January 1992

Preliminary Site Characterization Summary Installation Restoration Program

Naval Air Station Fallon Fallon, Nevada

Naval Energy and Environmental Support Activity

Port Hueneme, California

PRELIMINARY SITE CHARACTERIZATION SUMMARY NAVAL AIR STATION FALLON, FALLON, NEVADA

Prepared for

Naval Energy and Environmental Support Activity

Port Hueneme, California

Prepared by:

Oak Ridge National Laboratory

Pollution Assessment Group

P. O. Box 2567

Grand Junction, Colorado 81502

Submitted by

Hazardous Waste Remedial Actions Program

Martin Marietta Energy Systems, Inc.

P. O. Box 2003

Oak Ridge, Tennessee 37831-7606

for the

U. S. Department of Energy

under contract DE-AC05-84OR21400

January 1992

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ACRONYMS AND ABBREVIATIONS

2,4-D	(2,4-dichlorophenoxy) acetic acid
ARARs	Applicable or Relevant and Appropriate Requirements
asl	above sea level
avgas	aviation gasoline
bgs	below ground surface
bql	below quantitation limits
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
cfs	cubic feet per second
cm	centimeter
DCA	dichloroethane
DDD	dichlorodiphenyldichloroethane
DDE	dichlorodiphenyldichloroethene
DDT	dichlorodiphenyltrichloroethane
DNAPL	dense non-aqueous phase liquid
DOD	Department of Defense
EE/CA	Engineering Evaluation/Cost Analysis
EM	electromagnetic
FS	feasibility study
ft^2	square feet
ft/sec	feet per second
GATAR	Ground to Air Transmitting and Receiving (compound)
GC	gas chromatograph
gpm	gallons per minute
GSE	Ground Support Equipment
HAZWRAP	Hazardous Waste Remedial Actions Program

in.	inch
IR Program	Installation Restoration Program
kg	kilograms
L	liters
LD	Lower Diagonal Drain
LD #1	Lower Diagonal No. 1 Drain
m	meters
MCLs	maximum contaminant levels
MEK	methyl ethyl ketone
µg/kg	micrograms per kilogram
µg/L	micrograms per liter
µmhos/cm	micromhos per centimeter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
ml	milliliter
mogas	motor vehicle gasoline
NAAS Fallon	Naval Air Auxiliary Station Fallon
NAS Fallon	Naval Air Station Fallon
NDEP	Nevada Division of Environmental Protection
NDWS	National Drinking Water Standards
ORNL	Oak Ridge National Laboratory
OSWER	Office of Solid Waste and Emergency Response
O/WS	oil/water separator
PA/SI	Preliminary Assessment/Site Inspection
PC	personal computer
PCB	polychlorinated biphenyl
PEL	permissible exposure limits

PID	photoionization detector
ppb	parts per billion
ppm	parts per million
QA/QC	quality assurance/quality control
QC	quality control
RF	radio frequency
RI	remedial investigation
RI/FS	remedial investigation/feasibility study
RMCLs	recommended maximum contaminant levels
SARA	Superfund Amendments and Reauthorization Act
SDWA	Safe Drinking Water Act
TCA	trichloroethane
TCE	trichloroethene
TCLP	toxicity characteristic leaching procedure
TDS	total dissolved solids
TIC	tentatively identified compounds
TOC	top of casing
TPH	total petroleum hydrocarbons
USEPA	U.S. Environmental Protection Agency (United States)
USRADS	ultrasonic ranging and data collection system
VOC	volatile organic compounds

EXECUTIVE SUMMARY

This report describes the results of the remedial investigation of twenty-one potentially contaminated sites at Naval Air Station Fallon (NAS Fallon), Nevada, conducted August 1989 through May 1991. The document is submitted as part of the remedial investigation (RI) activities associated with Phase II of the Installation Restoration Program (IR Program) currently underway at the facility. Investigation results are presented for each of the twenty-one sites deemed potentially contaminated in the Phase I study. These results provide the direction for the additional investigations recommended at some sites and the basis for recommending no further investigations at other sites.

Introduction of contaminants to the environment has resulted from disposal activities, both through liquid disposal and landfilling, and from accidental spills and leaks associated with normal activities at NAS Fallon over the 49-year span of operations. Environmental sampling results indicate the vast majority of contaminants of concern are petroleum hydrocarbon related. These contaminants include JP-5, leaded gasoline, diesel fuel, heating oil, waste oils and lubricants, hydraulic fluids, and solvents. Indeed, areas of contiguous petroleum hydrocarbon contamination can be associated with twelve of the twenty-one IR sites at NAS Fallon. Other contaminants identified to date include pesticides, lead, and some organic compounds of uncertain origin.

The principal exposure pathway associated with sites at NAS Fallon is surface-water flows into shallow drainage-ditches that pass through the facility. Available data indicates NAS Fallon IR Program sites are not contributing detectable contamination to surface water emanating from the facility. Contaminants appear to be contained in a relatively immobile state in the shallow subsurface with little or no off-site migration.

1. INTRODUCTION

1.1 BACKGROUND

This characterization summary has been prepared as part of Phase II of the remedial investigation of the Installation Restoration Program (IR Program) currently underway at Naval Air Station Fallon (NAS Fallon), Nevada. The IR Program is designed to ensure that Department of Defense (DOD) facilities comply with environmental legislation outlined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of December 1980 as amended by the Superfund Amendments and Reauthorization Act (SARA) of October 1986 (NEESA 1984).

The IR Program is initiated through a Phase I Preliminary Assessment/Site Inspection (PA/SI). Phase I utilizes employee interviews, site inspections, record searches, and limited analytical testing to determine areas where environmental contamination may be present. Environmentally sensitive sites are recommended for inclusion in Phase II (Remedial Investigation/Feasibility Study) where additional analytical testing verifies and defines the extent and magnitude of contamination. Phase I activities were completed for NAS Fallon in April 1988. The resulting report concluded that twenty-one sites at NAS Fallon were potentially contaminated and recommended these sites for inclusion in Phase II activities (Dames and Moore 1988).

Phase II activities commenced at NAS Fallon in September, 1988. The objectives of the Phase II investigation are to further assess contamination at the twenty-one sites of interest and to recommend appropriate remedial measures. In order to meet these objectives, Phase II activities consist of a remedial investigation (RI) and a feasibility study (FS). The RI includes confirming and quantifying contamination at the sites of concern, and the FS includes developing and evaluating remedial alternatives capable of providing environmental protection from any contaminants confirmed to be present. Phase II work also includes performing risk analysis through a systematic evaluation of the available characterization data. The data and risk analysis are utilized in selecting preferred remedial alternatives during the feasibility study (FS) for each of the contaminated sites.

In general, the RI and FS are not conducted sequentially as separate investigations. Rather, both initiatives are conducted concurrently to facilitate an exchange of information between the two activities in order to guide the direction of future investigative efforts. Information disclosed during initial stages of the RI is channeled through the FS to develop a broad range of remedial alternatives applicable to the site. As remedial-alternative development and evaluation proceeds in the FS, any additional data needs that become apparent are channeled back to the RI for inclusion in future site- characterization activities. The resulting iterative process is well suited for addressing the complex environments associated with most installation restoration sites. The RI and FS thus collectively form the RI/FS process where subsequent activities are guided by previous investigations through a collaborative interaction between the two initiatives.

At the completion of the RI field activities, the resulting characterization summaries and feasibility study technical memorandums will be assimilated into an activity-wide Remedial Investigation Report and a Feasibility Study Report for NAS Fallon, consistent with Office of Solid Waste and Emergency Response (OSWER) Directive 9355.3-01, *Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA* (USEPA 1988a). Finally, the preferred remedial alternatives are implemented in Phase III, Remedial Design/Remedial Action.

Investigative activities covered by this report include field work performed in August and September 1989, field screening and surface water sampling; May, June, and July 1990, installing and sampling monitoring wells at Site 2; October and November 1990, field screening; and March and April 1991, drilling soil borings, installing wells, and sampling wells for the remaining sites. Table 1.1.i summarizes the field investigations performed through May 1991 on a site-specific basis.

Table 1.1.i. Summary of facility-wide IR Program activities through May 1991

Activity Summary		
Site Number or Description	**Sampling Method or Screening Technique**	**Number of Locations or Samples**
Site 1	Geophysical survey	1
	Groundwater test holes	57
	Soil borings	8
	Monitoring wells	8
	Piezometers	2
Site 3	Groundwater test holes	12
	Soil borings	8
	Sediment samples	3
	Monitoring wells	12
Site 20	Groundwater test holes	36
	Monitoring wells	6
Site 24	Groundwater test holes	25
	Soil borings	5
Group I Sites: Site 2 Site 4	Soil-gas survey	225
	Soil borings	12
	Groundwater test holes	97
	Monitoring wells	23
	Piezometers	7
	Geophysical survey	1
Group II Sites: Sites 6, 7, 21, &22	Groundwater test holes	79
	Monitoring wells	7
	Piezometers	8
Group III Sites: Sites 9 & 18	Groundwater test holes	10
	Soil borings	7
	Monitoring wells	2
	Piezometers	1
Group IV Sites Sites 10, 11, 12, 13, 14, 16, 19, & 23	Geophysical survey	2
	Groundwater test holes	162
	Soil borings	27
	Monitoring wells	16
	Piezometers	13
Lower Diagonal #1 Drain	Surface water/sediment	4
	Staff gauges	6
Lower Diagonal Drain	Surface water/sediment	4
	Staff gauges	1

1.2 PURPOSE AND OUTLINE OF REPORT

1.2.1 Purpose of Report

The purpose of this report is to present the results of the investigations performed to date and to develop the rationale for additional remedial investigations. This report is being submitted in conjunction with the RI portion of Phase II activities currently underway at NAS Fallon, Nevada. Information concerning contaminants at NAS Fallon is taken from the Phase I study (Dames and Moore 1988), initial RI field sampling activities (ORNL 1989), and other environmental studies (ERM-West 1988; NDEP 1990). Both field screening results and analytical laboratory results are presented. The laboratory results have been validated as discussed in Section 6. The potential exposure pathways and relative risks are discussed on a site-specific basis as related to the additional investigative activities being recommended.

1.2.2 Report Outline

The assessment of potential environmental risks at a specific site requires an understanding of: 1) the nature, extent, and magnitude of contaminants present; and 2) the mobility, transport pathways, exposure points, and receptors associated with contaminants. As these items are all dependent upon past activities in and around the site, a knowledge of site history is also required.

The following format will be used to present the data for each site:

Site History as based on available knowledge from investigations concerning environmental contaminants;

Investigative Approach, Extent of Contamination, and Exposure Pathways as determined from evaluating the available data; and,

Recommendations for field investigations to provide additional data for risk assessment and selection of remedial action alternatives.

A flow chart showing the process used in acquiring the data necessary for the completion of risk assessment and feasibility study activities is shown in Fig. 1.2.2.i. Ideally the remedial investigation satisfies three critical categories of information needs: (1) verification of contamination; (2) characterization of the extent and concentration of contaminants; and (3) assessment of potential for migration of contaminants away from the site in groundwater, surface water, or other media of concern at levels harmful to human health or the environment. Repetitive iterations of field investigations and data evaluation are generally required to satisfy these information needs. For many of the sites, contamination has either been verified or is not present, and characterization of the spatial extent of contamination is complete; however, the concentration gradients of contaminants within some of the identified plumes and the potential for contaminant migration have been only partially assessed. Thus, the final section describing each specific site or group of sites proposes additional investigations when necessary. The following sections present background data on the facility history and regional environmental setting including climate, geology, and hydrology. Site-specific investigative results are then presented, and the report concludes with a summary of activity-wide RI results and recommendations for future Phase II activities. Five appendices have been attached to the report to provide detailed information on field screening results (geophysical surveys and groundwater test holes), contaminant transport considerations, surface water characterization, and aquifer characterization.

1.3 HISTORY OF NAVAL AIR STATION FALLON

This section contains a brief history of operations at NAS Fallon. The history and nature of the environmental contaminants associated with the facility are also discussed.

NAS Fallon is located approximately six miles southeast of the town of Fallon and sixty miles east of the city of Reno, Nevada (Fig. 1.3.i). The facility lies in the central Carson Desert, commonly known as the Lahontan Valley. The climate is semiarid with an average rainfall of 5 in. per year.

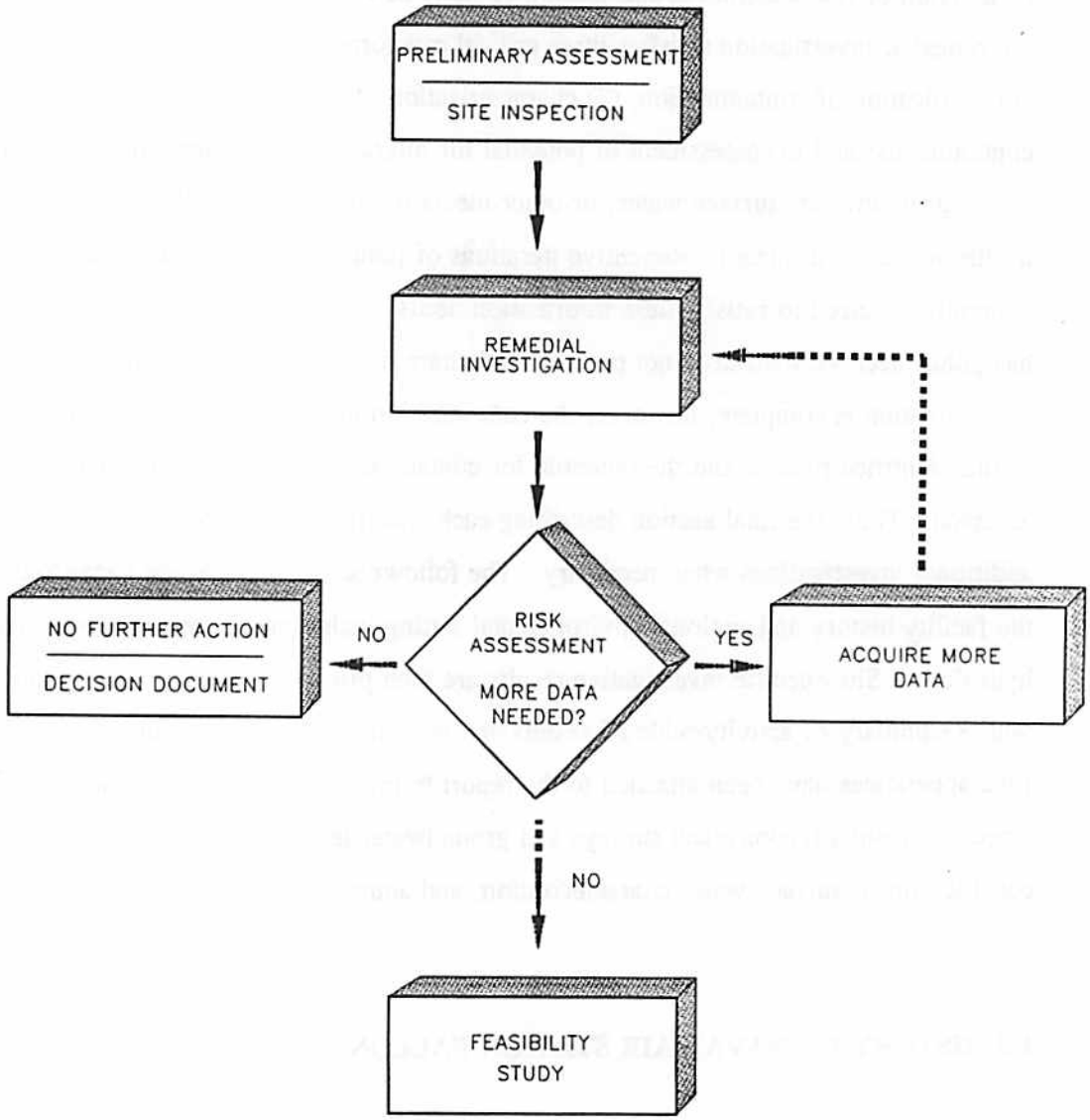

Fig. 1.2.2.i. Remedial Investigation/Feasibility Study decision flow chart.

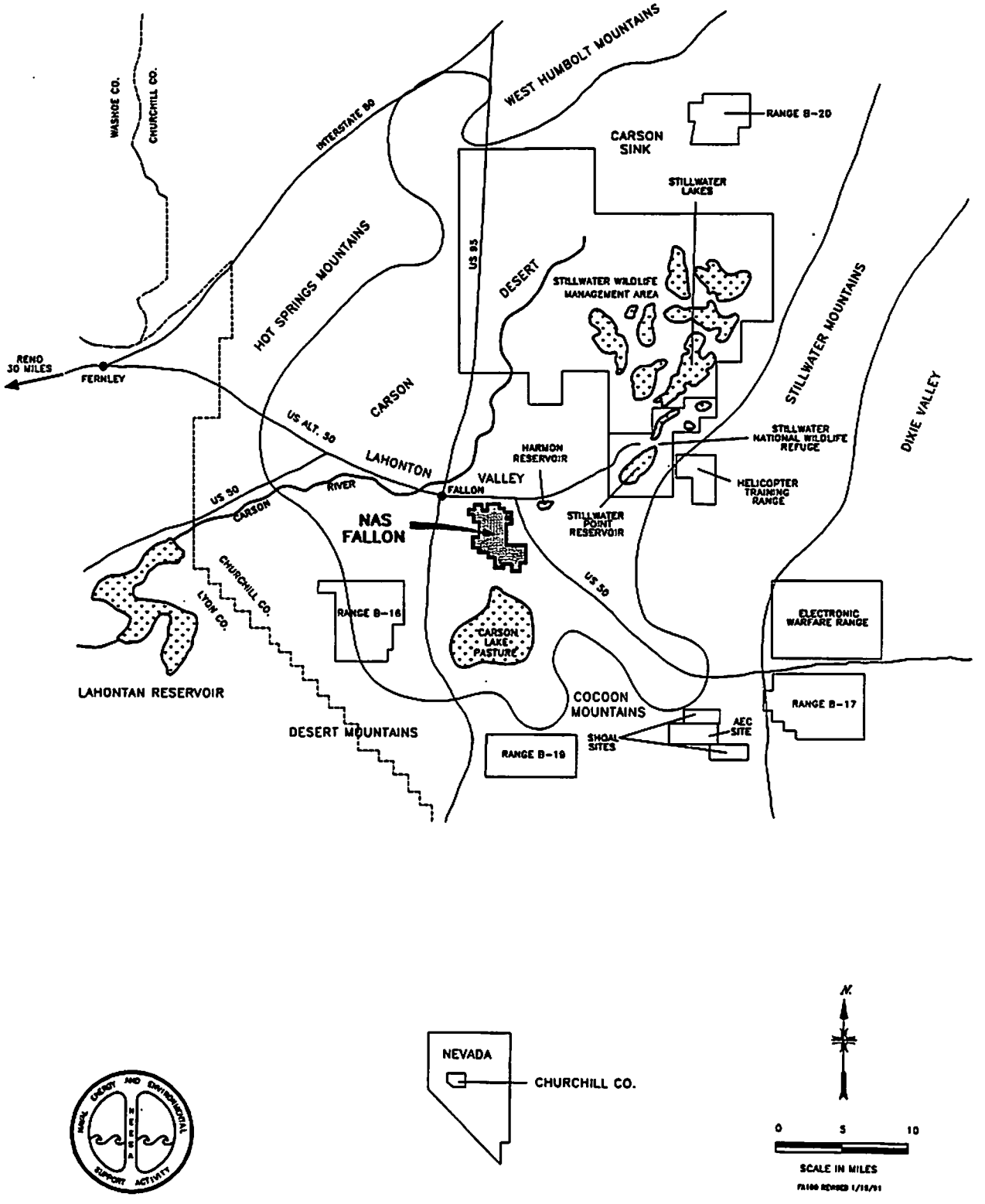

Fig. 1.3.i. Regional location map of Naval Air Station Fallon.

Naval Air Station Fallon was originally established as a military facility in 1942, when the Civil Aviation Administration and Army Air Corps constructed four airfields in Nevada as part of the Western Defense Program. In 1943 the Navy assumed control of the still-uncompleted facility, and on June 10, 1944, Naval Air Auxiliary Station (NAAS) Fallon was commissioned. The newly commissioned facility provided training, servicing, and support to air groups sent to the facility for combat training. From 1946 to 1951, NAAS Fallon experienced varying but reduced operational status and was eventually turned over to Churchill County and the Bureau of Indian Service.

In 1951, Fallon was used as an auxiliary landing field for NAS Alameda, California, and on October 1, 1953, NAAS Fallon was re-established. On January 1, 1972, NAAS Fallon was upgraded to its current status of Naval Air Station Fallon. NAS Fallon serves primarily as an aircraft weapons delivery and tactical air combat training facility.

Since its inception in 1942, various kinds of environmentally harmful materials have been routinely used and/or disposed of at NAS Fallon. These include jet fuel (JP-4 and JP-5), oil, avgas (aviation gasoline), gasoline, antifreeze, hydraulic fluid, solvents, paint, pesticides, and industrial and municipal garbage. These substances may have been introduced into the environment during: aircraft refueling, maintenance, and washing; vehicle maintenance; off-specification fuel disposal; fire training exercises; tank cleaning; sewage disposal; pest and weed control; landfilling; and accidental leaks and spills.

Environmental concerns associated with past activities at NAS Fallon have resulted in several environmental assessment initiatives. These include: 1) an investigation by ERM-West of fuel discovered floating on the water table underlying the new fuel farm facility (ERM-West 1988); 2) an investigation by the Nevada Division of Environmental Protection (NDEP) of an alleged fuel release at the new fuel farm facility (NDEP 1990); and 3) initiation of the current IR Program of which this document is a part. Portions of the IR Program initiative which have been completed to date include: the Phase I, PA/SI (Dames and Moore 1988); two iterations of field investigations at Site 2; the Engineering Evaluation and Cost Analysis for Site 2 (ORNL 1991); one iteration of field investigations at the other 20 sites; and initiation of process options screening for the FS on all sites.

To facilitate ease in referencing and in developing location maps, Phase II activities to date have referenced the twenty-one sites as four individual sites and four groupings (encompassing seventeen sites). Grouping is based on proximity of sites to one

another and/or similarity of contaminants. In order to maintain consistency throughout Phase II activities, reference to individual sites in this report is the same as that developed in the Work Plan (ORNL 1989).

