) and/or services, if, and only if, Buyer is at least partially at fault for said liabilities. Buyer shall also defend, indemnify and hold harmless Tri-Mer against any and all losses claims, demands, actions, damages, attorney's fees and costs, however characterized, including but not limited to those involving personal injury or wrongful death claims or actions maintained as a result of injuries sustained by Buyer's employee within the course of his or her employment, if, and only if, the Buyer and/or Buyer's employee is at least partially at fault for said personal injury or wrongful death. No claim of indemnification of any nature, including but not limited to, express contractual, implied contractual, tort-based, restatement-based and/or statutory, shall lie in favor of Buyer and against Tri-Mer unless stated in writing and signed by a duly authorized representative of Tri-Mer.
23. **DEFAULT.** In the event Buyer shall default on any of its obligations under this Agreement, Buyer shall be liable to Tri-Mer for reasonable attorney's fees, consulting fees, litigation fees and court costs associated with enforcing this Agreement and Tri-Mer may at its option, and without incurring any liability, elect to terminate this Agreement and shall have a right to all damages sustained including, but not limited to, loss of profits.
24. **SECURITY INTEREST.** Unless and until the products and/or services are fully paid for, Tri-Mer reserves the security interest to secure the unpaid balance of the price and all other obligations of the Buyer to Tri-Mer, however arising. Buyer hereby grants Tri-Mer Power of Attorney to execute and file on behalf of Buyer all necessary financing statements and other similar documents required to perfect security interest granted herein.

25. **INSOLVENCY AND BANKRUPTCY.** If Buyer shall be insolvent, cease doing business, be subject to any bankruptcy, insolvency or reorganization statute laws, or consent to the appointment of a receiver, trustee, liquidator or similar official such action shall, at the election of Tri-Mer, be deemed a default under this Agreement. Tri-Mer may elect to cease performing and cancel this Agreement with respect to any products, materials and/or services not delivered or received prior to election. The foregoing shall be without prejudice to recover by Tri-Mer of damages for work performed and for loss of profits, materials, and products delivered.
26. **SERVICE CHARGES.** Unless stated in writing by a duly authorized representative of Tri-Mer, this Agreement does not include charges for service visits, repair estimates, repair visits, field analysis, field adjustments, troubleshooting, modifications and related services and any out-of-pocket expenses associated with such work.
27. **CANCELLATION CHARGES.** Minimum cancellation charges are 15% of the purchase price of the order but in no case less than $500.00. In the case of cancellation of an order after acknowledgment, the following % of the original Contract amount is due:

    After acknowledgment but prior to drawn submittal 15%.
    After acknowledgment and drawing submittal 20%.
    After drawing approval and prior to material receipt 30%.
    After drawing approval and receipt of material 60%.
    After fabrication begins 85-95%.
    At completion of fabrication 100%.