The twenty-one sites and associated groupings under investigation are shown in Fig. 1.3.ii and include:

SITE	GROUPING
Site 1 - Crash Crew Training Area	Stand alone
Site 3 - Hangar 300 Area	Stand alone
Site 20 - Checkerboard Landfill	Stand alone
Site 24 - Road Oiling Area	Stand alone.
Site 2 - New Fuel Farm	Group I
Site 4 - Transportation Yard	Group I
Site 6 - Defuel Disposal Area	Group II
Site 7 - Napalm Burn Pit	Group II
Site 21 - Receiver Site Landfill	Group II
Site 22 - Northeast Runway Landfill	Group II
Site 9 - Wastewater Treatment Plant	Group III
Site 18 - Southeast Runway Landfill	Group III
Site 10 - Ground to Air Transmitting and Receiving (GATAR) Compound	Group IV
Site 11 - Paint Shop	Group IV
Site 12 - Pest Control Shop	Group IV
Site 13 - Boiler Plant Tanks	Group IV
Site 14 - Old Vehicle Maintenance Shop	Group IV
Site 16 - Old Fuel Farm	Group IV
Site 17 - Hangar 4	Group IV
Site 19 - Post-World War II Burial Site	Group IV
Site 23 - Shipping and Receiving Disposal Site	Group IV

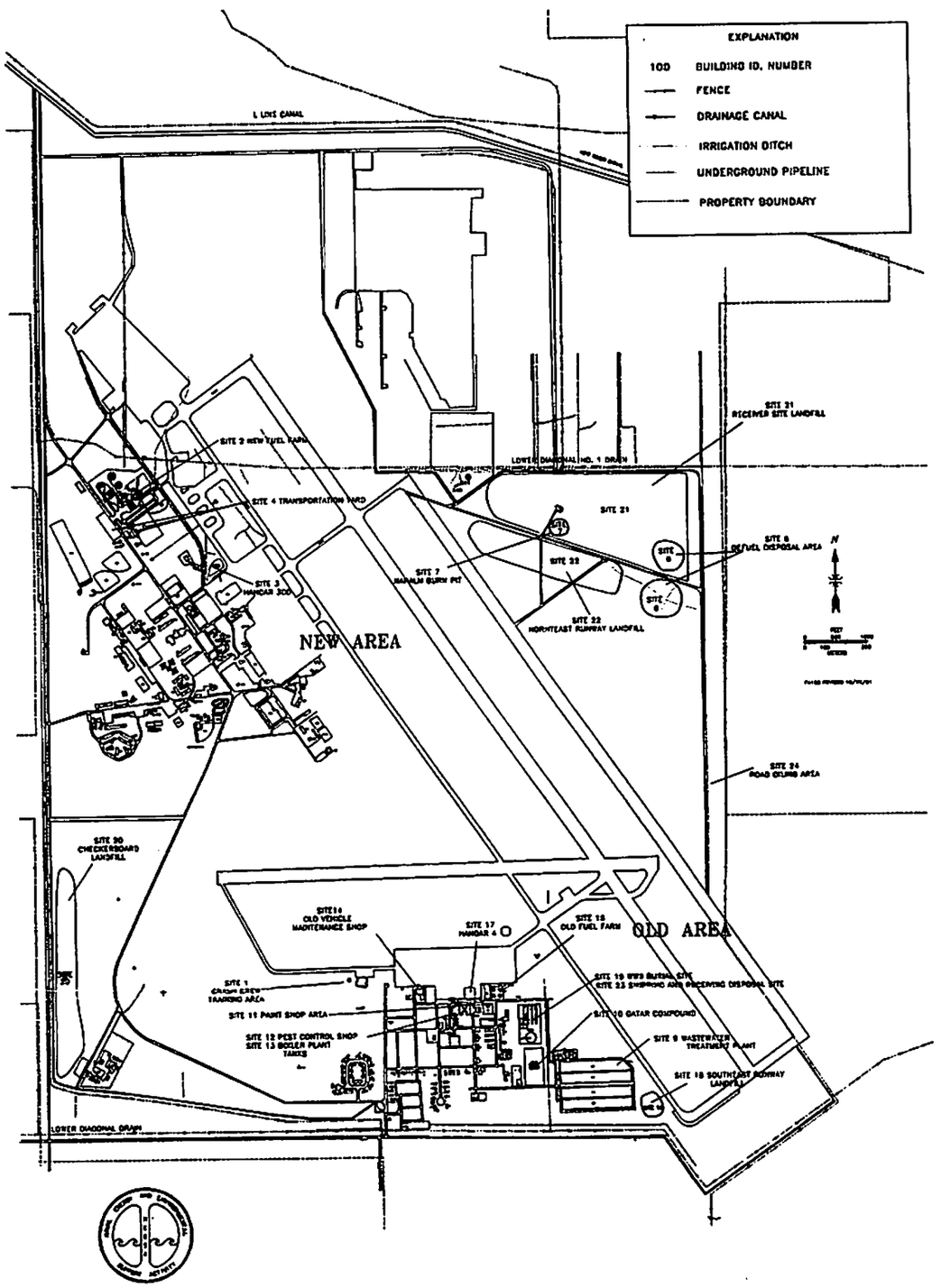

Fig. 1.3.ii. Map of the 21 sites under investigation.

2. ENVIRONMENTAL SETTING

The facility lies on a broad, flat alluvial plain in the southern Carson Desert referred to as the Lahontan Valley. The area is part of the Basin and Range geological province. It is a sink for surface runoff from surrounding mountains and the Carson River. The Carson Lake Pasture, a series of ditches and small marshes, is a few miles south of the facility. The Stillwater Lakes, a chain of small lakes, ponds, and marshes, extend for 20 miles south of the Carson Sink in the northern half of the Carson Desert (Fig. 1.3.i). The two wetland areas comprise an important stopover for migratory birds during the spring and fall. Recent drought years have caused the Stillwater Lakes to shrink from approximately 100,000 acres of wetlands in 1983 to 4,000 acres of wetlands in 1991.

The Carson Desert is a hydrologically closed depression and forms the sink for the Carson River. The entire area is in the rain shadow of the Sierra Nevada Mountains; consequently, precipitation is about 5 inches per year. About 80% of the Carson Desert surface is the Carson River floodplain, and the rest is composed of playas and alluvial fans (Wilden and Speed 1974). The associated soils are enriched in salts and cations such as arsenic, lithium, mercury, and molybdenum as a result of transport to the basin by the river and evaporative concentration from historic Lake Lahontan (Hoffman 1990). The Carson River, augmented by the Truckee River via the Truckee Canal (part of the Newlands Irrigation Project), provides more than 95% of all surface runoff received by the Carson Desert. Much of the area around the facility is irrigated, and there are several irrigation ditches to deliver water and drainage canals to remove excess water. The drainage canals generally intersect the shallow water table aquifer and drain excess water from the farmland. The quality of the irrigation return flows is described in Hoffman 1990.

Abundant groundwater is present in the valley fill-sediments and the underlying volcanic strata of the Carson Desert. This is due to the closed nature of the hydrologic basin and the remnants of Pleistocene Lake Lahontan that once covered the entire area. Groundwater occurs in three principal aquifer systems: (1) a shallow alluvial aquifer, (2) intermediate and deep alluvial aquifers, and (3) a basalt aquifer (Glancy 1986).

The shallow-water-table aquifer occupies the alluvium from near the surface to about 25 ft in depth. Many residents living outside of the town of Fallon have shallow wells in this aquifer which are utilized for domestic water, livestock watering, and irrigation. The aquifer is composed of many interconnected zones of varying permeability ranging from highly transmissive channel sands to less-transmissive silty clay floodplain and lake deposits (Fig. 2.i). The water quality is generally poor because the water is high in dissolved solids; however, freshwater recharge from the surface-water irrigation system helps maintain water quality in some parts of the valley (Glancy 1986). Reports on regional water quality in the shallow alluvial aquifer and irrigation return flows contains information on the range of concentrations of various metals and anions (Hoffman et al. 1990) (Glancy 1986). This information is summarized on Table 2.i. There is considerable variability in the concentrations of these constituents; however, there is a trend of increasing concentrations toward discharge areas at Stillwater Lakes and Carson Lake (Glancy 1986). Concentrations of many trace metals exceed various criteria for protection of aquatic life, crop protection, effect levels for fish reproduction, and limits for propagation of wildlife. For example, background surface water concentrations of boron often exceed the 200 μg/L effect level for fish reproduction, and concentrations of arsenic in groundwater and surface water often exceed Nevada criteria for protection of aquatic life of 40 μg/L and the drinking water standard of 50 μg/L (Hoffman et al. 1990).

Regional information on the concentrations of metals in soils is not readily available for comparison to the site-specific data in this report. It would seem reasonable, however, to consider most of the metals results for samples analyzed during the RI as representative of background soil concentrations. This assumption is based on the lack of historical evidence suggesting that metals were disposed of in solubilizable forms at sites other than Site 9, Wastewater Treatment Plant. In fact, the soil sample metals data from upgradient wells MW06, MW11, and MW12 were specifically collected to provide background information. Thus, the data in Section 3.2, Table 3.2.1.i, which consists solely of metals data from MW11 can be considered as background data. Likewise, based on waste disposal history, data from soil samples for the Group I Sites, Group II Sites, Site 3, and Site 20 could also be used as background soils data.

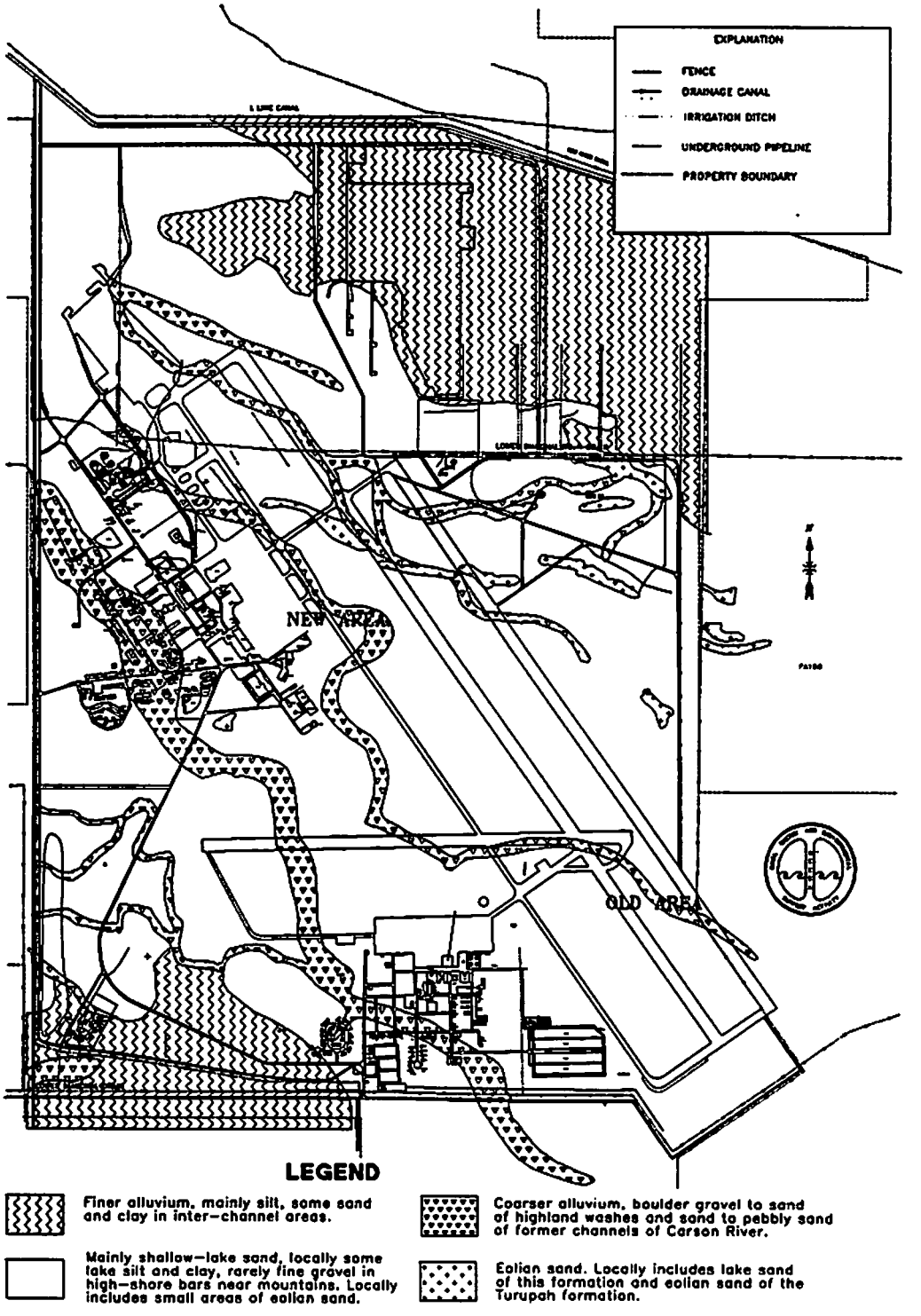

Fig. 2.i. Surficial geologic map showing former Carson River channels.

Table 2.i. Regional water quality data for metals and anions

Constituent	Surface Water Concentration Range, µg/L	Groundwater Concentration Range, µg/L
Aluminum	<10 - 14,000	not available
Arsenic	<1 - 1400	37 - 730
Barium	34 - 400	not available
Beryllium	<10	<10 - 10
Boron	190 - 28,000	2200 - 120,000
Cadmium	<1 - 12	<1 - 1
Calcium	22,000 - 710,000	100,000 - 750,000
Chloride	8.6 - 26,000 mg/L	4300 - 27,000 mg/L
Chromium	<1 - 50	20 - 50
Cobalt	<1 - 7	<1 - 7
Copper	<10 - 80	2 - 9
Fluorine	not available	200 - 2700
Iron	190 - 16,000	90 - 330
Lead	<5 - 8	<5
Lithium	19 - 2800	400 - 8200
Manganese	130 - 1600	340 - 1800
Magnesium	6100 - 780,000	140,000 - 1,700,000
Mercury	<0.1 - 1.1	<1 - 1
Molybdenum	<1 - 1600	20 - 1500
Nitrogen	0.001 - 14 mg/L	0.01 - 34 mg/L
Nickel	<1 - 13	1 - 16
Phosphorus	<10 - 2500	90 - 770
Potassium	3100 - 450,000	110,000 - 490,000
Selenium	1.0 - 26	<1
Sodium	25 - 18,000 mg/L	2700 - 20,000 mg/L
Silver	<1 - 2	<1 - 1
Uranium	0.9 - 300	1.9 - 310
Vanadium	1 - 810	80 - 300
Zinc	<10 - 80	30 - 80
Total Dissolved Solids	560 - 41,000 mg/L	12,800 - 70,700 mg/L

Source: Hoffman et al. 1990

The regional groundwater-flow direction is to the east and southeast towards Grimes Point and slightly diagonal to the drainage ditches which cross the facility (Fig. E.1 Appendix E). The regional groundwater-flow velocity estimated by Glancy is 35 ft per year. The site-specific groundwater-flow velocities from numerous aquifer tests are highly variable (Appendix D).

The intermediate and deep alluvial aquifers are present beneath the shallow alluvial aquifer. The boundary between the shallow and the intermediate aquifer is a relatively impermeable clay layer, approximately 20-ft thick. The water in the intermediate and deep aquifers is generally of better quality than the water in the shallow aquifer. The boundary between the intermediate and deep aquifers is based more on water quality than the presence of a physical boundary with water quality generally improving with depth. The base of the deep alluvial aquifer is about 2,200 ft below ground surface (bgs) in the center of the basin. The basalt aquifer lies sandwiched in the alluvium about 600 ft bgs in an area with a radius of about 4 miles around a small volcanic cone, Rattlesnake Hill, which outcrops just north of the town of Fallon (Glancy 1986). It is the only source of municipal domestic water in the area and is recharged from the intermediate and deep alluvial aquifers. The basalt aquifer is not present beneath NAS Fallon except possibly in the extreme northeast corner of the facility; however, NAS Fallon derives all of its domestic water from this aquifer utilizing deep wells northeast of the facility. Three monitoring wells penetrating the intermediate aquifer on the facility indicate a head difference of about 5 to 9 ft between the shallow unconfined and the intermediate confined aquifer. The head is higher in the deeper aquifer indicating artesian conditions which preclude any downward migration of groundwater at the facility. Thus, the main thrust of the investigations involved only the shallow water table aquifer, and only three widely spaced wells were drilled into the intermediate aquifer.

3. SITE-SPECIFIC INVESTIGATIVE RESULTS

Site-specific analytical data are presented in table format. The tables are separated into results for water samples and results for soil samples. The water sample results tables are divided into columns showing the method-specific results of organic analyses for each

sample. Each row of sample data often includes results for petroleum hydrocarbon analyses, PCB/pesticide analyses, semivolatile organic analysis, and volatile organic analysis. The petroleum hydrocarbon data is reported as either results for method 418.1 which was the analytical method used for samples collected prior to November 1990, or as results for modified method 8015/8020 which was required by the NDEP as of September 1990. The method 8015/8020 total petroleum hydrocarbon results were often reported as a value for diesel, gasoline, JP-5, or motor oil. This indicates the standard which the analyst thought most closely matched the sample but does not positively fingerprint the product. The laboratory did not consistently report the closest standard match. Thus, some detected TPH values consist only of a concentration without an identifier.

The soil sample results for organic analyses are similarly presented. The tables show all detected compounds, which include a wide variety of tentatively identified compounds (TIC) and unknowns. The tables also include the data quality flags which resulted from data validation. These flags are explained for each table; however, there are some consistent flags which appear throughout the data. For instance, *J indicates an estimated value, ** indicates unusable data resulting from associated blank contamination and *? indicates that the values listed for some or all unknowns are questionable because of blank contamination.

The results for semivolatile and volatile organic compounds contain many TICs and unknowns. These are presented in the tables, and the TICs are footnoted with the name submitted by the laboratory as the closest match. The names are often incomplete because the laboratory report format provided only 29 characters of text, and some of the names were apparently longer than the space available. The unknowns are not listed but are shown as the number of unknowns detected and a range of values for the unknowns. Thus, there is a number to the right of the number of unknowns identified which is the low value and below that, the high value number. These are invariably estimated values.

The data for TICs and other flagged data has been reviewed and warrant several comments. Many of the semivolatile and volatile compounds shown on the tables are common lab solvents such as acetone, methylene chloride, 2-butanone, and tetrahydrofuran. Many of the TICs are polynuclear aromatics such as fluorene, phenanthrene derivatives, acenapthene, and napthalene. These compounds are found in oil and jet fuel but are also formed by incomplete combustion of fuels, oils, and even much smaller hydrocarbon

compounds. Thus, they may be found associated with fire training, road dust, and automobile and jet engine exhaust. Other combustion products known as cresols, such as 4,6-dinitro-2-methylphenol and 4-methylphenol, were detected in some samples. These are also commonly found in automobile exhaust. Many of the TICs were hydrocarbons which would be expected in jet fuel, oil, or gasoline such as octanes, nonanes, and decanes. Also, the "cyclo-" compounds are found in large quantities in fuels and appear as TICs on some tables. Some detected compounds, such as hexadecanoic acid, octadecanoic acid, etc., are naturally occurring fatty acids. These could be related to humates, plant material in the soil, or poorly refined fuels and oils. Many of the TICs are commonly occurring anthropogenic compounds such as phthalates from plasticizers, siloxanes from grease, and oxirane from antifreeze.

The inorganic data (metals and anions) are presented in a different format. These tables are arranged with the analytes on the left and sample results are given as an average, minimum, and maximum of the values reported for samples from each site or group of sites. The column identified by the # sign indicates the number of samples with positive detection of a specific analyte. If a particular analyte was not detected in any sample at the site, ND for "analyte not detected" appears on the table. Thus, the data provided by the laboratory matches the list of analytes in the Work Plan for all metals except molybdenum, which was not reported consistently. Some additional metals not listed in the Work Plan were reported by the laboratory because they are part of the protocol for the method.

Regional information on the range of concentrations of various metals and anions in surface water and groundwater is summarized on Table 2.i. There is considerable variability in the concentrations of these constituents. Background concentrations of many trace metals exceed various environmental protection criteria and guidelines. Regional information on the concentrations of metals in soils is absent; however, most of the metals results for samples analyzed during the RI are probably representative of background soil concentrations. This assumption is based on the lack of historical evidence for disposal of solubilizable metals at any sites other than possibly Site 9, Wastewater Treatment Plant. Soil samples collected from upgradient wells MW06 (Site 2, New Fuel Farm), MW11 (Site 1, Crash Crew Training Area), and MW12 (Site 21, Receiver Site Landfill) were specifically included to provide background information. Thus, the data in Section 3.2, Table 3.2.1.i, which consists solely

Table 3.2.1.i. Soil sample results for Site 1 (Crash Crew Training Area)

Location / Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg	Volatiles Method 8240, ug/kg QL: 5 ug/kg
BH001 11/90	3549	0'-2'	2100.00	2200.00 E 5.40 T 2.40 X 23.00	NP	2-Meth 7500.0 4-Chlo 160.0 4-Metp 1500.0 Acen 270.0 Bis2 380.0 Di-N 190.0 Fluor 950.0 Naph 2700.0 Phena 310.0 TIC 1 100000.0 TIC 2 7300.0 TIC 3 3800.0 TIC 4 140.0 TIC 5 3700.0 TIC 6 17000.0 14 Unknowns 2100.0*? 40000.0	1,2DCE 120.0 2-But 930.0 Acet 2300.0 B 160.0 E 2100.0 Methcl 40.0 Tetra 14000.0 T 1900.0 TCE 3200.0 X 19000.0 TIC 7 8000.0 TIC 8 3900.0 TIC 9 16000.0 TIC 10 3300.0 TIC 11 6800.0 TIC 12 6200.0 TIC 13 4800.0 TIC 14 4300.0 TIC 15 4400.0 TIC 16 5800.0 TIC 17 6000.0 TIC 18 13000.0 TIC 19 4200.0 TIC 20 8800.0 TIC 21 4600.0 TIC 22 5500.0 TIC 23 5400.0 TIC 24 7600.0 TIC 25 6000.0 1 Unknown 6000.0*?
BH001 11/90	3549D	0'-2'	NP	NP	NP	NP	Acet 1000.0 E 1800.0 Tetra 12000.0 T 1700.0 TCE 1400.0 X 15000.0 TIC 26 6000.0 TIC 9 5900.0 TIC 11 6900.0 TIC 27 3800.0 TIC 12 4000.0 TIC 16 4100.0 TIC 18 5200.0 TIC 20 6200.0 3 Unknowns 4400.0*? 8800.0

Table 3.2.1.i. (continued)

Location / Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH001 11/90	3550	3'-5'	300.00	420.00 E 0.70 T 0.30 X 3.70	NP	2-Meth 4-Metp Bis2 Fluor Naph Phena Phen TIC 1 TIC 28 TIC 29 TIC 30 TIC 5 TIC 31 TIC 6 13 Unknowns	1600.0 2200.0 200.0 130.0 410.0 76.0 270.0 100000.0 5000.0 1500.0 3000.0 1600.0 1700.0 3600.0 510.0*? 6100.0	1,2DCE 2-But Acet B E Methcl Tetra T TCE X TIC 32 TIC 8 TIC 9 TIC 11 TIC 12 TIC 33 TIC 34 TIC 35 TIC 16 TIC 36 TIC 18 TIC 20 TIC 22 TIC 24 TIC 37 TIC 38 3 Unknowns	110.0 1400.0 2400.0 82.0 380.0 45.0 2200.0 480.0 700.0 2300.0 730.0 380.0 1400.0 520.0 670.0 750.0 1000.0 560.0 330.0 570.0 1900.0 520.0 610.0 630.0 610.0 320.0 500.0*? 870.0
BH001 11/90	3550D	3'-5'	NP	NP	NP	NP		Acet E Tetra T TCE X TIC 11 TIC 18 8 Unknowns	4700.0 310.0 1700.0 350.0 380.0 4000.0 1700.0 3100.0 1700.0*? 5700.0
BH001 11/90	3551	6'-8'	200.00	140.00 X 0.70	NP	2-Meth 4-Metp Bis2 Naph Phen TIC 1 TIC 28 TIC 29 TIC 31 TIC 6 15 Unknowns	690.0 1300.0 270.0 180.0 230.0 100000.0 8000.0 1500.0 2400.0 4400.0 1400.0*? 7900.0	2-But Acet E Methcl Tetra T TCE X TIC 9 TIC 33 TIC 39 TIC 36 TIC 17 TIC 18 TIC 24 1 Unknown	450.0 2000.0 210.0 300.0 2400.0 310.0 200.0 1600.0 890.0 890.0 1300.0 1100.0 1100.0 1900.0 1400.0 570.0*?

Table 3.2.1.i. (continued)

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH002 11/90	3552	0'-2'	4300.00	1000.00 B 0.09 E 7.50 T 1.00 X 7.50	NP	4-Chlo 4-Metp Bis2 Di-N Fluor Phena Phen TIC 1 TIC 40 TIC 3 TIC 29 TIC 41 TIC 6 14 Unknowns	180.0 2300.0 340.0 2200.0 470.0 240.0 250.0 100000.0 15000.0 5900.0 2900.0 9300.0 45000.0 4200.0*? 75000.0	2-But E Tetra T TCE X TIC 9 TIC 11 TIC 27 TIC 12 6 Unknowns	660.0 1600.0 2800.0 1800.0 1400.0 11000.0 7100.0 3400.0 3900.0 4300.0 3600.0*? 8900.0
BH002 11/90	3553	3'-5'	310.00	19.00	U	2-Meth 4-Metp Bis2 Di-N Fluor Phena TIC 1 TIC 28 TIC 3 TIC 29 TIC 5 TIC 31 14 Unknowns	290.0 150.0 280.0 37.0 66.0 47.0 59000.0 3200.0 1100.0 1100.0 1200.0 1600.0 760.0*? 5600.0	1,2DCE 2-But Acet E Methcl Tetra T TCE X TIC 42 TIC 26 TIC 43 TIC 44 TIC 11 TIC 45 TIC 46 TIC 35 TIC 47 TIC 16 TIC 48 TIC 49 TIC 18 TIC 20 TIC 22 TIC 24 TIC 37 2 Unknowns	3.0 62.0 500.0 64.0 24.0 600.0 38.0 31.0 520.0 1200.0 230.0 1900.0 630.0 520.0 440.0 140.0 410.0 210.0 210.0 210.0 500.0 1600.0 560.0 460.0 180.0 240.0 360.0*? 800.0

Table 3.2.1.i. (continued)

Location / Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg	Volatiles Method 8240, ug/kg QL: 5 ug/kg
BH002 11/90	3553D	3'-5'	NP	NP	NP	NP	2-But 85.0 Acet 950.0 E 47.0 Methcl 260.0 Tetra 300.0 T 22.0 TCE 14.0 X 350.0 TIC 50 1300.0 TIC 43 2600.0 TIC 11 430.0 TIC 51 160.0 TIC 27 400.0 TIC 40 3500.0 TIC 35 410.0 TIC 47 190.0 TIC 49 660.0 TIC 18 1600.0 TIC 20 350.0 TIC 22 570.0 TIC 24 170.0 TIC 37 180.0 TIC 52 440.0 3 Unknowns 590.0*? 920.0
BH002 11/90	3554	6'-8'	3100.00	760.00 B 0.06 E 1.10 T 0.60 X 5.50	NP	2-Meth 5400.0 4,6Din 93.0 4-Chlo 120.0 4-Metp 2600.0 Acen 230.0 Bis2 350.0 Di-N 460.0 Fluor 590.0 Naph 2300.0 Phena 300.0 Phen 340.0 TIC 1 110000.0 TIC 40 16000.0 TIC 3 4900.0 TIC 29 3500.0 TIC 4 140.0 TIC 6 38000.0 15 Unknowns 4600.0*? 79000.0	E 1900.0 Tetra 94000.0 T 1900.0 TCE 1600.0 X 15000.0 TIC 53 8900.0 TIC 44 12000.0 TIC 11 5900.0 TIC 12 5900.0 TIC 18 4600.0 4 Unknowns 4900.0*? 10000.0

Table 3.2.1.i. (continued)

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH002 11/90	3554D	6'-8'	NP	NP	NP	NP		E Tetra T TCE X TIC 54 TIC 44 TIC 11 TIC 33 TIC 18 TIC 37 4 Unknowns	2400.0 67000.0 2300.0 1600.0 16000.0 9800.0 7300.0 8500.0 6700.0 7400.0 12000.0 6100.0*? 17000.0
BH003 11/90	3610	1.5-2 ft	U	U	NP	Bis2 TIC 1 TIC 55 4 Unknowns	220.0*J 10000.0** 500.0 160.0 330.0	Methcl	6.0**
BH003 11/90	3611	3.5-4 ft	U	U	NP	Bis2 TIC 1 TIC 55 TIC 56 TIC 57 2 Unknowns	1300.0 14000.0** 380.0 290.0 260.0 290.0 300.0	Methcl Tetra	8.0** 34.0
BH003A 11/90	3557	0'-2'	U	U	NP	Bis2 TIC 1 TIC 55 TIC 56 12 Unknowns	280.0 230000.0 2000.0 250.0 140.0*? 8600.0	Methcl	21.0
BH003A 11/90	3558	4'-6'	U	13.00	NP	Bis2 TIC 1 TIC 55 TIC 56 6 Unknowns	380.0 350000.0 290.0 380.0 290.0*? 12000.0	Acet Methcl	8.0 8.0
BH004 3/91	3612	1.5-2 ft	U	U	NP	Bis2 TIC 1 TIC 55 2 Unknowns	120.0** 9000.0** 160.0 150.0 220.0	Methcl	6.0**
BH004 3/91	3613	3.5-4 ft	U	U	NP	Bis2 TIC 1 TIC 55 TIC 58 TIC 56 TIC 57 1 Unknown	68.0** 8300.0** 140.0 140.0 140.0 12000.0 170.0	Methcl	5.0**

Table 3.2.1.i. (continued)

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH004A 11/90	3559	0'-2'	U	6.00	NP	Bis2 TIC 1 TIC 55 6 Unknowns	170.0 220000.0 240.0 140.0*? 6700.0	Methcl	6.0
BH004A 11/90	3560	4'-6'	U	U	NP	Bis2 TIC 1 TIC 55 5 Unknowns	380.0 320000.0 290.0 340.0*? 9300.0	Methcl Tetra	28.0 2.0
BH005 3/91	3614	1.5-2 ft	U	U	NP	Bis2 TIC 1 TIC 58 TIC 56 TIC 57 2 Unknowns	550.0 9200.0** 150.0 180.0 22000.0 170.0 600.0	Methcl	4.0**
BH005 3/91	3615	3.5-4 ft	U	U	NP	Bis2 TIC 1 TIC 55 3 Unknowns	230.0*J 9000.0** 150.0 180.0 530.0	Methcl	5.0**
BH006 3/91	3616	1.5-2 ft	U	U	NP	Bis2 TIC 1 TIC 58 13 Unknowns	810.0 8500.0** 160.0 14.4 600.0	Methcl	8.0**
BH006 3/91	3617	3.5-4 ft	U	U	NP	Bis2 TIC 1 TIC 58 TIC 56 TIC 57 3 Unknowns	140.0** 10000.0** 170.0 320.0 220.0 160.0 450.0	Methcl	12.0**
MW014 3/91	3566	7-9 ft	U	U	NP	Bis2 TIC 1 1 Unknown	68.0*J 4200.0** 190.0	Methcl	3.0*J
MW015 3/91	3567	7-9 ft	U	U	NP	TIC 1 1 Unknown	5900.0 380.0	Methcl	3.0*J
MW016 3/91	3568	7-9 ft	U	U	NP	Bis2 TIC 1 1 Unknown	57.0*J 4700.0 220.0	1,2DCE Methcl TCE	11.0 4.0*J 9.0
MW017 3/91	3569	7-9 ft	U	U	NP	Bis2 TIC 1 1 Unknown	62.0*J 4500.0 360.0	T TCE	3.0*J 1.0*J

Table 3.2.1.i. (continued)

** - unusable data due to method blank contamination	E - ethylbenzene
*1 - Method 8015 Modified, quantitation limit: 10 mg/kg	Fluor - fluorene
*2 - Method 8015/8020, quantitation limit: 5 mg/kg	HBP - high boiling point
*3 - Method 3550/8080, quantitation limit: 8.3 ug/kg	LBP - low boiling point
*? - some or all unknowns contain unusable data	Methcl - methylene chloride
*J - concentration estimated	Naph - naphthalene
1,2DCE - 1,2-dichloroethene (total)	NP - analysis not performed
2-But - 2-butanone	PHC - petroleum hydrocarbons
2-Meth - 2-methylnaphthalene	Phen - phenol
4,6Din - 4,6-dinitro-2-methylphenol	Phena - phenanthrene
4-Chlo - 4-chlorophenyl-phenylether	QL - quantitation limit
4-Metp - 4-methylphenol	T - toluene
Acen - acenaphthene	TCE - trichloroethene
Acet - acetone	Tetra - tetrachloroethene
B - benzene	TIC - tentatively identified compound
Bis2 - bis(2-Ethylhexyl) phthalate	U - no compounds detected
Di-N - di-n-butylphthalate	X - xylenes (total)
NOTE - concentrations are estimated for TICs and unknowns	TIC 30 - naphthalene, 1-methyl-
TIC 1 - 2-pentanone, 4-hydroxy-4-met	TIC 31 - tridecane, 3-cyclohexyl-,3-
TIC 2 - benzene, methyl-propyl-	TIC 32 - 1-hexene, 5,5-dimethyl-
TIC 3 - heptadecane	TIC 33 - cyclohexane, propyl-
TIC 4 - n-nitrosodiphenylamine (1)	TIC 34 - cyclopentane, (2-methylbutyl-
TIC 5 - naphthalene, dimethyl-	TIC 35 - heptane, 2,4-dimethyl-
TIC 6 - undecane	TIC 36 - hexane, 2,3-dimethyl-
TIC 7 - 1-hexane, 5,5-dimethyl-	TIC 37 - pentane, 2,3,3-trimethyl-
TIC 8 - 1-undecane, 7-methyl-	TIC 38 - pentane, 2,3-dimethyl-
TIC 9 - benzene, 1-ethyl-3-methyl-	TIC 39 - dodecane, 3-cyclohexyl-, 3-cy
TIC 10 - benzene, propyl-	TIC 40 - decane
TIC 11 - cyclohexane, 1,1,2-trimethyl-	TIC 41 - naphthalene, tetrahydro-dime
TIC 12 - cyclohexane, methyl-	TIC 42 - 1-decene, 2,4-dimethyl-
TIC 13 - cyclohexane, undecyl-	TIC 43 - 1-octanol, 2-butyl-
TIC 14 - cyclopentane, 1-butyl-2-prop-	TIC 44 - benzene, 1-ethyl-2-methyl-
TIC 15 - heptane (dot)	TIC 45 - cyclopentane, 1-methyl-3-(2-m
TIC 16 - heptane, 2-methyl-	TIC 46 - heptane, 2,3-dimethyl-
TIC 17 - hexane, 3,3-dimethyl-	TIC 47 - heptane, 2,6-dimethyl-
TIC 18 - nonane	TIC 48 - heptane, 3-ethyl-2-methyl-
TIC 19 - nonane, 2-methyl-	TIC 49 - heptane, 4-(1-methylethyl)-
TIC 20 - octane (dot)	TIC 50 - 1-decene, 3,4-dimethyl-
TIC 21 - octane, 2-methyl-	TIC 51 - cyclohexane, 1-ethyl-4-methyl-
TIC 22 - octane, 3-methyl-	TIC 52 - undecane, 6,6-dimethyl-
TIC 23 - octane, 4-methyl-	TIC 53 - benzene, 1,3,5-trimethyl-
TIC 24 - pentane, 2,2,4-trimethyl-	TIC 54 - 1-octene, 3-ethyl-
TIC 25 - pentane, 2,3,4-trimethyl-	TIC 55 - 3-penten-2-one, 4-methyl-
TIC 26 - 1-hexene, 4,5-dimethyl-	TIC 56 - hexadecanoic acid
TIC 27 - cyclohexane, 1-propenyl-	TIC 57 - hexanedioic acid, dioctyl es
TIC 28 - dodecane	TIC 58 - 5-hexen-2-one, 5-methyl-
TIC 29 - hexadecane	

of metals data from MW11, can be considered background data. Likewise, based on waste disposal history, metals data from soil samples for the Group I Sites, Group II Sites, Site 3, and Site 20 can also be used as background soils data.

3.1 SITE 1, CRASH CREW TRAINING AREA

3.1.1 Site History

As shown in Fig. 1.3.ii, Site 1, the Crash Crew Training Area, is located in the southern part of NAS Fallon. The site consists of an unlined earth-bermed fire pit and two aboveground storage tanks (Fig. 3.1.1.i). From the mid-1950s to April 1988, the fire pit was used to conduct fire training activities for NAS Fallon personnel. Wastes burned included off-specification fuel, napalm, oil, and solvents. From April 1988 to the present, no petroleum hydrocarbons have been burned in the pit. Fire training activities presently consist of igniting and extinguishing wooden pallets, tires, wrecked automobiles, and stripped aircraft. A complete description of the site along with an operational history is presented in the PA/SI Report (Dames and Moore 1988).

3.1.2 Investigative Approach, Extent of Contamination, and Exposure Pathways

Phase I investigations revealed soil staining in and to the south of the fire pit. Minor staining, resulting from spills during filling activities, was also observed around the two storage tanks (Fig. 3.1.1.i). Phase I activities led to the conclusion that, due to the amount of liquids disposed of at the site, subsoil and groundwater contamination was likely.

3.1.2.i Investigative Approach

Obviously stained soil was taken as verification that contamination existed at the site. The approach taken to fulfill the data needs based on the preliminary risk screening in the Work Plan was to: (1) characterize the type, extent, and concentrations of contamination in the soil; (2) determine if the contaminants have reached the groundwater; (3) characterize the type, extent, and concentration of contaminants in the groundwater; and (4) determine if

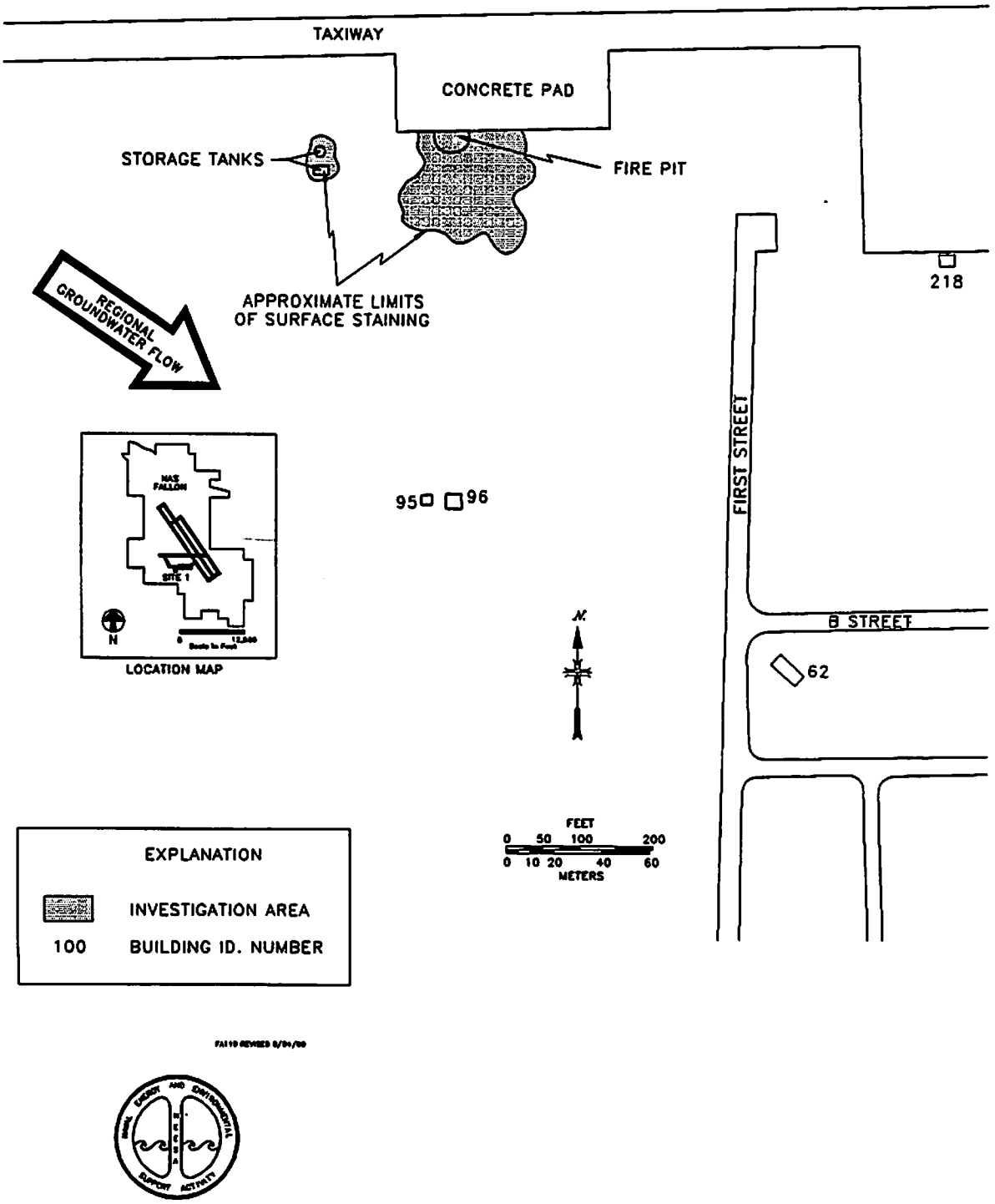

Fig. 3.1.1.i. Site 1, Crash Crew Training Area.

contaminants are migrating off site. The Work Plan describes the approach and rationale for the investigation of the site (ORNL 1989). Some modifications to the investigations were made based on site-specific conditions, the results of field screening surveys, and improvements in field investigation techniques. Primarily, a method of direct groundwater screening was developed to replace the proposed soil-gas survey. Also, two additional soil borings were drilled to assess the extent of soil contamination around the burn pit, and the locations of downgradient monitoring wells were modified based on groundwater-test-hole and geophysical-survey results.

Contaminant assessment activities conducted in conjunction with the Phase II RI included: an EM-31 geophysical survey; field screening of fifty-seven groundwater test holes; drilling of eight soil borings, installation of eight groundwater monitoring wells, and installation of two piezometers (Table 1.1.i). Results from the geophysical survey tentatively identified a former Carson River channel passing through the southwestern portion of the site (Fig. 3.1.2.i). This channel is shown clearly on the surficial geologic map (Fig. 2.i) and was apparent from lithologies encountered during the groundwater testhole drilling and piezometer installations. The abundant, concentrated rings of conductivity data represent cultural interferences, but the trend shows clearly despite the noise. The trend is believed to be associated with increased clay and moisture content of the soils adjacent to the predominantly sandy channel sediments. Appendix A describes the geophysical survey methodology.

Figure 3.1.2.ii shows the location of the groundwater test hole screening used to delineate the boundaries of a petroleum hydrocarbon plume underlying the facility. Results from the groundwater screening are given in Appendix B, Table B.1. The groundwater screening delineated plume boundaries out to the limits of detection of the method. These limits appear to be near National Primary Drinking Water maximum concentration limits and NDEP TPH criteria for many compounds based on comparison of monitoring well chemical data to available regulatory standards.

3.1.2.ii Extent of Contamination

Shown on Fig. 3.1.2.ii are the locations for the soil borings, the monitoring wells, and the piezometers. The types and concentrations of contaminants discovered in the soil borings and monitoring-well soil samples are shown in Table 3.2.1.i.

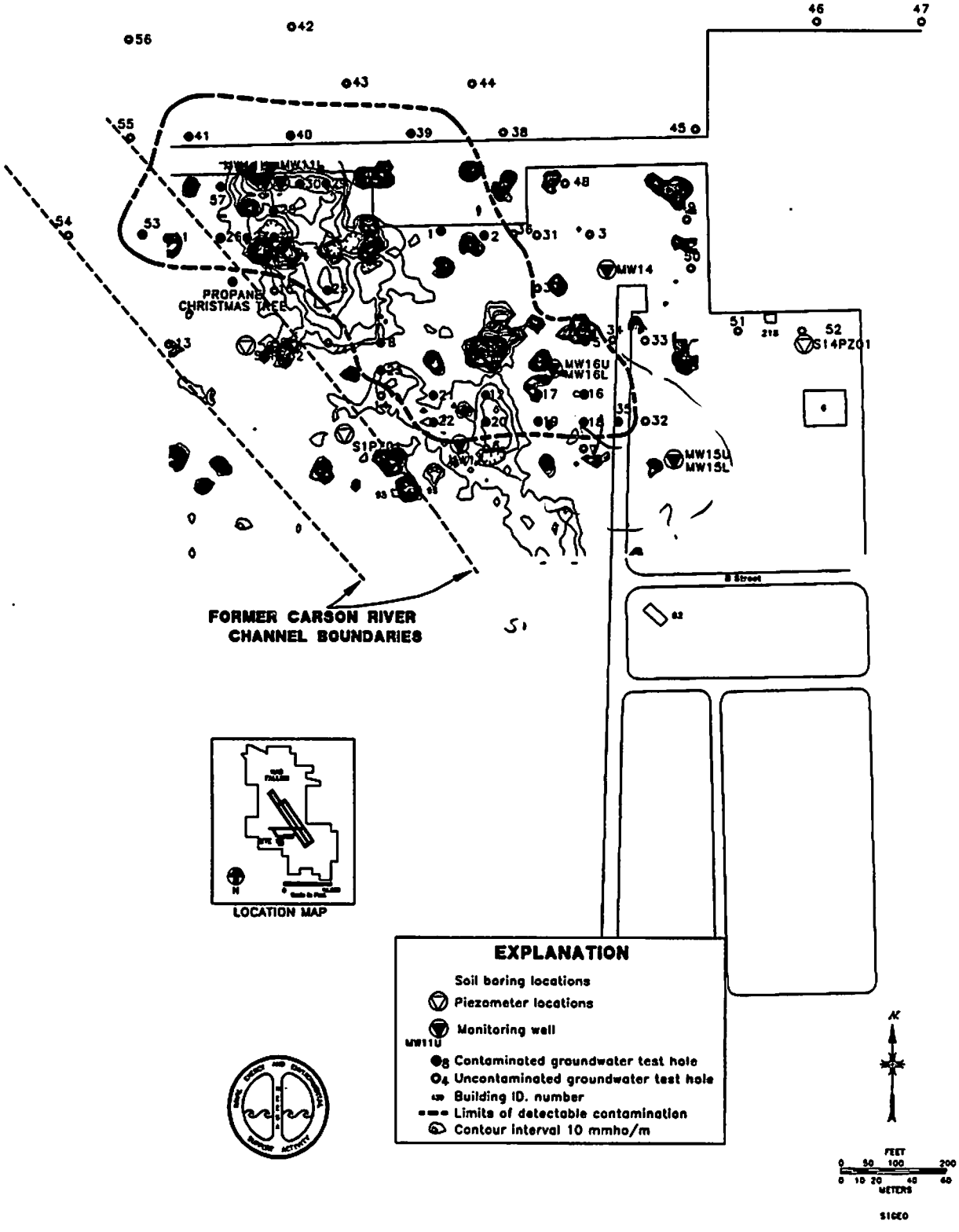

Fig. 3.1.2.i. Site 1, Crash Crew Training Area. Quadrature geophysical contour map.

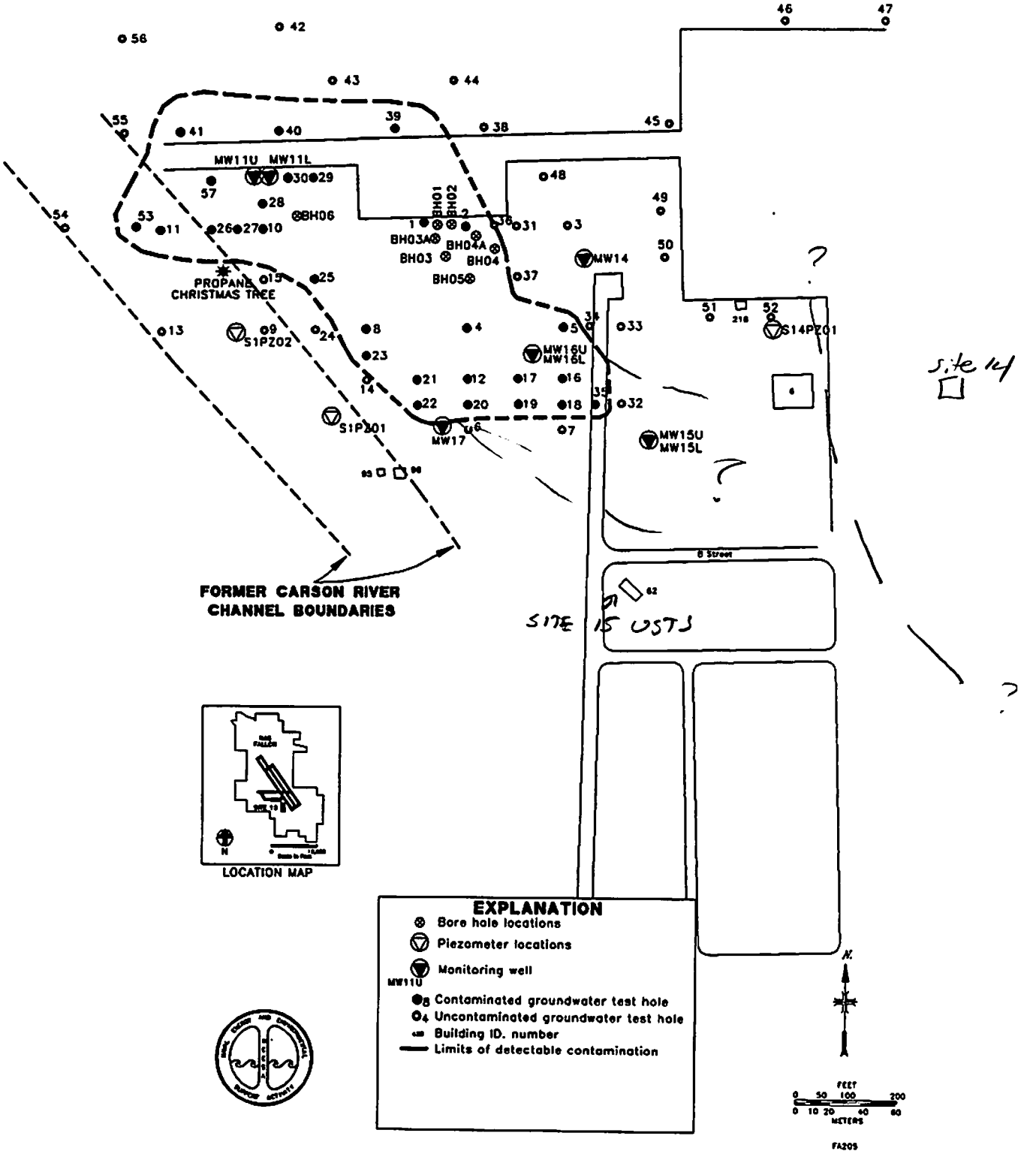

Fig. 3.1.2.ii. Site 1, Crash Crew Training Area. Groundwater test hole and analytical sampling locations.

Soil Contamination

Soil contamination at the site consists of petroleum-hydrocarbon-related compounds and solvents. Concentrations of petroleum hydrocarbons in soil exceed the NDEP action level of 100 mg/kg in soils within the burn pit as shown by samples from BH01 and BH02. Sample numbers 3549D and 3550D are duplicate samples from BH01, and sample numbers 3553D and 3554D are duplicate samples from BH02. They were analyzed for volatile organic compounds only; thus, there are no data to compare values for the other analyses. Also, even though they are shown as duplicate samples, true duplicate soil samples are not obtained by the sampling method used, and the duplicate sample is actually a sample from a vertical section a few inches deeper than the original sample. The major surface-soil contamination appears to be confined to the burn pit, where soil is contaminated from the surface to the water table. Contamination dissipates rapidly within a few meters south of the pit as shown by the rapid decrease in contaminant types and concentrations between BH03A and BH04A, which are closer to the pit than BH03, BH04, and BH05. Soil borings BH03A and BH04A were drilled to further refine the definition of soil contamination and were numbered out of sequence. No surface-soil contamination was detected associated with the aboveground tanks, shown by sample results from BH06. The only other soil contamination discovered outside of the burn pit area is associated with the plume of contaminated groundwater. Soil sample results for samples taken in the capillary fringe from MW16 and MW17 indicate that only solvent-related compounds have contaminated the soil at any considerable distance from the pit. It is anticipated that soil at the water table within the boundaries of the plume will show a rapid decrease in the number and concentration of contaminants with increasing distance from the pit.

Shallow Aquifer Contamination

Some of the solvent-related compounds appear to have migrated to form the distal portion of the groundwater plume, with most of the petroleum hydrocarbon compounds contained within the central part of the plume. Further assessment of the concentration gradients of contaminants in soil and water within the plume will be included in a second

iteration of field investigations for the site. This information will provide insight into the fate and transport of the contaminants in the plume.

Groundwater sample results for the first round of water samples collected from the monitoring wells are shown in Table 3.2.1.ii. These results indicate that groundwater test hole samples successfully delineated the plume of groundwater contamination down to parts per billion levels of organic contaminants. Monitoring wells MW14, MW15U, MW15L, and MW17 were all intended to be placed just outside the portion of the groundwater plume considered to potentially exceed contaminant levels of concern. The wells were apparently located successfully based on the first round of analytical results. An additional round of groundwater sampling was performed in August 1991 to confirm the initial results. These results will be included in a subsequent report.

wrong mw-15 & mw15L HAVE TCE

MW16U and MW16L were intentionally completed within the plume boundary. MW16U was screened across the top of the water table, and MW16L was screened at the bottom of the shallow alluvial aquifer. The results for MW16U confirm relatively high levels of dissolved petroleum hydrocarbons and solvents, with trichloroethene detected at levels exceeding Maximum Contaminant Levels (MCLs) of 5 ug/L established in the Safe Drinking Water Act (SDWA). Results for MW16L are of less concern with all detected contaminants below MCLs. This indicates that the contamination is essentially confined to the upper few feet of the aquifer and that the groundwater flow is essentially laminar and horizontal. Results from the lower well completions, MW15L and MW16L, which do not show solvents near the solubility-limit concentration for TCE, indicate that there is probably not a dense non-aqueous phase liquid (DNAPL) plume at the site. Additional work recommended for the site will further assess the potential for a DNAPL plume by testing the groundwater closer to the source of contamination.

MW11U was installed as an upgradient well based on one clean groundwater test hole drilled prior to the delineation of the plume boundaries. It has been sampled twice as part of routine sampling, once in July 1990 (sample number 3467) and again in November 1990 (sample number 3778). It is apparent from the subsequent groundwater test hole screening that the well lies within the horizontal confines of the plume boundary; yet it did not contain detectable levels of contaminants. The non-detection of contamination in MW11U is apparently due to heterogeneous geology. The well was completed in sandy silt which has a much lower hydraulic conductivity than the nearby former Carson River channel (consisting

Table 3.2.1.ii. Water sample results for Site 1
(Crash Crew Training Area)

Location / Date	Sample Number	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	PCB/Pesticide (*3) ug/L	Semivolatiles Method 625, ug/L QL: 10 ug/L		Volatiles Method 624, ug/L QL: 5 ug/L	
MW011L 7/90	3468	NP	NP	U	TIC 1 1 Unknown	39.0 11.0	U	
MW011U 7/90	3467	NP	NP	U	TIC 2 TIC 3 1 Unknown	10.0 11.0 65.0	U	
MW011U 4/91	3778	U	U	U	TIC 4	10.0	U	
MW014 4/91	3733	Die 50.0	U	U	TIC 5 TIC 3 1 Unknown	18.0 31.0 25.0	U	
MW015L 4/91	3727	Die 290.0	65.0	U	U		1,2DCE Tetra TCE	18.0 1.0*J 23.0
MW015U 4/91	3730	U	U	U	TIC 6 2 Unknowns	14.0 8.1 8.7	1,2DCE TCE	1.0*J 5.0
MW016L 4\91	3729	U	U	U	1 Unknown	14.0	1,2DCE TCE	7.0 2.0*J
MW016U 4/91	3728	Die 13000.0	95.0	U	TIC 7 TIC 8 TIC 9 17 Unknowns	15.0 180.0 65.0 15.0 88.0	1,1DCE 1,2DCE B TCE	5.0 110.0 3.0*J 45.0
MW017 4/91	3731	Die 140.0	U	U	TIC 5 TIC 3 1 Unknown	24.0 23.0 18.0	TCE	5.0*J

*1 - Method 8015 Modified, quantitation limit: 50 ug/L
*2 - Method 8015/8020, quantitation limit: 50 ug/L
*3 - Method 608, quantitation limit: 0.05 ug/L
*J - concentration estimated
1,1DCE - 1,1-dichloroethene
1,2DCE - 1,2-dichloroethene (total)
B - benzene
Die - HBP PHC as compared to diesel fuel
HBP - high boiling point
LBP - low boiling point
NP - analysis not performed
PHC - petroleum hydrocarbons
QL - quantitation limit
TCE - trichloroethene
Tetra - tetrachloroethene
TIC - tentatively identified compound
U - no compounds detected

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - sulfur, mol. (s8)
TIC 2 - cyclohexanol, 1-bromo-2-chlor
TIC 3 - cyclohexanol, 2-bromo-
TIC 4 - hexanoic acid, 2-ethyl-
TIC 5 - cyclohexane, 1-bromo-2-chlor
TIC 6 - 2-pentanone, 4-hydroxy-4-met
TIC 7 - 1(2h)-naphthalenone isomer
TIC 8 - butane, 1-(2-methoxyethoxy)-
TIC 9 - oxirane, 2,2'-oxybis(methyl

Table 3.2.1.ii. (continued)

Anions, mg/L Method 429 Quantitation limit: 0.5 mg/L				
Compound	#	Average	Minimum	Maximum
Chloride	9	15,108	71.00	35,000.00
Fluoride	1	5	5.00	5.00
Nitrate, as N	0	ND	ND	ND
Phosphate	0	ND	ND	ND
Sulfate	8	6,975	1,200.00	16,000.00

Metals, ug/L Method 200.7 Quantitation limit: 1 ug/L				
Compound	#	Average	Minimum	Maximum
Aluminum	3	51	42.80	56.40
Antimony	0	ND	ND	ND
Arsenic	6	409	38.20	892.00
Barium	8	93	23.40	202.00
Beryllium	0	ND	ND	ND
Boron	8	31,466	4,660.00	60,400.00
Cadmium	0	ND	ND	ND
Calcium	6	99,217	19,700.00	343,000.00
Chromium	0	ND	ND	ND
Cobalt	1	72	72.00	72.00
Copper	5	103	22.40	333.00
Iron	6	35	24.80	59.10
Lead	0	ND	ND	ND
Lithium	8	299	68.90	593.00
Magnesium	6	132,700	14,600.00	289,000.00
Manganese	6	419	20.40	1,980.00
Mercury	1	0	0.24	0.24
Molybdenum	6	912	492.00	1,730.00
Nickel	1	178	178.00	178.00
Potassium	6	147,667	51,900.00	286,000.00
Selenium	0	ND	ND	ND
Silver	5	13	5.50	21.70
Sodium	6	7,561,667	2,450,000.00	14,900,000.00
Thallium	0	ND	ND	ND
Vanadium	6	152	22.90	351.00
Zinc	7	68	20.70	133.00

- number of samples with detectable quantities of analyte
ND - analyte not detected
Includes data from 7/90 and 4/91

(consisting of coarse sand) which may form a preferential flow path for the shallow groundwater. Further investigation of the influence of the channel on plume migration is proposed.

Intermediate Aquifer

MW11L was installed adjacent to MW11U to assess the vertical head gradient between the intermediate and shallow aquifers. Non-detection of contaminants in MW11L is readily explained. Because MW11L was completed in the intermediate aquifer at 85 ft, it was not actually completed within the plume boundaries in the vertical dimension (the plume is confined in the shallow aquifer on top of a 20-ft-thick clay layer). MW11L is a flowing well, and head measurements exceed 2 ft above ground level whereas head measurements in MW11U, which was screened across the shallow water table, are approximately 7 ft below ground level. Thus, there is a positive vertical head between the intermediate and the upper aquifer precluding downward migration of the shallow groundwater. In other words, there is no pathway for migration of contaminants from the shallow aquifer to the intermediate aquifer.

Contaminant Summary

Phase II site-characterization activities completed so far indicate that the contaminants of concern at Site 1 are petroleum hydrocarbons (primarily JP-5) and solvents. Results also indicate that the contaminated media of concern include the soils and shallow groundwater underlying the site. The atmospheric medium is not considered a concern because petroleum hydrocarbons have not been disposed of at the site since April 1988. Thus, sufficient time has elapsed for mobile volatile contaminants at or near the surface to have dissipated, leaving concentrations well-below levels of concern. Ambient VOC measurements taken on site with the detector tip of an HNU PI-101 photoionization detector in the human breathing zone confirm no detectable airborne volatile contaminants.

Note that the analytical results include numerous tentatively identified compounds and unknowns for the volatile and semivolatile analysis. This is a common phenomenon when dealing with long-chain, complex organic compounds such as petroleum hydrocarbons.

The removal of atoms from the hydrocarbon structure by various degradation processes changes the compound. Analytical instruments often respond with a complex pattern of overlapping and fragmented peaks making positive identification difficult or impossible, even though the laboratory routinely performs a computer library search of 45,000 compounds in an effort to match unknown peaks.

Evaluation of analytical data for metals and anions in the groundwater reveals that the general water quality of the upper aquifer on the facility is very poor, approaching brine conditions. The metals appear to be naturally occurring because the concentrations do not seem to differ significantly across the facility. Regional studies also indicate that the general water quality is poor due to high concentrations of dissolved metals. Hoffman et al. (1990) reported dissolved solid concentrations ranging from 12,800 mg/L to 70,700 mg/L for six groundwater wells in the area. Exceptions are noticed locally near fresh water recharge zones associated with irrigation and drainage ditches. The extreme salinity of the groundwater decreases the solubility of many organic compounds such as benzene, toluene, ethylbenzene, and xylenes. This in itself does not constitute a problem; however, excessive scaling could have negative impacts on the implementability of some remedial technologies, such as air stripping.

3.1.2.iii Exposure Pathways

A synopsis of media-specific contaminant transport pathways, assimilation routes, exposure points, and affected biota for NAS Fallon is given in Appendix C. The following paragraphs expand on these initial evaluations in light of the characterization activities completed and additional activities recommended at Site 1.

Direct exposure pathways for contaminated soils at Site 1 include dermal contact, ingestion, and inhalation of dust particles and volatile constituents. Potentially affected biota include indigenous plants and burrowing animals as well as personnel associated with site activities such as fire training exercises and construction/maintenance. Plant and animal populations are controlled on NAS Fallon property; thus, exposures associated with these biota are minimized. The fact that most of the contamination is in the subsurface also prevents contaminated soils at Site 1 from constituting a primary exposure pathway.

Direct exposure pathways for groundwater include use of contaminated groundwater extracted from the shallow aquifer and intermediate aquifer. The shallow aquifer is not pumped on NAS Fallon property and, due to its high salinity, is used for human consumption in only two out of sixteen households in the downgradient area surrounding the activity (Appendix C). Twelve wells tapping the shallow aquifer and ten wells tapping the intermediate aquifer are known to exist within a radius of two miles on the downgradient (southeast) side of the activity (Appendix C, Fig. C.2). The uses of these wells range from two which are used for drinking water to four which are not used at all due to naturally poor water quality (Appendix C). The two drinking-water wells are actually located east of the facility and are not downgradient from any known contaminant plumes.

Available site-characterization results indicate that, due to an upward flow gradient between the intermediate and shallow aquifers, contaminants are not migrating into the intermediate aquifer or into the deep basalt aquifer (Appendix D). Additionally, a confining clay layer approximately 20 ft thick is known to exist between the contaminated shallow aquifer and the intermediate aquifer. All monitoring well boreholes drilled during the remedial investigation of the 21 sites were drilled down to this clay layer confirming its existence over the entire facility. The depth to the clay layer varied from 10 to 25 ft below ground surface across the facility. It is believed that these natural containment mechanisms prevent contaminants from reaching the intermediate aquifer.

Inspection of the drainage ditch system (Fig. E.1, Appendix E) and the groundwater potentiometric map (Fig. D.4, Appendix D) associated with the site indicate that the plume from Site 1 would intersect the Lower Diagonal Drain long before approaching any downgradient wells. Groundwater which flows under the drainage ditches could potentially, over a very long period of time, reach downgradient groundwater wells or Carson Lake Pasture several miles to the south; however, most of the contaminants seem to be in the top 3 to 5 feet of the aquifer and are expected to remain there due to essentially horizontal laminar flow in the shallow aquifer. Thus, the contaminants would be more likely to discharge into the drainage ditch than to pass beneath it. The lack of use of shallow groundwater in the immediate vicinity and the natural containment properties associated with the regional groundwater flow system inhibit the shallow groundwater from serving as a direct exposure pathway.

The direct influence of the former Carson River channel is not readily apparent. It is reasonable to assume, based on first principles of groundwater flow, that the flow rates would be faster in the channel than in the adjacent sediments. The plume boundary definition shows a tendency for the plume to migrate toward the channel west of the fire training pit source area, thus the channel may represent a preferred flow path. Additional investigation is needed to determine the influence of the channel on contaminant migration.

Should groundwater discharge into the drainage ditch, it would be transported to Stillwater Point Reservoir a few miles east of the facility. This reservoir is connected by ditches to the Stillwater Wildlife Refuge and the Stillwater Lakes. Therefore, the most sensitive and critical pathway is the groundwater-to-surface-water connection in the drainage ditch and exposures to various inhabitants and users of the surface water (Appendix C). Potential off site transport mechanisms include: 1) eventual seepage discharge of contaminated groundwater and free product to surface water, and 2) discharge of contaminated surface water (from rainfall and human activity) to surface water drainage systems. Additional aquifer and contaminant-plume characterizations are needed to assess the rate of movement of contaminants from the site in order to determine the likelihood of contaminants reaching the drainage ditch.

Although contaminants may exceed levels of concern for specific media at Site 1, the need for active remediation must still be evaluated in light of the restricted access to NAS Fallon property and the lack of use of the upper aquifer. The Risk Assessment and FS will address these issues. While the existence of soil contamination in excess of action limits does not necessarily mandate active remediation, the existence of free-phase product on the groundwater in excess of 1.27 cm (0.5 in.) does require the implementation of an active removal action according to NDEP regulations . Groundwater-test-hole-screening results and borehole soil-sample results indicate that this action level has probably been exceeded at Site 1. Therefore, additional investigation is needed to assess the existence and extent of floating product at the site.

3.1.3 Recommendations

Preliminary evaluation of the laboratory data, field data, and discussions with Hazardous Waste Remedial Actions Program (HAZWRAP), Navy, and NDEP personnel have led to the conclusion that some additional field work is needed at Site 1. Based on the results of the first iteration of IR Program field work, the following additional investigations are recommended to collect the data required to characterize the extent and degree of contamination needed to complete the risk assessment and feasibility study.

An upgradient well will be installed as a pumping test well. The testing well is needed to provide data for evaluating plume-migration potential. The well will be surrounded with four piezometers as observation points. The 5-in.-diameter well will be fully penetrating and fully screened with respect to the upper aquifer.

Two additional well pairs will be installed within the boundaries of the identified plume (Fig. 3.1.3.i). Each well pair will consist of one 2-in.-diameter well screened across the top of the shallow aquifer and one 2-in.-diameter well screened at the bottom of the shallow aquifer. One well pair will be placed within the old burn pit to check for both floating product on the groundwater and sinking contaminants at the bottom of the shallow aquifer. If floating product is detected on the groundwater under the old burn pit, three piezometers will be installed around the area to assess the extent of the floating-product plume. The other well pair will be placed outside the burn pit but inside the plume in order to evaluate contaminant-concentration gradients within the plume. Groundwater test holes will be drilled at all proposed well and piezometer locations prior to installation to ensure optimum placement. The proposed locations may be modified accordingly.

All work will be performed in accordance with the Work Plan with respect to drilling, installing, and sampling wells. Two rounds of groundwater samples will be collected from the new wells. Wells with floating product need only be sampled once. The first round of samples will be collected shortly after completion of the wells (estimated early December 1991), and the second round will be collected about 3 months later after receipt of the data from the first round.

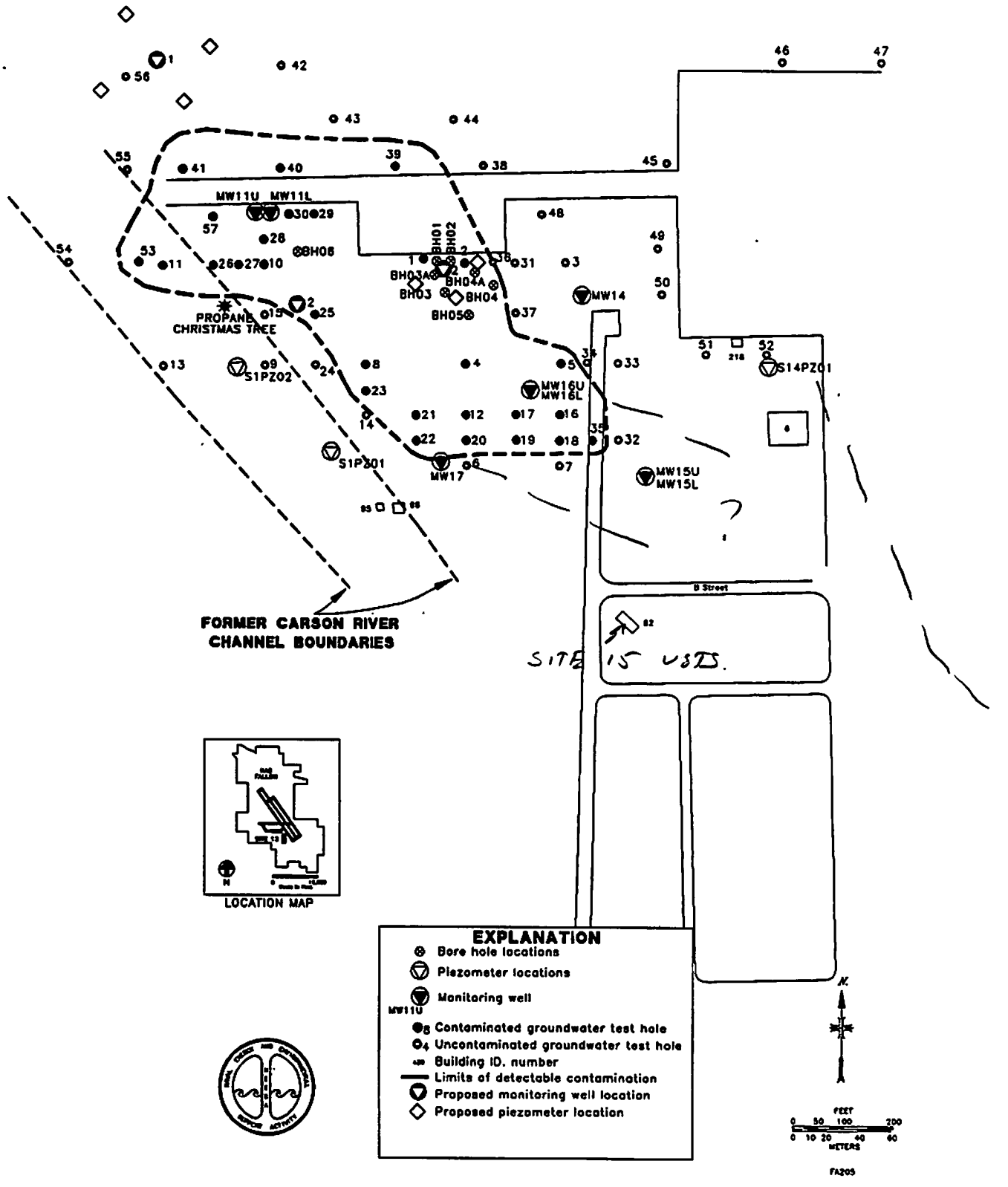

Fig. 3.1.3.i. Site 1, Crash Crew Training Area. Proposed locations for additional investigations.

3.2 SITE 3, HANGAR 300 AREA

3.2.1 Site History

As shown in Fig. 1.3.ii, Site 3, Hangar 300 Area, is located in the west- central portion of NAS Fallon. Environmental concerns at the site are associated with several separate areas including the north and south disposal areas, bowser disposal area, oil/water separator area, GSE (ground support equipment) area, and the wells air start building (Fig. 3.2.1.i). Because of their close proximity, the areas are grouped into one site (Dames and Moore 1988).

The north and south disposal areas and the bowser disposal area all received similar contaminants derived from disposal of waste aircraft fluids. Contaminants consisted of JP-5, hydraulic fluids, lube oil, and solvents including carbon tetrachloride, trichloroethene (TCE), and PD-680 (stoddard solvent).

The oil/water separator and associated drainage ditch are located west of the north disposal area (Fig. 3.2.1.i). Overflow from the separator discharges into the surface drainage ditch. This ditch drains northeast and connects with the Lower Diagonal #1 Drain.

The GSE area is located south of Hanger 300 (Fig. 3.2.1.i) and received fluids from spills and leaks. Wastes introduced include hydraulic fluid, lube oil, waste oil, and solvents [including TCE, Turco (paint remover), and PD-680]. Estimates of waste volumes introduced at the areas are detailed in the PA/SI Report (Dames and Moore 1988). No surface water drains away from the south disposal area.

The wells air start building is located in the south disposal area south of Hangar 300 (Fig. 3.2.1.i) and received oil blow down from air compressor operations. Waste consisted primarily of motor oil (Dames and Moore 1988).

3.2.2 Investigative Approach, Extent of Contamination, and Exposure Pathways

Phase I activities identified the areas of concern at the site, and Phase I samples taken from stained areas in the north disposal area and from the oil/water separator drain revealed petroleum hydrocarbon contamination of both surface soil and sediment (Dames and Moore 1988). Samples were analyzed for total petroleum hydrocarbons (TPH) using EPA method

FIGURE 4

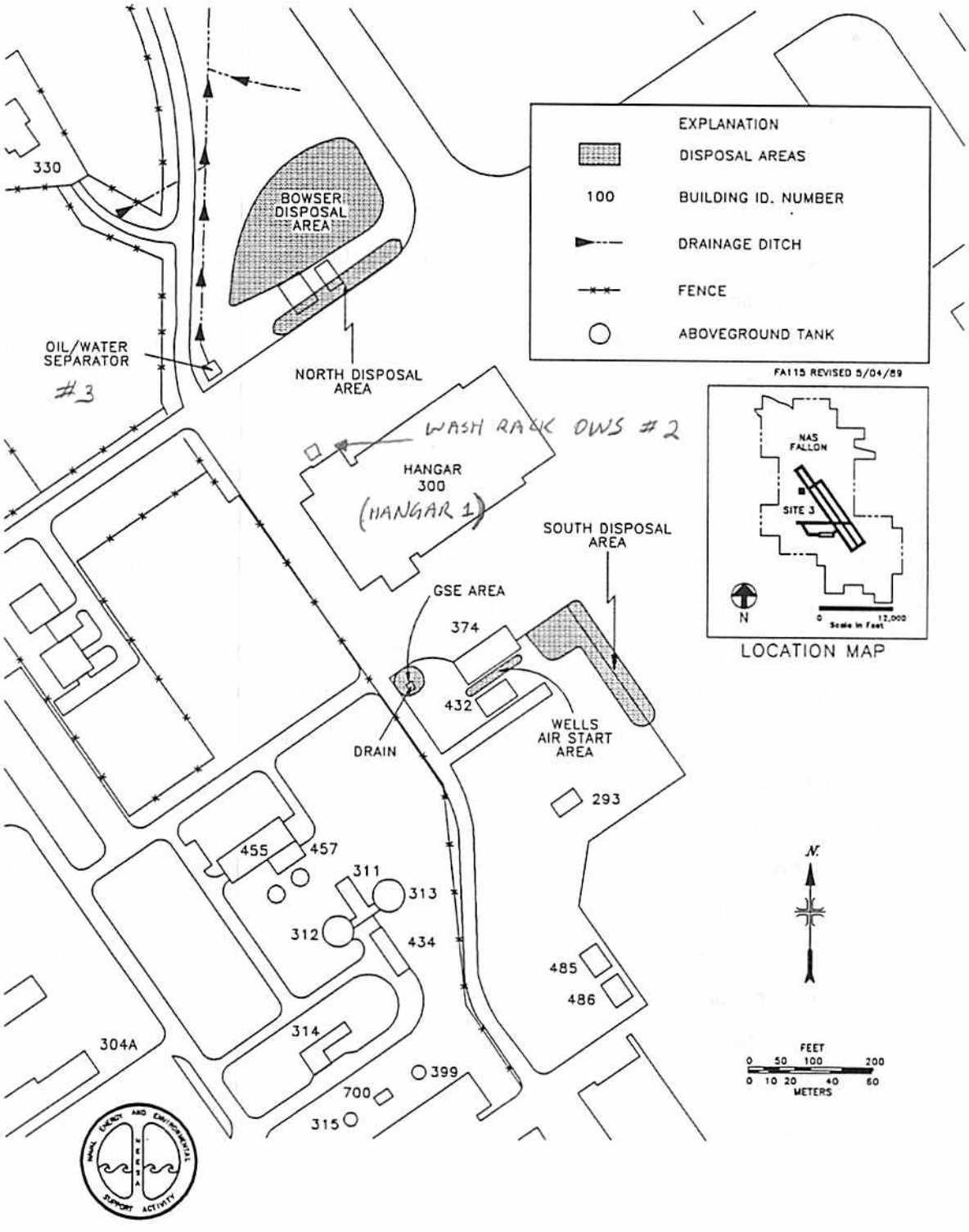

Fig. 3.2.1.i. Site 3, Hangar 300 Area.

418.1 and volatile organic compounds (VOC) using EPA method 8240. Stained soil in the vicinity of the wells air start building was taken as proof of contamination at the south end of the site. Phase II analytical results confirmed contamination.

3.2.2.i Investigative Approach

Obviously stained soils containing total petroleum hydrocarbons exceeding 100 mg/kg were taken as verification that contamination existed at the site (Dames and Moore 1988). The approach taken to fulfill the data needs based on the preliminary risk screening in the Work Plan was to: (1) characterize the type, extent, and concentrations of contamination in the soil; (2) determine if the contaminants have reached the groundwater; (3) characterize the type, extent, and concentration of contaminants in the groundwater; and (4) determine if contaminants are migrating off site. The Work Plan describes the approach and rationale for the investigation of the site (ORNL 1989). Some modifications to the approach were made based on site-specific conditions, the results of field screening surveys, and improvements in field investigation techniques. Primarily, a method of direct groundwater screening was developed to replace the proposed soil-gas survey. Also, no geophysical surveys were conducted because groundwater-test-hole results indicated no areas of floating product on the groundwater. The locations of downgradient wells were modified based on groundwater-test-hole results. Soil borings were drilled with a small truck-mounted drilling rig instead of a hand auger as specified in the Work Plan.

Preliminary field screening and site-characterization activities conducted during the Phase II RI included: twelve groundwater test holes, eight soil borings, twelve monitoring wells, and three sediment samples (Table 1.1.i). Screening, soil sampling, sediment sampling, and monitoring well locations are shown on Fig. 3.2.2.ii. Soil, sediment, and initial groundwater samples were submitted for laboratory analysis. Figure 3.2.2.ii shows the location of the groundwater test hole screening used to delineate the boundaries of a petroleum hydrocarbon and solvent plume in the south area. Results from the groundwater screening are given in Appendix B, Table B.7.

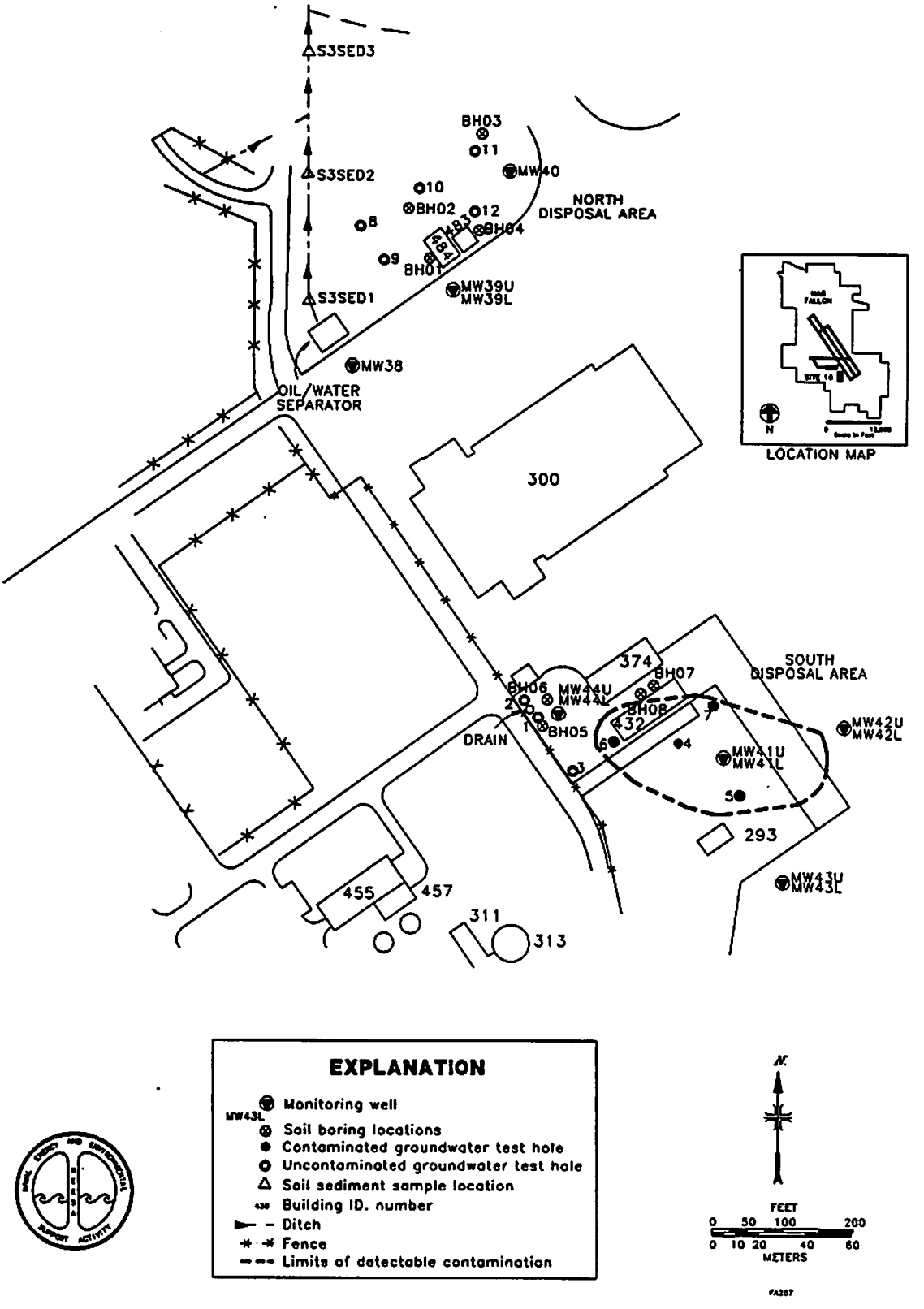

Fig. 3.2.2.ii. Site 3, Hangar 300 Area. Groundwater test hole and analytical sampling locations.

3.2.2.ii Extent of Contamination

Groundwater test hole screening results (Appendix B, Table B.7) did not indicate contaminants at the north disposal area or the bowser disposal area, confirming that the Phase I soil sampling only detected small hotspots. Contaminants were, however, discovered by the screening method at the wells air start area and the south disposal area (Fig. 3.2.2.ii). As shown in Fig. 3.2.2.ii, the contaminants extend eastward underneath the parking apron where thick concrete prevented assessment of the eastern contaminant boundary by groundwater test hole methods.

Soil Contamination

The types and concentrations of contaminants discovered in the soil borings, sediment samples, and monitoring-well soil samples are shown in Table 3.2.2.i. Soil contamination at the site consists of petroleum-hydrocarbon-related compounds and solvents. Several samples showed minor contamination by petroleum hydrocarbons and other organic compounds, but none of the soil samples contained levels of contaminants exceeding the NDEP action level of 100 mg/kg in soils. One sediment sample from the drainage ditch contained 130 mg/kg of petroleum hydrocarbons.

Shallow Groundwater Contamination

The four wells drilled to assess groundwater contamination at the north area included one well completed at the base of the shallow aquifer, MW39L, and three wells screened across the top of the water table, MW38, MW39U, and MW40. Some petroleum hydrocarbons and related compounds were detected at relatively low levels in MW38 and MW39U; however, MW39L and MW40 were essentially clean with respect to all analytical parameters (Table 3.2.2.ii).

Eight wells were drilled to assess groundwater contamination at the south area. Because groundwater test hole screening had indicated TCE contamination (a compound which may sink in groundwater if concentrations are sufficient), all wells were installed as pairs with one well completed at the bottom of the shallow alluvial aquifer and one well

Table 3.2.2.i. Soil sample results for Site 3 (Hangar 300)

Location / Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH001 3/91	3658	0-2 ft	20.00*J	U	Bis2	160.0**	Methcl	6.0**
					TIC 1	20000.0**		
					18 Unknowns	1500.0		
						110000.0		
BH001 3/91	3659	5-7 ft	U	U	Bis2	88.0**	Methcl	7.0**
					TIC 1	13000.0**		
					TIC 2	520.0		
					TIC 3	640.0		
					TIC 4	280.0		
					3 Unknowns	210.0*?		
						450.0		
BH002 3/91	3660	0-2 ft	U	U	Bis2	85.0**	Methcl	5.0**
					TIC 5	200.0		
					TIC 1	14000.0**		
					TIC 6	310.0		
					TIC 2	310.0		
					TIC 3	910.0		
					5 Unknowns	150.0*?		
						390.0		
BH002 3/91	3661	5-7 ft	U	U	Bis2	340.0*J	Methcl	5.0**
					TIC 1	14000.0**	X	1.0*J
					TIC 6	330.0		
					TIC 2	330.0		
					TIC 3	520.0		
					TIC 4	260.0		
					4 Unknowns	160.0*?		
						480.0		
BH003 3/91	3662	0-2 ft	U	U	Bis2	140.0**	Acet	6.0*J
					TIC 1	17000.0**	Methcl	5.0**
					TIC 6	880.0		
					TIC 3	1200.0		
					TIC 7	6000.0**		
					1 Unknown	570.0*?		
BH003 3/91	3663	5-7 ft	U	81.00	Bis2	170.0**	Acet	32.0
					Phena	89.0*J	E	29.0
					TIC 1	14000.0**	Methcl	12.0**
					TIC 3	730.0	X	15.0
					TIC 4	380.0	TIC 9	100.0
					TIC 8	640.0	TIC 10	61.0
					16 Unknowns	360.0	TIC 11	160.0
						3300.0	TIC 12	62.0
							TIC 12	52.0
							TIC 13	240.0
							TIC 14	110.0
							TIC 15	160.0
							TIC 16	53.0
							1 Unknown	140.0
BH004 3/91	3664	0-2 ft	U	U	Bis2	64.0**	Methcl	6.0**
					TIC 1	8200.0**		
					TIC 6	250.0		
					TIC 2	160.0		
					TIC 3	490.0		
					3 Unknowns	150.0*?		
						260.0		

Table 3.2.2.i. (continued)

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH004 3/91	3665	5-7 ft	U	U	Bis2 TIC 1 TIC 6 TIC 2 TIC 3 1 Unknown	94.0** 12000.0** 240.0 180.0 620.0 300.0*?	Acet Methcl	8.0*J 8.0**
BH005 3/91	3667	0-2 ft	U	U	Bis2 TIC 17 TIC 1 TIC 3 TIC 4 TIC 7 2 Unknowns	63.0** 150.0 9900.0** 790.0** 260.0 13000.0 170.0*? 240.0	Methcl	4.0**
BH005 3/91	3668	2-4 ft	U	U	Bis2 TIC 17 TIC 1 TIC 2 TIC 3 TIC 4 3 Unknowns	86.0** 160.0 12000.0** 160.0** 850.0** 300.0 160.0*? 330.0	Methcl	5.0**
BH006 3/91	3669	0-2 ft	U	U	Bis2 TIC 17 TIC 1 TIC 2 TIC 3 2 Unknowns	250.0** 160.0 9400.0** 200.0** 650.0** 230.0*? 270.0	Methcl	8.0**
BH006 3/91	3670	2-4 ft	U	U	Bis2 TIC 1 TIC 2 TIC 3 TIC 4 2 Unknowns	76.0** 9900.0** 180.0** 360.0** 200.0 150.0*? 250.0	Methcl	4.0**
BH007 3/91	3697	0-2 ft	U	U	Bis2 TIC 1 TIC 6 TIC 3 TIC 8 16 Unknowns	140.0*J 16000.0 830.0 1500.0 650.0 400.0 6800.0	Methcl	5.0**
BH007 3/91	3698	2-4 ft	U	U	Bis2 TIC 1 TIC 3 14 Unknowns	360.0*J 17000.0 1100.0 1200.0 4700.0	Methcl	7.0**
BH008 3/91	3699	0-2 ft	U	U	Bis2 TIC 1 TIC 3 18 Unknowns	140.0*J 12000.0 1100.0 470.0 13000.0	Methcl	6.0**

Table 3.2.2.i. (continued)

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH008 3/91	3700	2-4 ft	14.00	U	TIC 1 TIC 6 TIC 3 3 Unknowns	16000.0 640.0 1200.0 770.0 16000.0	Methcl	7.0**
MW038 3/91	3596	5-7 ft	U	U	Bis2 TIC 1 TIC 4 3 Unknowns	62.0** 9300.0** 470.0 170.0 430.0	Methcl	30.0
MW039 3/91	3597	7-9 ft	U	U	Bis2 TIC 1 TIC 4 TIC 18 1 Unknown	110.0** 11000.0** 730.0 180.0 420.0	Methcl	29.0
MW040 3/91	3598	7-9 ft	U	U	Bis2 TIC 1 TIC 4 2 Unknowns	91.0** 12000.0** 390.0 190.0 420.0	Methcl	7.0**
MW041 3/91	3599	7-9 ft	U	U	Bis2 TIC 5 TIC 1 TIC 4 2 Unknowns	80.0** 170.0 13000.0** 210.0 210.0 580.0	Methcl TCE	5.0** 3.0*J
MW042 3/91	3601	7-9 ft	U	U	Bis2 TIC 1 3 Unknowns	100.0*J 9900.0 200.0 880.0	Methcl	12.0**
MW043 3/91	3602	5-7 ft	U	U	Bis2 TIC 1 TIC 19 2 Unknowns	83.0*J 9500.0 150.0 300.0 750.0	Methcl	7.0**
MW044 3/91	3603	5-7 ft	U	U	Bis2 TIC 1 1 Unknown	72.0*J 8500.0 460.0	Methcl	9.0**
SD001 3/91	3701	0-6 inches	U	U	Bis2 TIC 1 TIC 6 TIC 3 TIC 20 8 Unknowns	630.0*J 24000.0 560.0 1100.0 510.0 510.0 3100.0	Acet Methcl TIC 21	44.0 7.0** 29.0

Table 3.2.2.i. (continued)

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
SD002 3/91	3702	0-6 inches	70.00	130.00 X 0.43	2-Meth Bis2 Naph TIC 1 TIC 22 TIC 23 TIC 24 TIC 25 TIC 25 TIC 26 TIC 27 TIC 28 TIC 29 TIC 30 9 Unknowns	5000.0 1500.0*J 310.0*J 18000.0 5000.0 5200.0 4900.0 7300.0 4800.0 5600.0 5500.0 4700.0 5700.0 5500.0 4800.0 30000.0	Acet Methcl T TIC 10 TIC 31 TIC 32 TIC 33 TIC 34 TIC 35 4 Unknowns	20.0 8.0** 2.0*J 61.0 110.0 200.0 250.0 70.0 82.0 58.0 150.0
SD003 3/91	3703	0-6 inches	U	U	Bis2 TIC 1 TIC 6 TIC 3 TIC 36 1 Unknown	190.0*J 14000.0 590.0 1500.0 920.0 1400.0	Methcl TIC 21	6.0** 15.0

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
*? - some or all unknowns contain unusable data
*J - concentration estimated
2-Meth - 2-methylnaphthalene
Acet - acetone
Bis2 - bis(2-Ethylhexyl) phthalate
E - ethylbenzene
HBP - high boiling point
LBP - low boiling point
Methcl - methylene chloride
Naph - naphthalene
PHC - petroleum hydrocarbons
Phena - phenanthrene
QL - quantitation limit
T - toluene
TCE - trichloroethene
TIC - tentatively identified compound
U - no compounds detected
X - xylenes (total)

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanone, 4-hydroxy-4-met
TIC 2 - 3-penten-2-one, 4-methyl-
TIC 3 - 5-hexen-2-one, 5-methyl-
TIC 4 - hexadecanoic acid
TIC 5 - 2-butanone, 3,4-epoxy-3-ethy
TIC 6 - 3-heptanone, 2,4-dimethyl-
TIC 7 - hexanedioic acid, dioctyl es
TIC 8 - hydroxylamine, o-decyl-
TIC 9 - cyclohexane, 1-ethyl-2-methyl-
TIC 10 - cyclohexane, 1-ethyl-4-methyl
TIC 11 - cyclohexane, propyl-
TIC 12 - cyclohexane, trimethyl-
TIC 13 - cyclopentane, (2-methylbutyl-
TIC 14 - hexane, 1-(hexyloxy)-3-methyl-
TIC 15 - octane, 3,5-dimethyl-
TIC 16 - octane, 4-methyl-
TIC 17 - 2,5-hexanedione
TIC 18 - octadecanoic acid
TIC 19 - 3-hexen-2-one, 5-methyl-
TIC 20 - silicic acid (h4sio4), tetra
TIC 21 - ethane, 1,2-dichloro-1,1,2-t
TIC 22 - benzene, (1,1-dimethylpropyl
TIC 23 - benzene, 1,3-diethyl-5-methy
TIC 24 - benzene, 1,3-dimethyl-5-(1-m
TIC 25 - benzene, 2-ethyl-1,4-dimethy
TIC 26 - naphthalene, 1,3-dimethyl-
TIC 27 - naphthalene, 1,5-dimethyl-
TIC 28 - naphthalene, 1-methyl-
TIC 29 - phenol, 4-nonyl-
TIC 30 - phenol, nonyl-
TIC 31 - cyclohexane, 1-methyl-2-propy
TIC 32 - cyclopropane, 1-methyl-2-(3-m
TIC 33 - decane
TIC 34 - nonane
TIC 35 - nonane, 3-methyl-
TIC 36 - octadecanal

Table 3.2.2.i. (continued)
Date: 3/91

Metals, mg/kg Method 6010 Quantitation limit: 1 mg/kg				
Compound	#	Average	Minimum	Maximum
Aluminum	19	7,434	2,280.00	18,600.00
Antimony	0	ND	ND	ND
Arsenic	19	7	1.20	25.50
Barium	19	71	29.60	154.00
Beryllium	18	0	0.15	0.61
Boron	18	16	1.40	67.10
Cadmium	3	1	0.79	1.20
Calcium	19	7,604	2,130.00	15,500.00
Chromium	19	7	2.60	12.90
Cobalt	17	6	3.10	12.90
Copper	19	31	7.60	97.60
Iron	19	12,865	5,210.00	26,100.00
Lead	19	8	1.70	38.70
Lithium	19	11	3.50	26.30
Magnesium	19	3,586	1,210.00	8,190.00
Manganese	19	262	113.00	889.00
Mercury	4	0	0.03	0.06
Molybdenum	2	5	2.50	7.50
Nickel	19	7	3.50	14.00
Potassium	19	1,761	393.00	3,920.00
Selenium	0	ND	ND	ND
Silver	7	1	0.69	2.50
Sodium	19	1,932	293.00	8,570.00
Thallium	0	ND	ND	ND
Vanadium	19	28	12.90	50.50
Zinc	19	50	24.70	106.00

- number of samples with detectable quantities of analyte
ND - analyte not detected

Table 3.2.2.ii. Water sample results for Site 3 (Hangar 300)

Location / Date	Sample Number	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	PCB/Pesticide (*3) ug/L	Semivolatiles Method 625, ug/L QL: 10 ug/L	Volatiles Method 624, ug/L QL: 5 ug/L
MW038 4/91	3806	Die 310.0	Gas 200.0	NP	TIC 1 10.0 TIC 2 19.0 TIC 3 28.0 2 Unknowns 9.6 15.0	E 5.0 TIC 4 32.0 TIC 5 16.0
MW039L 4/91	3807	U	U	NP	U	U
MW039U 4/91	3808	Die 60.0	U	NP	1 Unknown 17.0	U
MW040 4/91	3810	U	U	NP	1 Unknown 12.0	U
MW041L 4/91	3797	U	U	NP	U	Methcl 2.0** TCE 3.0*J
MW041L 4/91	3798	U	U	NP	TIC 6 10.0	Methcl 1.0** TCE 3.0*J
MW041U 4/91	3799	Die 90.0	Gas 160.0	NP	TIC 7 16.0 1 Unknown 9.0	1,1DCE 2.0*J 1,2DCE 33.0 Methcl 3.0** TCE 160.0 TIC 5 14.0 TIC 8 6.2 1 Unknown 7.3
MW042L 4/91	3796	U	U	NP	TIC 7 25.0	Methcl 1.0**
MW042U 4/91	3792	U	U	U	TIC 6 42.0 2 Unknowns 10.0 250.0	U
MW043L 4/91	3793	U	U	NP	U	U
MW043U 4/91	3794	Die 340.0	U	NP	TIC 7 13.0 1 Unknown 9.2	Methcl 1.0**
MW044L 4/91	3805	U	U	NP	TIC 7 93.0 1 Unknown 11.0	Methcl 2.0**
MW044U 4/91	3800	U	U	NP	TIC 7 32.0 TIC 9 11.0 1 Unknown 8.6	Methcl 2.0**

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 50 ug/L
*2 - Method 8015/8020, quantitation limit: 50 ug/L
*3 - Method 608, quantitation limit: 0.05 ug/L
*J - concentration estimated
1,1DCE - 1,1-dichloroethene
1,2DCE - 1,2-dichloroethene (total)
Die - HBP PHC as compared to diesel fuel
E - ethylbenzene
Gas - LBP PHC as compared to gasoline
HBP - high boiling point
LBP - low boiling point
Methcl - methylene chloride
NP - analysis not performed
PHC - petroleum hydrocarbons
QL - quantitation limit
TCE - trichloroethene
TIC - tentatively identified compound
U - no compounds detected

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 1-hexadecyne
TIC 2 - benzene, 2-ethyl-1,4-dimethy
TIC 3 - phenol, 4-(2,2,3,3-tetrameth
TIC 4 - ethane, 1,1,2-trichloro-1,2,2
TIC 5 - ethane, 1,2-dichloro-1,1,2-t
TIC 6 - 2-pentanone, 4-hydroxy-4-met
TIC 7 - 1,13-tetradecadiene
TIC 8 - pentane, 2,2,3-trimethyl-
TIC 9 - 2-heptenal, (z)-

Table 3.2.2.ii. (continued)
Date: 4/91

Anions, mg/L Method 429 Quantitation limit: 0.5 mg/L				
Compound	#	Average	Minimum	Maximum
Chloride	13	10,385	3,200.00	24,000.00
Fluoride	0	ND	ND	ND
Nitrate, as N	0	ND	ND	ND
Phosphate	0	ND	ND	ND
Sulfate	13	10,123	2,900.00	16,000.00

Date: 4/91

Metals, ug/L Method 200.7 Quantitation limit: 1 ug/L				
Compound	#	Average	Minimum	Maximum
Aluminum	12	64	47.90	82.80
Antimony	7	40	32.20	46.90
Arsenic	13	1,306	80.10	4,430.00
Barium	13	23	13.30	85.30
Beryllium	0	ND	ND	ND
Boron	13	94,231	56,800.00	126,000.00
Cadmium	0	ND	ND	ND
Calcium	13	68,562	5,700.00	287,000.00
Chromium	0	ND	ND	ND
Cobalt	0	ND	ND	ND
Copper	13	48	27.80	84.80
Iron	13	28	17.40	37.60
Lead	0	ND	ND	ND
Lithium	13	378	113.00	638.00
Magnesium	13	156,777	16,800.00	359,000.00
Manganese	13	61	4.50	155.00
Mercury	2	0	0.20	0.36
Molybdenum	13	2,326	1,110.00	3,440.00
Nickel	0	ND	ND	ND
Potassium	13	203,985	81,800.00	337,000.00
Selenium	1	42	42.20	42.20
Silver	13	15	5.00	20.30
Sodium	13	11,880,769	6,870,000.00	17,200,000.00
Thallium	0	ND	ND	ND
Vanadium	13	196	39.00	581.00
Zinc	11	28	8.60	81.40

- number of samples with detectable quantities of analyte
ND - analyte not detected

completed at the top of the water table. Three of the well pairs, MW42U & L, MW43U & L, and MW44U & L, were specifically located to be on the outside of the limits of contamination of concern for the plume. The other well pair, MW41U & L, was purposely placed inside the plume to assess the concentration of contaminants within the plume. The wells were sampled in April 1991. As anticipated, MW41U contained TCE in excess of the MCL. It also contained petroleum hydrocarbon contamination and other solvent-related compounds but contained no floating or sinking product. MW41L contained only some minor amounts of solvent-related organic compounds, thus indicating that no DNAPL plume is present. The other wells contained either no organic contamination or minor amounts of petroleum hydrocarbons and semivolatile organic compounds. One compound which was present in several of the wells at less than 100 ppb (parts per billion) was 1,13-tetradecadiene. The compound is uncommon, and no references associating it to suspected contaminants at the site were found. An additional round of water samples was collected from the wells in August, and the results will be included in the next report.

3.2.2.iii Exposure Pathways

A synopsis of media-specific contaminant transport pathways, assimilation routes, exposure points, and affected biota for NAS Fallon is given in Appendix C. The following paragraphs expand on these initial evaluations in light of the characterization activities completed at Site 3.

Site-characterization activities indicate the primary contaminants of concern at Site 3 are petroleum hydrocarbon-related wastes and solvents in the surface soils and shallow groundwater. Direct exposure pathways for contaminated soils at Site 3 include dermal contact, ingestion, and inhalation of dust particles and volatile constituents. Affected biota include indigenous plants and burrowing animals as well as personnel associated with site excavation activities. Plant and animal populations are controlled on NAS Fallon property; thus, exposures associated with these biota are minimized. Restricted access and lack of surface soil contamination further prevent contaminated soils at Site 3 from constituting a primary exposure pathway.

Direct exposure pathways for groundwater include use of contaminated groundwater extracted from the shallow aquifer and the underlying intermediate aquifer.

The shallow aquifer is not pumped on NAS Fallon property and, due to its high salinity, is used for human consumption in only two out of sixteen households in the downgradient area surrounding the activity (Appendix C). Twelve wells tapping the shallow aquifer and ten wells tapping the intermediate aquifer are known to exist within a radius of two miles on the downgradient (southeast) side of the activity (Appendix C). The uses of these wells range from two which are used for drinking water to four which are not used at all due to naturally poor water quality (Appendix C). The drinking water wells are not downgradient from any IR sites.

Available site-characterization results indicate that, due to an upward flow gradient between the intermediate and shallow aquifers, contaminants are not migrating into the intermediate aquifer (Appendix D). Additionally, a confining clay layer is known to exist between the contaminated shallow aquifer and the intermediate aquifer. All monitoring well boreholes drilled during the remedial investigation were drilled down to this clay layer confirming its existence over the entire facility. Depth to the clay layer varied from 10 to 25 ft below ground surface. The clay layer was approximately 20-ft thick at the three locations where it was completely penetrated (MW06L, MW11L, and MW12L). It is believed that these natural containment mechanisms prevent contaminants from reaching the intermediate aquifer.

The plume is not traveling toward the nearest ditch, the unnamed ditch at the north disposal area. Inspection of the drainage ditch system (Fig. E.1, Appendix E) and the groundwater potentiometric map (Fig. D.5, Appendix D) associated with the site, indicate that the plume from Site 3 is traveling toward the Lower Diagonal Drain 8,000 ft to the south and would intersect the ditch long before reaching any downgradient wells. Groundwater which flows under the drainage ditches could potentially, over a very long period of time, reach downgradient groundwater wells or Carson Lake Pasture several miles to the south. However, most of the contaminants seem to be in the top 3 to 5 feet of the aquifer and are expected to remain there due to essentially horizontal laminar flow in the shallow aquifer. Thus, the contaminants would be more likely to discharge into the drainage ditch than to pass beneath it. Furthermore, the shallow groundwater plume would degrade naturally over the distance of 8,000 ft to the ditch, removing any potential threat. Thus, it is very unlikely that the plume will ever discharge into the drainage ditch system or remain so concentrated as to pose a threat during the time it would take to travel in groundwater to downgradient wells over two miles away. The lack of use of shallow groundwater in the immediate vicinity and

the natural containment properties associated with the regional groundwater flow system inhibit the shallow groundwater from serving as a direct exposure pathway. Thus, without evidence of other pathways or exposure points, there is little necessity to collect additional subsurface data at the site.

Surface-water transport of surface-soil contamination from the site is possible via the unnamed ditch which joins the Lower Diagonal #1 Drain. Considering the scattered point-source nature of surface-soil contamination at the site and the infrequent occurrence of surface runoff, this transport mechanism does not seem to warrant further investigation. The unnamed ditch does, however, contain some contaminated sediments, and as long as the oil/water separator remains at the site, there is potential for contaminants to be spilled into the ditch and transported off site.

Even though contaminants of concern do not appear to exceed action limits at Site 3, the need for remediation must still be evaluated in light of the ARARs (Applicable or Relevant and Appropriate Requirements) for the site. These will be developed during the FS. The existence of soil and groundwater contaminants does not necessarily mandate remediation. There does not appear to be any free-phase product on the groundwater or any contiguous areas of petroleum hydrocarbon-contaminated soil exceeding 100 mg/kg. Thus, the site does not appear to require the implementation of a removal action.

3.2.3 Recommendations

No additional field investigations are recommended for Site 3 at this time.

3.3 SITE 20, CHECKERBOARD LANDFILL

3.3.1 Site History

As shown in Fig. 1.3.ii, Site 20, the Checkerboard Landfill, is located in the southwestern corner of NAS Fallon near the activity boundary. The site is a nearly level area of open ground near the Checkerboard Building (Fig. 3.3.1.i). Waste disposal activities at the site consisted of the burial of wet garbage, trash, and rubble between 1951 and 1965.

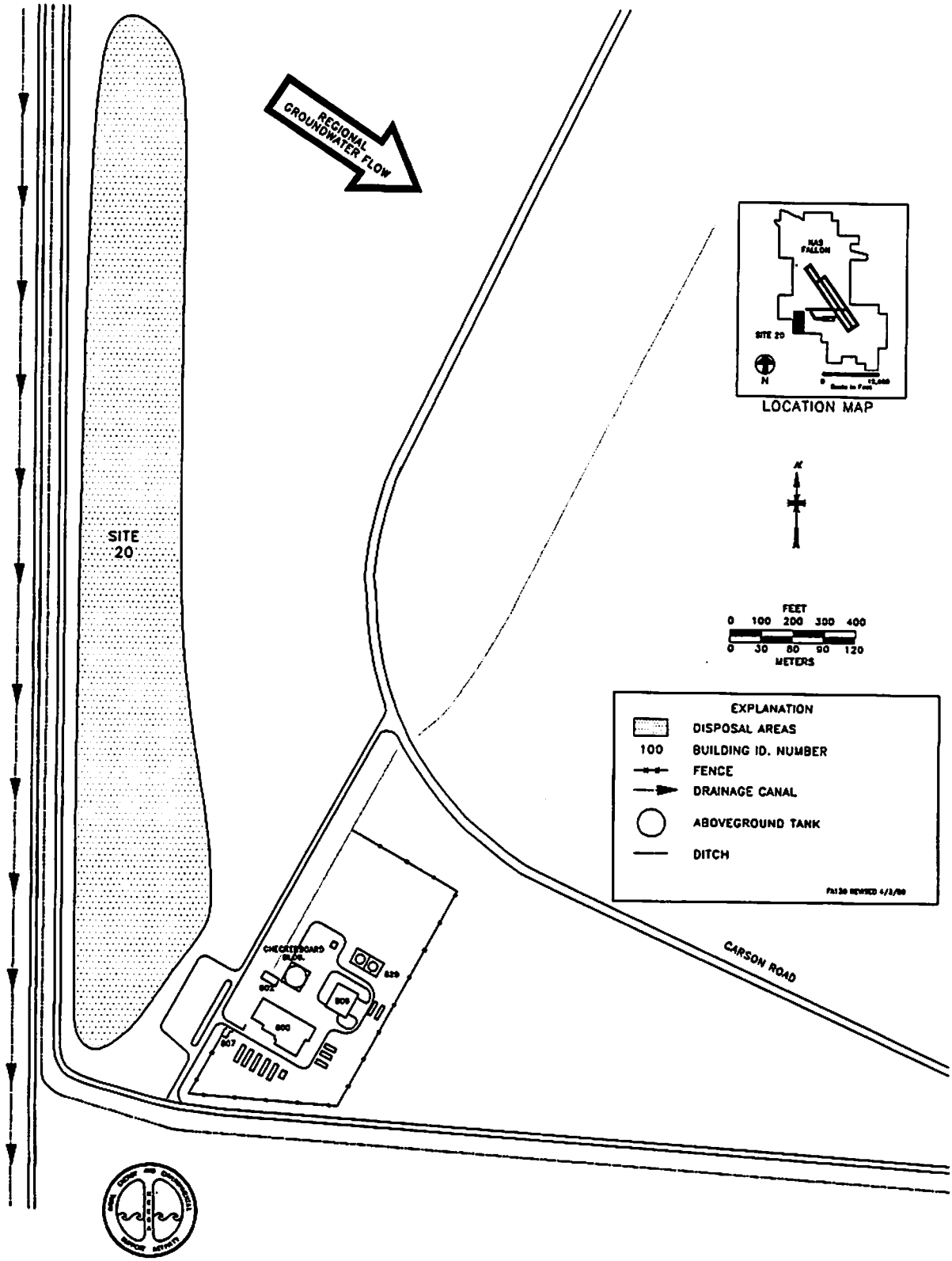

Fig. 3.3.1.i. Site 20, Checkerboard Landfill.

Sludge scraped from the wastewater treatment plant is known to have been buried there. Burning of disposed hydrocarbon liquids is also reported to have occurred (Dames and Moore 1988).

Landfilling at the site was conducted with bulldozers which constructed trenches across the site in an east-west direction. The depth of excavation is unknown. The trenches were subsequently filled with waste and then backfilled with soil. It is possible that excavations may have been of sufficient depth to deposit wastes below the water table. A more detailed description of waste disposal at the site is included in the Phase I PA/SI Report (Dames and Moore 1988).

3.3.2 Investigative Approach, Extent of Contamination, and Exposure Pathways

No quantitative site-characterization analysis was conducted at Site 20 during the Phase I PA/SI investigation. Based on a visual inspection and records search, the Phase I study concluded that because disposal of liquid hydrocarbons and other hazardous materials (paint wastes and metals) was suspected (although not confirmed), soil and groundwater contamination in the area was likely (Dames and Moore 1988).

3.3.2.i Investigative Approach

Records indicating the type and amount of wastes disposed of at the site were taken as verification that contamination existed at the site. The approach taken to fulfill the data needs based on the preliminary risk screening in the Work Plan was to: (1) determine if the contaminants have reached the groundwater around the site; (2) characterize the type, extent, and concentration of contaminants in the groundwater; and (3) determine if contaminants are migrating off site. It was taken for granted that some soil contamination existed within the landfill area. However, characterizing the contents of a landfill is an impractical undertaking, and the important issue at the site was whether or not contaminants were migrating from the site. The Work Plan describes the approach and rationale for the investigation of the site (ORNL 1989). A modification to the investigation outlined in the Work Plan was made based on an improvement in field techniques. A method of direct groundwater screening was developed to replace the proposed soil-gas survey. The locations of downgradient wells were only slightly modified based on the groundwater test hole results.

Preliminary field screening and site-characterization activities completed during the Phase II RI included screening thirty-six groundwater test holes and installing six monitoring wells (five shallow completions screened across the top of the water table and one deep completion screened at the bottom of the shallow aquifer). Groundwater test hole and monitoring well locations are shown on Fig. 3.3.2.i. Initial groundwater samples were submitted for laboratory analysis, and the results are discussed below. A second round of water samples was collected in August 1991, and the results will be included in the next report.

3.3.2.ii Extent of Contamination

No contamination was detected during screening of the groundwater test holes with the field gas chromatograph (GC) (Appendix B, Table B.5). However, photoionization detector (PID) analysis of six groundwater test holes did reveal contamination of an unknown type (Fig. 3.3.2.i). It is surmised that the detected contaminants must have a very short retention time in the GC column and were thus not detected during screening. Another possibility is that the contaminants may have been present only in the vadose zone and were not detected by the groundwater testing. The characteristics of the detected contaminants are consistent with those of methane gas which is commonly produced during the biodegradation of buried organic matter in landfills, but methane is normally not detected with a PID. A water sample was collected from one of the anomalous test holes and submitted for a complete GC/Mass Spectrometer laboratory analysis. The only compound detected was toluene at 2 ppb.

The monitoring well locations are shown on Fig. 3.3.2.i. Both soil and water samples were collected from the wells. The types and concentrations of contaminants discovered in monitoring-well soil samples are shown in Table 3.3.2.i.

Soil Contamination

Soil contamination detected by laboratory analysis consisted of compounds related to laboratory contamination such as bis (2-Ethylhexyl) phlalate and methylene chloride. Three of the TICs; TIC 1, TIC 6 and TIC 7, are also lab solvent related compounds.

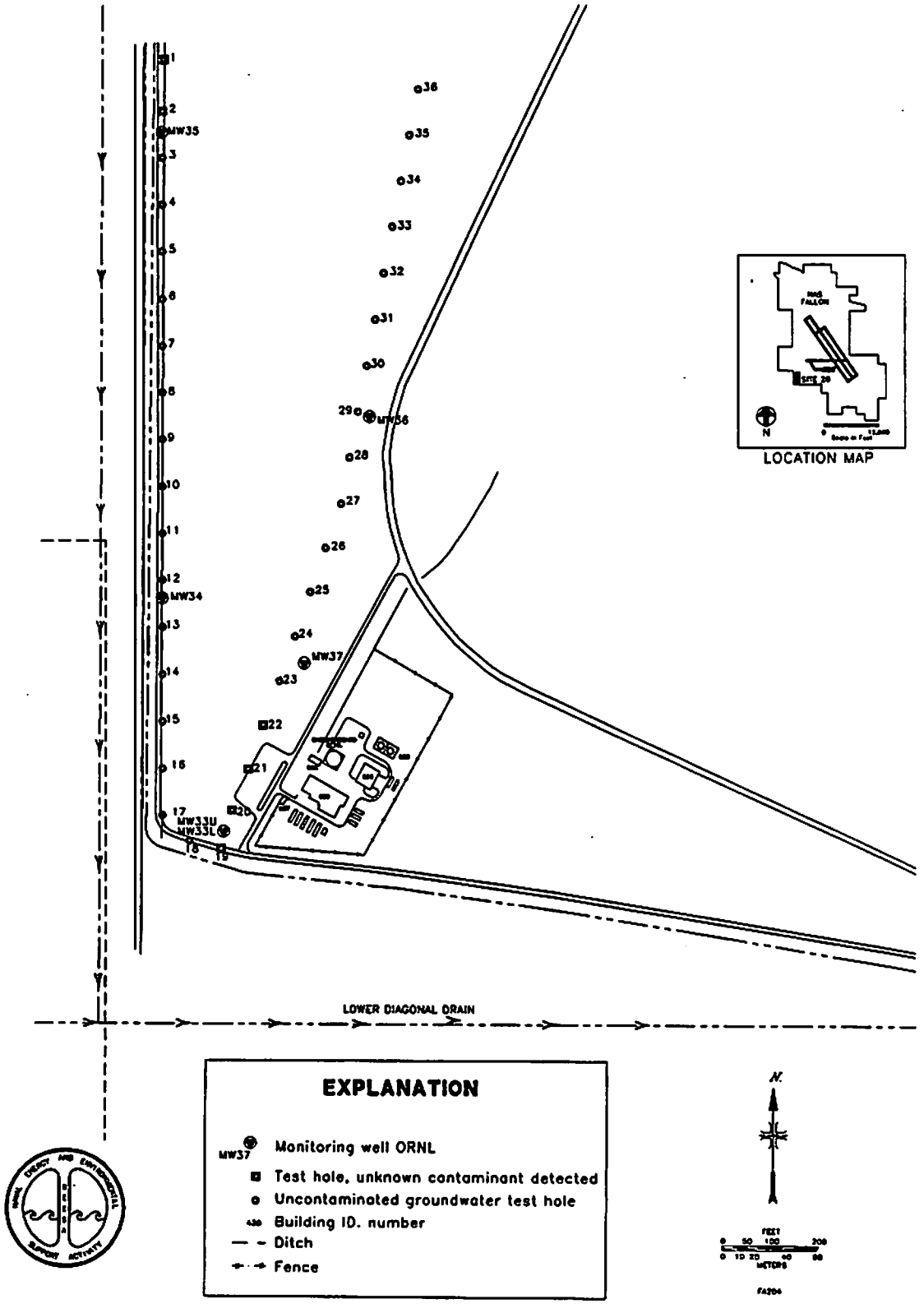

Fig. 3.3.2.i. Site 20, Checkerboard Landfill. Groundwater test hole and analytical sampling locations.

Table 3.3.2.i. Soil sample results for Site 20 (Checkerboard Landfill)

Location / Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
MW033 3/91	3590	7-9 ft	U	U	Bis2	93.0*J	Methcl	10.0**
					TIC 1	11000.0		
					TIC 2	620.0		
					TIC 3	2700.0		
					TIC 4	240.0		
					2 Unknowns	180.0		
						520.0		
MW034 3/91	3592	5-7 ft	U	U	Bis2	76.0**	Methcl	9.0**
					TIC 5	180.0		
					TIC 1	12000.0**		
					TIC 6	220.0		
					TIC 2	690.0		
					TIC 3	220.0**		
					3 Unknowns	250.0*?		
						520.0		
MW035 3/91	3593	5-7 ft	U	U	Bis2	66.0**	Methcl	6.0**
					TIC 1	11000.0**		
					TIC 6	170.0		
					TIC 2	280.0		
					TIC 3	4900.0**		
					2 Unknowns	180.0		
						440.0		
MW036 3/91	3594	7-9 ft	U	U	Bis2	72.0**	Methcl	8.0**
					TIC 1	9800.0**		
					TIC 7	200.0		
					TIC 2	1400.0		
					TIC 3	2200.0**		
					TIC 4	430.0		
					1 Unknown	370.0		

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
*? - some or all unknowns contain unusable data
*J - concentration estimated
Bis2 - bis(2-Ethylhexyl) phthalate
HBP - high boiling point
LBP - low boiling point
Methcl - methylene chloride
PHC - petroleum hydrocarbons
QL - quantitation limit
TIC - tentatively identified compound
U - no compounds detected

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanone, 4-hydroxy-4-met
TIC 2 - hexadecanoic acid
TIC 3 - hexanedioic acid, dioctyl es
TIC 4 - octadecanoic acid
TIC 5 - 1,2-benzenedicarboxylic acid
TIC 6 - 5-hexen-2-one, 5-methyl-
TIC 7 - 3-penten-2-one, 4-methyl-

Other TICs detected in the soil are naturally occurring fatty acids such as hexadecanoic acid and octadecenoic acid. None of the samples contained levels of contaminants which are cause for concern (Table 3.3.2.i).

Groundwater Contamination

No petroleum hydrocarbon contamination was detected in any of the water samples. Volatile organic analysis detected bromoform below quantitation limits (bql) in MW36 and tetrahydrofuran at 130 ppb in MW37 (Table 3.3.2.ii). Both are sometimes used as solvents, but neither compound is cause for concern at the concentrations detected. This is because inhalation is the primary exposure route and the permissible exposure limits (PEL) in air are 0.5 ppm (parts per million) and 200 ppm respectively. Semivolatile analytical results show TICs and unknowns for all wells except MW33L. The TICs were compounds such as bromocyclohexene and diethyltetrahydrofuran which are not listed wastes with quantitative exposure limits. Thus, there is no data for comparison for risk analysis.

Summary

Site-characterization activities indicate that the primary contaminants of concern at Site 20 are semivolatile organic compounds and possibly methane gas. Although not detected during site-characterization activities, other petroleum hydrocarbon-related wastes, metals, and paints may also be present but are not migrating. Contaminated media may include the soils within the landfill and possibly the shallow groundwater underlying the facility, although sufficient time has elapsed since the waste disposal for most mobile or degradable compounds to have either disappeared or degraded. The atmosphere is not considered to be a contaminated medium of concern because burial of the wastes effectively contains contaminants in the subsurface environment and HNU readings taken around the site detected no VOCs.

Table 3.3.2.ii. Water sample results for Site 20 (Checkerboard Landfill)
Date: 4/91

Location	Sample Number	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	PCB/Pesticide (*3) ug/L	Semivolatiles Method 625, ug/L QL: 10 ug/L	Volatiles Method 624, ug/L QL: 5 ug/L
MW033L	3777	U	U	U	U	U
MW033U	3784	U	U	U	TIC 1 12.0 TIC 2 13.0 TIC 3 20.0 3 Unknowns 18.0 280.0	U
MW034	3789	U	U	U	TIC 4 17.0	U
MW035	3791	U	U	U	Bis2 6.0**	U
MW036	3785	U	U	U	TIC 2 16.0 TIC 5 25.0 TIC 4 37.0	Bro 4.0*J
MW037	3788	U	U	U	Bis2 2.0** TIC 1 12.0 TIC 2 14.0 TIC 5 18.0 TIC 4 30.0 1 Unknown 9.8	TIC 6 130.0

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 50 ug/L
*2 - Method 8015/8020, quantitation limit: 50 ug/L
*3 - Method 608, quantitation limit: 0.05 ug/L
*J - concentration estimated
Bis2 - bis(2-Ethylhexyl) phthalate
Bro - bromoform

HBP - high boiling point
LBP - low boiling point
PHC - petroleum hydrocarbons
QL - quantitation limit
TIC - tentatively identified compound
U - no compounds detected

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-heptenal, (z)-
TIC 2 - 2-pentanone, 4-hydroxy-4-met
TIC 3 - cyclohexanol, 2-bromo-, tran
TIC 4 - furan, 2,5-diethyltetrahydro
TIC 5 - cyclohexene, 3-bromo-
TIC 6 - furan, tetrahydro-

Table 3.3.2.ii. (continued)
Date: 4/91

Anions, mg/L Method 429 Quantitation limit: 0.5 mg/L				
Compound	#	Average	Minimum	Maximum
Chloride	6	11,078	670.00	18,000.00
Fluoride	1	410	410.00	410.00
Nitrate, as N	0	ND	ND	ND
Phosphate	0	ND	ND	ND
Sulfate	6	8,208	850.00	16,000.00

Date: 4/91

Metals, ug/L Method 200.7 Quantitation limit: 1 ug/L				
Compound	#	Average	Minimum	Maximum
Aluminum	3	45	41.30	51.20
Antimony	0	ND	ND	ND
Arsenic	6	426	13.50	1,740.00
Barium	6	17	6.80	33.70
Beryllium	0	ND	ND	ND
Boron	6	25,252	2,540.00	51,200.00
Cadmium	0	ND	ND	ND
Calcium	6	198,395	5,470.00	616,000.00
Chromium	0	ND	ND	ND
Cobalt	0	ND	ND	ND
Copper	5	18	13.80	21.30
Iron	5	20	13.60	31.20
Lead	0	ND	ND	ND
Lithium	6	265	49.50	668.00
Magnesium	6	421,280	8,280.00	812,000.00
Manganese	6	656	17.70	3,140.00
Mercury	1	0	0.40	0.40
Molybdenum	6	1,113	167.00	1,980.00
Nickel	0	ND	ND	ND
Potassium	6	109,090	5,840.00	283,000.00
Selenium	0	ND	ND	ND
Silver	2	10	9.60	9.80
Sodium	6	6,195,167	461,000.00	11,300,000.00
Thallium	0	ND	ND	ND
Vanadium	6	65	14.90	190.00
Zinc	4	52	30.90	75.90

- number of samples with detectable quantities of analyte
ND - analyte not detected

3.3.2.iii Exposure Pathways

A synopsis of media-specific contaminant transport pathways, assimilation routes, exposure points, and affected biota for NAS Fallon is given in Appendix C. The following paragraphs expand on these initial evaluations in light of the characterization activities completed at Site 20.

Direct exposure to contaminated soils at Site 20 would first require removal of the overlying backfill. If contaminants are exposed through excavation, exposure pathways for contaminated soils include dermal contact, ingestion, and inhalation of dust particles and volatile constituents. Affected biota include indigenous plants (with root systems deep enough to penetrate the overlying backfill) and burrowing animals as well as personnel associated with site excavation activities. Because NAS Fallon is a restricted area, plant and animal populations at the site are controlled, and exposures associated with these biota are minimized. Direct exposure to the human populace is restricted to naval personnel and subcontractors. Health and safety measures requiring effective environmental monitoring, and environmentally safe construction practices further mitigate exposure to contaminated soils during on-site activities. Restricted access and lack of surface soil contamination thus prevent contaminated soils at Site 20 from constituting a primary exposure pathway.

Direct exposure pathways for groundwater include use of contaminated groundwater extracted from the shallow aquifer and the intermediate aquifer. The shallow aquifer is not pumped on NAS Fallon property and, due to its high salinity, is used sparingly for human consumption in the surrounding area (Appendix C). Thus, direct exposures to contaminants through extraction of the shallow groundwater in the area are believed to be minimal. Available site-characterization results indicate contaminants are not migrating into the intermediate aquifer (Appendix E). The semiarid climate of the region also minimizes the potential for percolation of residual soil contaminants into the underlying saturated zone. Indeed, the numerous alkali flats in the surrounding area indicate a negative water balance for the region which renders downward percolation unlikely.

As with the soils and contaminated groundwater associated with Site 20, surface water does not constitute a substantial direct exposure pathway. Due to the infrequency

of surface runoff resulting from excessive precipitation and the fact that contaminants are contained in a buried state, little, if any, contaminant-transport potential exists.

Contaminated groundwater may, however, act as a source for contaminating surface water which could constitute an exposure pathway to downstream receptors. Furthermore, wastes deposited below the water table offer the potential of contributing dissolved contaminants to the surrounding groundwater. Contaminants associated with the shallow groundwater may then migrate downgradient for eventual seepage discharge into the surrounding drainage ditches.

Restricted access and institutional controls again minimize any surface water exposures on NAS Fallon property. Contaminated surface water does, however, have the potential to transport contaminants off site to exposure points. As explained in Appendix C, off-site exposure points associated with surface water include recreational exposure, direct exposure to biota which inhabit contaminated surface water channels and wetlands, secondary exposure to humans who consume contaminated biota, and exposures associated with the final deposition of contaminated waters into reservoirs and wetlands.

Seepage discharge of groundwater contaminants to off-site surface-water receptors is thus the primary exposure pathway for contaminants of concern at Site 20. The principal exposure pathway of concern is the regional surface-water system extending from the downgradient (southeastern) edge of the facility to Stillwater Point Reservoir and the Stillwater Wildlife Refuge. Inspection of the groundwater potentiometric map (Fig. D.6, Appendix D) and the surface water drainage map (Fig. E.1, Appendix E) shows that the shallow groundwater is probably discharging into the Lower Diagonal Drain. However, lack of contaminants in the downgradient wells indicates that there is little reason for concern about surface-water contamination from this site. Based on the results of the investigation, there is no substantial groundwater contaminant plume at the site, and no further investigations are warranted at this time.

3.3.3 Recommendations

Site-characterization activities have not detected any significant contamination at Site 20. Thus, no further site characterization is recommended at this time.

3.4 SITE 24, ROAD OILING AREA

3.4.1 Site History

Site 24, Road Oiling Area, is shown in Fig. 3.4.1.i. Disposal activities at the site consisted of applying wastes to unpaved perimeter roads along the northern and eastern boundaries of NAS Fallon. Wastes disposed of included waste oils, hydraulic fluids, antifreeze, leaded gasoline, carbon tetrachloride, mogas (motor vehicle gasoline), JP-4, JP-5, TCE, and TCA (trichloroethane). Waste application consisted of pouring or spraying the accumulated wastes onto the perimeter road areas. Since termination of road oiling in 1981, portions of the disposal area along the north perimeter road have been paved.

3.4.2 Investigative Approach, Extent of Contamination, and Exposure Pathways

3.4.2.i Investigative Approach

No qualitative site-characterization analysis was conducted at Site 24 during the Phase I PA/SI investigation. Based on the amount of liquid wastes disposed of at the site, the Phase I study concluded that soils and groundwater contamination was likely (Dames and Moore 1988). The preliminary risk screening performed in conjunction with development of the Work Plan, however, indicated that potential risks associated with the site were minimal. Thus the approach taken for site characterization was to: (1) determine if soil or groundwater contamination existed at the site; (2) characterize the type, extent, and concentrations of contaminants; and (3) determine if contaminants were migrating off site. The Work Plan describes the approach and rationale for investigation of the site (ORNL 1989). Modification to the investigation was made based on an improvement in field investigation techniques. A method of direct groundwater screening was developed to replace soil-gas surveys and many of the groundwater test holes drilled to assess Group II sites were drilled along the former Road Oiling Area. The proposed investigation included drilling and sampling five soil borings along the length of unpaved road. The locations of soil borings were only slightly modified from those shown in the Work Plan.

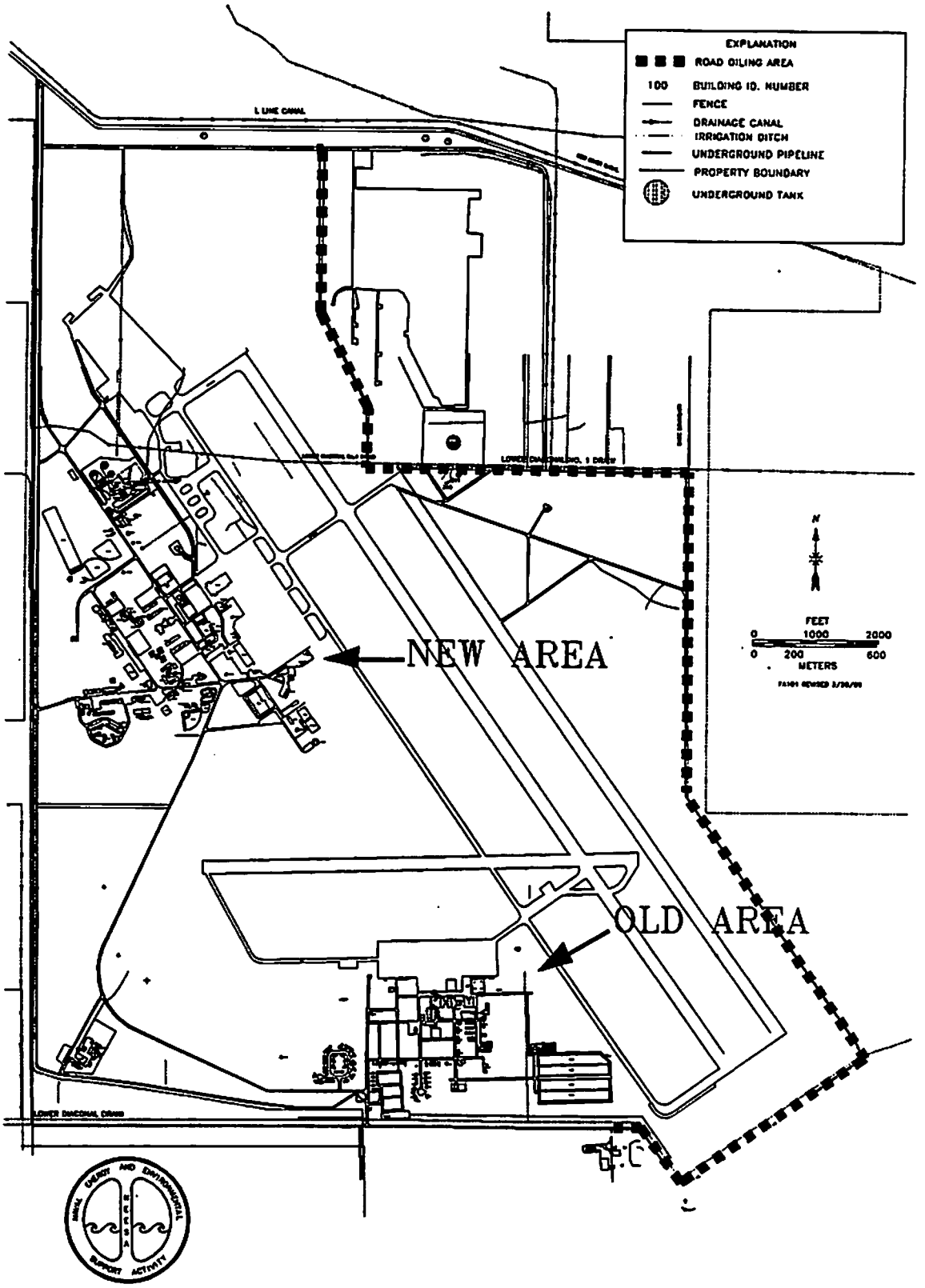

Fig. 3.4.1.i. Site 24, Road Oiling Area.

3.4.2.ii Extent of Contamination

Phase II field screening activities at Site 24 consisted of a comprehensive groundwater test hole survey designed to encompass the adjacent Group 2 Sites (Fig. 3.4.2.i). Results of the groundwater test hole screening are given in Appendix B, Table B.8. The results of the numerous groundwater test holes drilled along the road showed no detectable contamination in the groundwater associated with Site 24. The only contamination discovered was related to a jet fuel plume in the groundwater at Site 6.

The five soil borings were drilled down to the water table. Soil boring locations are shown in Fig. 3.4.2.ii. The types and concentrations of contaminants discovered in the soil borings are shown in Table 3.4.2.i. Compounds detected by laboratory analysis of the soil samples consisted of laboratory-sample-preparation-related contaminants and other tentatively identified compounds for the volatile and semivolatile organic analysis. The concentrations of metals may appear to be elevated, but when compared to other soil sample results for other sites on the facility, including background samples from wells MW06, MW11 and MW12, the concentrations are consistent with the regional range of values.

3.4.2.iii Exposure Pathways

A synopsis of media-specific contaminant transport pathways, assimilation routes, exposure points, and affected biota for NAS Fallon is given in Appendix C. The following paragraphs expand on these initial evaluations in light of the characterization activities at Site 24.

Media of concern include the soils and shallow groundwater underlying the site. The atmosphere is not considered to be a contaminated medium of concern because surface application of the wastes is conducive to rapid dispersal of any volatile constituents. Additionally, sufficient time has elapsed (waste disposal activities were terminated in 1981) for volatilization and biodegradation of shallow gas-phase contaminants to be complete.

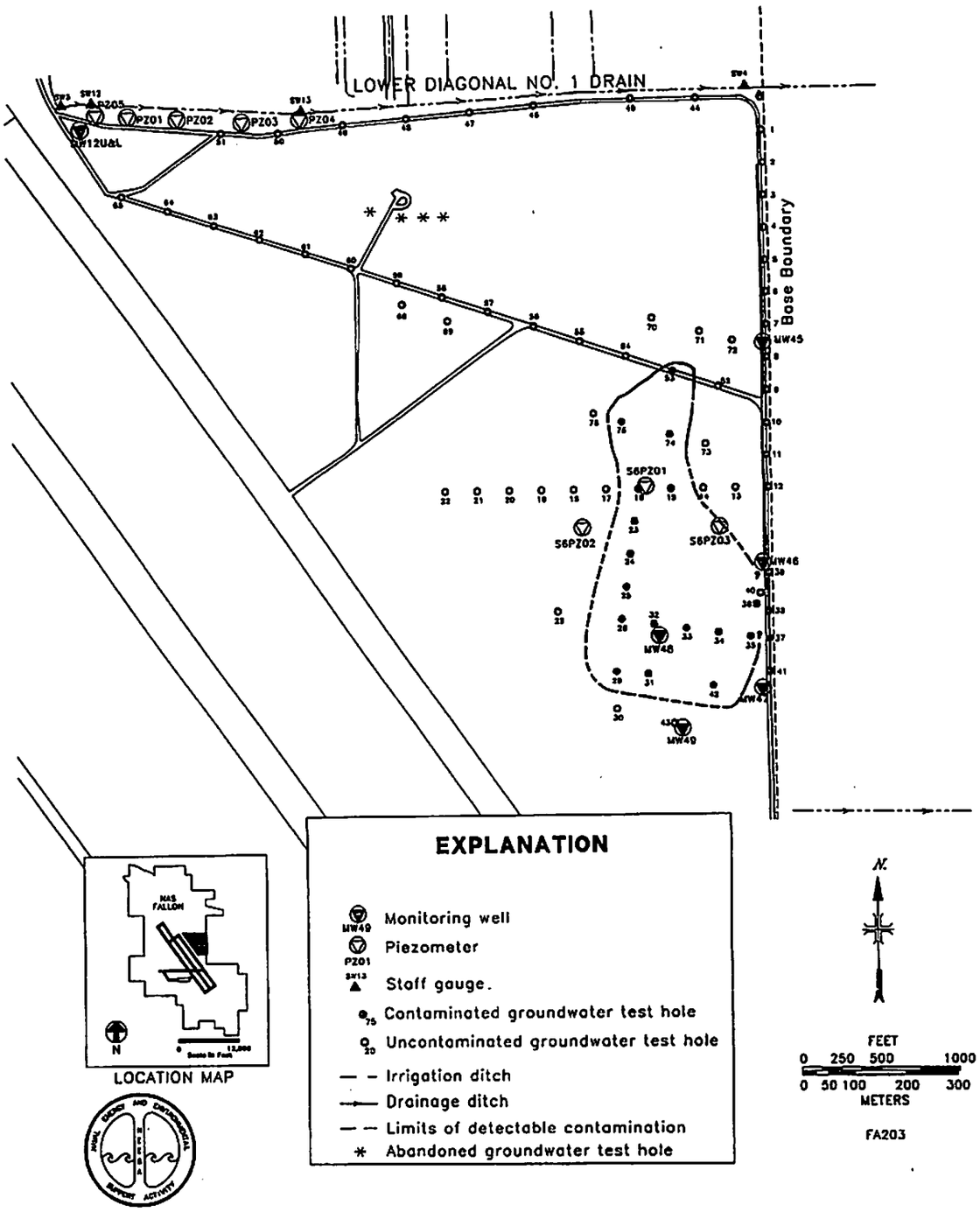

Fig. 3.4.2.i. Site 24, Road Oiling Area. Groundwater test hole locations associated with Group II sites.

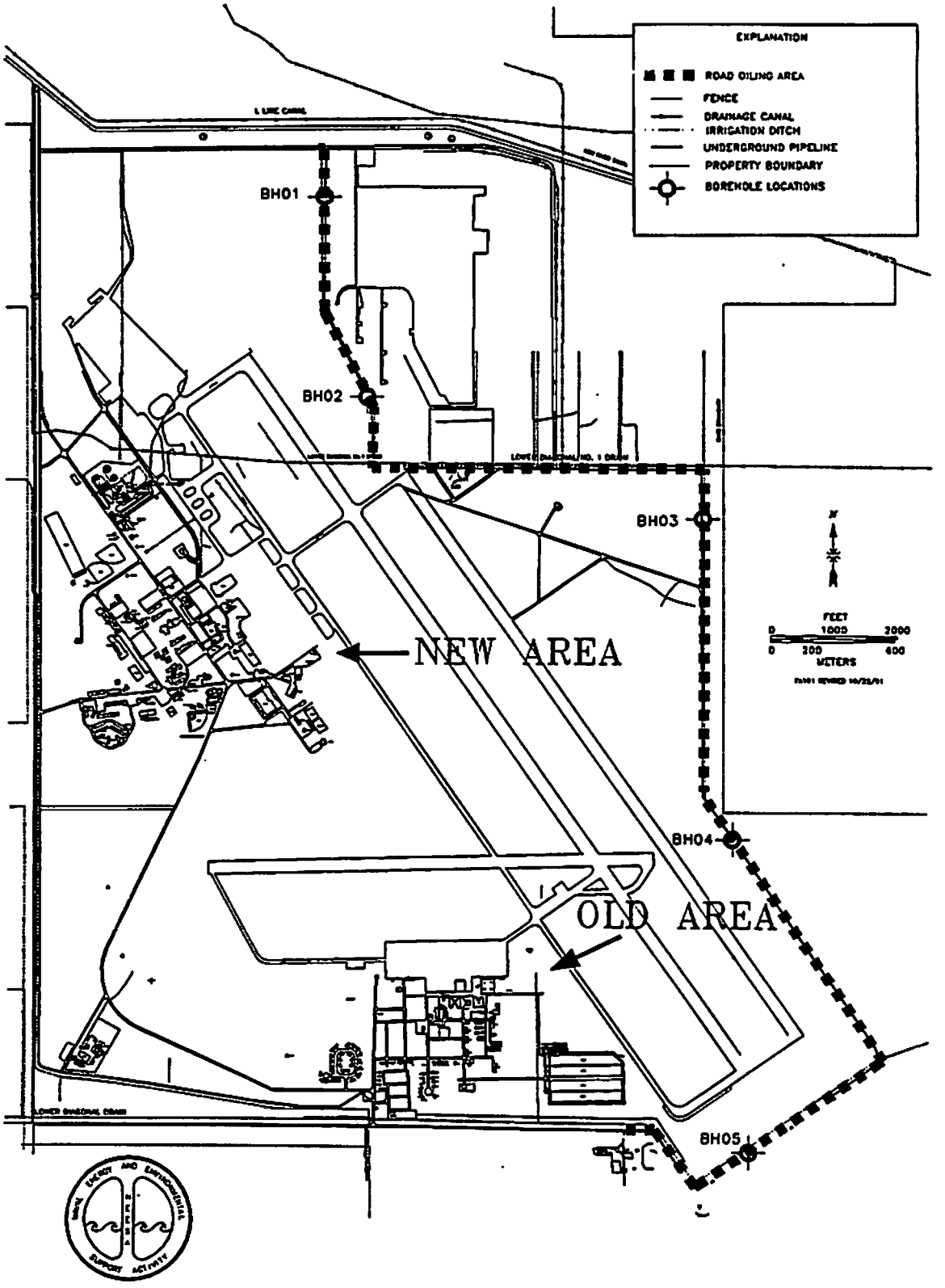

Fig. 3.4.2.ii. Site 24, Road Oiling Area. Soil boring locations.

Table 3.4.2.i. Soil sample results for Site 24 (Road Oiling Area)
Date: 4/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH001	3715	0-2 ft	U	U	TIC 1	5900.0**	Acet	22.0
					TIC 2	140.0**	Methcl	8.0**
					TIC 3	170.0**	TIC 4	1.9
					4 Unknowns	140.0*?		
						840.0		
BH001	3716	8-10 ft	U	U	Bis2	41.0**	Acet	24.0
					TIC 1	5400.0**	Methcl	8.0**
					TIC 5	160.0		
					TIC 2	170.0**		
					TIC 3	200.0**		
					3 Unknowns	180.0*?		
						530.0		
BH002	3717	0-2 ft	U	U	Bis2	58.0**	Acet	8.0*J
					TIC 1	6300.0**	Methcl	4.0**
					TIC 3	200.0**		
					2 Unknowns	300.0*?		
						520.0		
BH002	3718	8-10 ft	U	U	TIC 1	7400.0**	Methcl	11.0**
					TIC 5	440.0		
					TIC 2	180.0**		
					TIC 3	240.0**		
					3 Unknowns	190.0*?		
						600.0		
BH003	3719	0-2 ft	U	U	Bis2	800.0*J	Methcl	5.0**
					TIC 1	5800.0**		
					TIC 3	170.0**		
					5 Unknowns	180.0*?		
						390.0		
BH003	3720	5-7 ft	U	U	Bis2	96.0**	Methcl	13.0**
					TIC 1	6900.0**		
					TIC 3	230.0**		
					2 Unknowns	340.0*?		
						510.0		
BH004	3721	0-2 ft	U	U	Bis2	120.0**	Methcl	4.0**
					TIC 1	5900.0**		
					2 Unknowns	190.0*?		
						520.0		
BH004	3722	0-2 ft	U	U	Bis2	50.0**	Methcl	4.0**
					TIC 1	5300.0**		
					TIC 3	150.0**		
					3 Unknowns	230.0*?		
						430.0		
BH004	3723	5-7 ft	U	U	Bis2	39.0**	Methcl	5.0**
					TIC 1	5500.0**		
					2 Unknowns	180.0*?		
						420.0		

Table 3.4.2.i. (continued)
Date: 4/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH005	3724	0-2 ft	U	U	Bis2 TIC 1 6 Unknowns	50.0** 6200.0** 150.0*? 1000.0	Methcl	5.0**
BH005	3725	5-7 ft	U	U	Bis2 TIC 1 4 Unknowns	62.0** 5700.0** 140.0*? 470.0	Methcl	4.0**

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
*? - some or all unknowns contain unusable data
*J - concentration estimated
Acet - acetone
Bis2 - bis(2-Ethylhexyl) phthalate

HBP - high boiling point
LBP - low boiling point
Methcl - methylene chloride
PHC - petroleum hydrocarbons
QL - quantitation limit
TIC - tentatively identified compound
U - no compounds detected

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanone, 4-hydroxy-4-met
TIC 2 - octane, 3-methyl-
TIC 3 - octane, 4-methyl-
TIC 4 - cyclotetrasiloxane, octameht
TIC 5 - 3-penten-2-one, 4-methyl-

Table 3.4.2.i. (continued)
Date: 4/91

Metals, mg/kg Method 6010 Quantitation limit: 1 mg/kg				
Compound	#	Average	Minimum	Maximum
Aluminum	11	6,339	2,020.00	11,800.00
Antimony	0	ND	ND	ND
Arsenic	11	5	3.00	12.30
Barium	11	87	29.90	213.00
Beryllium	9	0	0.11	0.49
Boron	10	30	7.70	105.00
Cadmium	0	ND	ND	ND
Calcium	11	11,455	1,530.00	40,600.00
Chromium	11	6	2.70	9.30
Cobalt	11	5	2.70	8.40
Copper	11	70	9.40	316.00
Iron	11	11,145	5,060.00	19,200.00
Lead	11	4	0.82	7.80
Lithium	11	15	2.80	39.00
Magnesium	11	3,887	903.00	8,030.00
Manganese	11	246	57.30	777.00
Mercury	5	0	0.03	1.00
Molybdenum	0	ND	ND	ND
Nickel	11	5	2.50	9.70
Potassium	11	1,904	487.00	3,800.00
Selenium	0	ND	ND	ND
Silver	6	1	0.56	1.50
Sodium	11	2,831	271.00	6,940.00
Thallium	1	0	0.30	0.30
Vanadium	11	23	9.70	30.90
Zinc	11	72	25.00	308.00

- number of samples with detectable quantities of analyte
ND - analyte not detected

Direct exposure pathways for contaminated soils at Site 24 include dermal contact, ingestion, and inhalation of dust particles and volatile constituents. Affected biota include indigenous plants and burrowing animals as well as personnel associated with site excavation activities. The hardpacked, gravelly nature of the perimeter road surface is not well suited for plant or animal habitation, and exposures associated with these biota are thus minimized. Because NAS Fallon is a restricted area, direct exposure to the human populace is restricted to naval personnel and subcontractors. Health and safety measures requiring effective environmental monitoring, and environmentally safe construction practices further mitigate exposure to contaminated soils during on-site activities. The compacted road surface, restricted access, and lack of detectable surface soil contamination prevent contaminated soils at Site 24 from constituting a primary exposure pathway.

Direct exposure pathways for groundwater include use of contaminated groundwater extracted from the shallow aquifer and the underlying intermediate aquifer. The groundwater does not appear to have been affected by waste disposal at the site and is not considered a potential pathway. Direct exposures to contaminants through extraction of the shallow groundwater do not exist because the groundwater is not contaminated.

Lack of significant contamination of surface soils and groundwater remove these pathways from consideration at Site 24.

Surface-water runoff resulting from excessive precipitation or human activities may transport contaminated surface sediments or dissolved constituents to the regional surface drainage system. Lack of significant contamination, restricted access and institutional controls again minimize any sensitive surface-water exposures on NAS Fallon property or potential for off-facility migration of contaminants.

3.4.3 Recommendations

Due to the lack of contamination associated with the site, no further investigations are recommended.

3.5 GROUP I SITES: SITE 2, NEW FUEL FARM; SITE 4, TRANSPORTATION YARD

3.5.1 Site History

The Group I Sites contain two adjacent areas of interest: Site 2, the New Fuel Farm, and Site 4, the Transportation Yard. As shown in Fig. 1.3.ii, the Group I Sites are located in the northwestern portion of NAS Fallon in the new area of the activity. A discussion of the history of each of the two sites follows.

3.5.1.i Site 2, New Fuel Farm

Site 2, the New Fuel Farm, was reportedly constructed in 1957 to provide fuel delivery services for NAS Fallon. The New Fuel Farm was used in conjunction with the Old Fuel Farm (Site 16, Fig. 1.3.ii) until 1963 at which time the Old Fuel Farm was taken out of service. As shown in Fig. 3.5.1.i, Lower Diagonal No. 1 Drain borders Site 2 on the north. Site 4, the Transportation Yard, is immediately south of Site 2. The New Fuel Farm's main operations consist of storing and dispensing petroleum fuels routinely used on the facility. Stored fuels include JP-5, avgas, diesel, and mogas. Jet fuel (JP-5) is supplied to the fuel farm via underground pipeline from Sparks, Nevada. Other stored fuels are delivered to the site by truck.

Over the lifetime of operations of the New Fuel Farm, numerous spills, leaks, and disposal/maintenance activities have resulted in introduction of petroleum hydrocarbons to the surface and shallow subsurface environments. Potentially contaminated areas (Fig 3.5.1.i) identified in the Phase I PA/SI Report include the oil/water separator and associated leach field, the tank bottom disposal area, the weed control area, and the vehicle parking area (Dames and Moore 1988).

Investigations at Site 2 were expedited due to regulatory concern over contamination at the site. The results of these investigations are included in the *Preliminary Site Characterization Summary and Engineering Evaluation/Cost Analysis for Site 2, New Fuel Farm; Naval Air Station Fallon, Nevada* (ORNL 1991). The results summarized in section 3.5.2.ii are related to recommendations for additional site characterization.

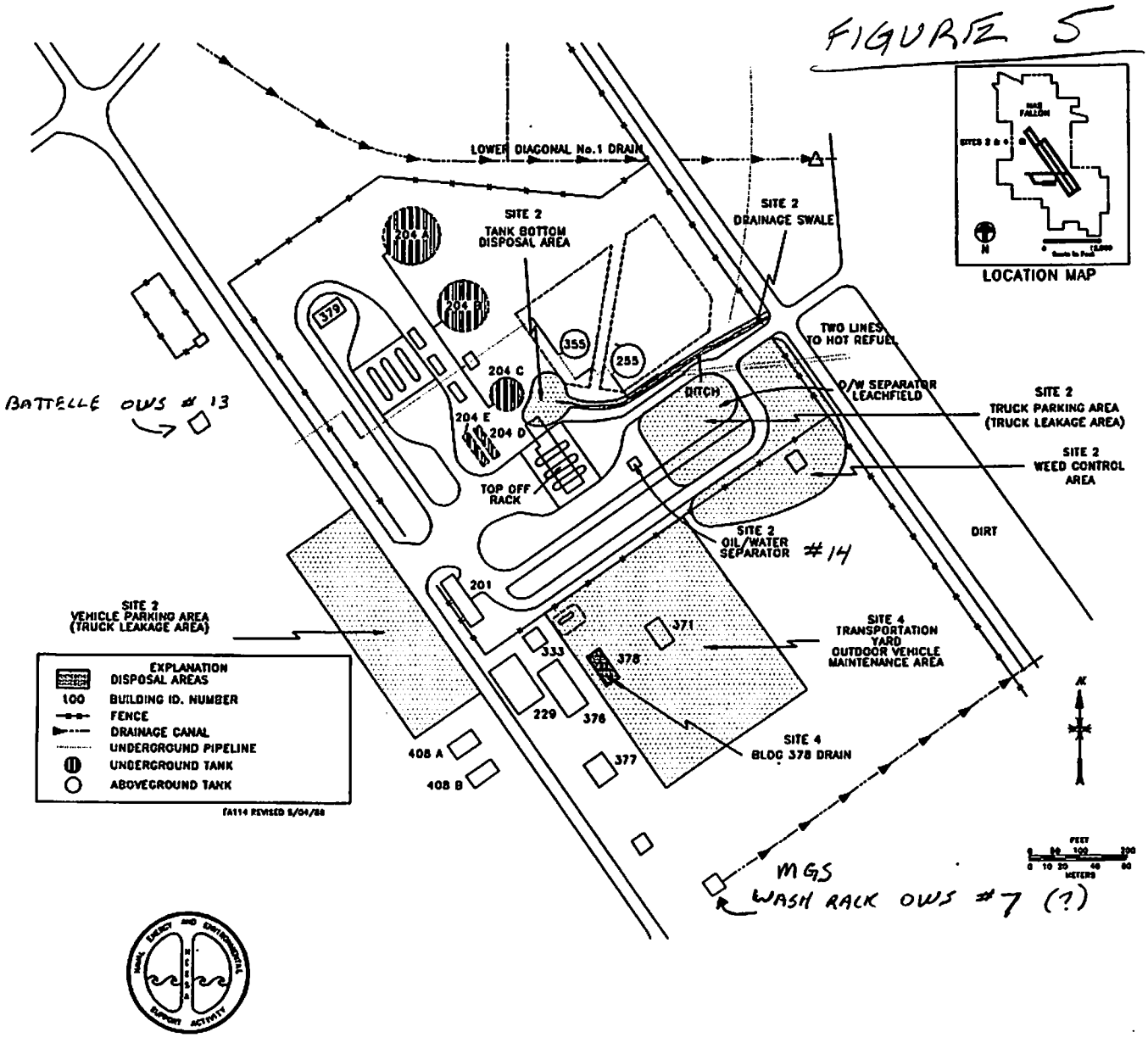

Fig. 3.5.1.i. Group I sites: Site 2, New Fuel Farm; Site 4, Transportation Yard.

3.5.1.ii Site 4, Transportation Yard

Site 4, the Transportation Yard, is located directly south of Site 2, the New Fuel Farm (Fig. 3.5.1.i). The Transportation Yard is believed to have been constructed in 1971 and serves to store and maintain vehicles used by Public Works. The Building 378 floor drain and the outdoor vehicle maintenance yard (Fig. 3.5.1.i) are the areas of concern associated with Site 4.

Building 378 was used from 1976 to 1981 for painting and light overhaul operations. The building has a cement floor and associated floor drain which reportedly was used to flush wastes into the subsoils beneath the building. It is not known if the drain system includes a grease trap. Inspection indicates that no leach field exists. Wastes disposed of through the Building 378 drain included radiator coolants, vehicle fluids, and paint wastes.

The outdoor vehicle maintenance yard surrounds Building 378 (Fig. 3.5.1.i). Spills or leaks of vehicle waste fluids between 1971 and 1986 may have resulted in the contamination of area soils. Potential contaminants include waste oils, hydraulic fluids, transmission and gear oils, gasoline, and diesel fuel.

3.5.2 Investigative Approach, Extent of Contamination, and Exposure Pathways

Phase I investigations recommended Sites 2 and 4 for further study based on known soil and groundwater contamination at Site 2 and sample results for two soil samples taken from a stained surface area at Site 4 (Dames and Moore 1988). Previously installed wells had confirmed groundwater contamination at Site 2, but the extent of contamination was not known.

3.5.2.i Investigative Approach

The investigative approach taken at Site 2 was to delineate the extent of the groundwater plume. The field-screening information combined with the information from the installation and sampling of monitoring wells was sufficient to design an interim

remedial action for free-product recovery; however, concentration gradients in the distal portion of the dissolved-contaminant plume are still in question (ORNL 1991).

The approach taken at Site 4 included drilling groundwater test holes and taking soil samples around Building 378 to determine if contamination existed. Some of the monitoring wells and many of the groundwater test holes drilled to delineate the Site 2 plume also served to assess potential contamination from Site 4.

3.5.2.ii Extent of Contamination

Past activities at the Group I Sites, specifically Site 2, have resulted in public concern and several legal actions against NAS Fallon regarding environmental contamination issues. Numerous environmental investigations have been initiated to address these issues. Results from these investigations are presented in the report cited above which presents an interim plan for removing floating product at Site 2 (ORNL 1991). The dissolved portion of this plume extends into the Transportation Yard; however, no significant contamination was found associated with activities at Site 4. The results of the investigations are summarized below.

After discovery of free product at the site in 1986, ERM-West was hired to investigate the extent of contamination (ORNL 1991). Recovery wells were installed, and in 1987 recovery of free product from these wells was initiated. By June 1987, fourteen wells were in place and thirteen of these wells contained from 5.08 cm (2 in.) to 43.18 cm (17 in.) of free product (Dames and Moore 1988). The product recovery effort was discontinued when Phase II of the facility-wide IR Program began in September, 1988. The rationale for discontinuing recovery was that the recovery was working very poorly due to improper well design. More effective remediation would be implemented as an interim protective measure through the IR Program (ORNL 1991).

Additional NDEP actions occurred in March 1989 when the NDEP notified NAS Fallon of an apparent malfunction of the oil/water separator. The notice resulted in discontinuing the use of the oil/water separator (ORNL 1991). In February 1990 another NDEP action involved the investigation of an alleged fuel spill in January/February 1988 (ORNL 1991). The investigation concluded that a release of JP-5 jet fuel did occur on February 22, 1988, and recommended further investigation into the scope of subsurface contamination (NDEP 1990).

The Phase I PA/SI initiated shallow soil-sampling efforts to address contamination of the tank bottom disposal area, the vehicle parking area and the outdoor vehicle maintenance area (Dames and Moore 1988). Soil samples were submitted for laboratory analysis of TPH by EPA method 418.1. Results indicate significant petroleum hydrocarbon contamination (260 ppm and 4200 ppm) in the tank bottom disposal area, minimal contamination (< 54 ppm) in the vehicle parking area, and significant but rapidly attenuating contamination (17,000 ppm and 40 ppm) in the outdoor vehicle maintenance area (Dames and Moore 1988).

Phase II field screening activities completed at the Group I Sites include a geophysical survey, a soil-gas survey, and field screening of ninety-seven shallow boreholes (Appendices A and B). Table 3.5.2.i summarizes the environmental sampling completed at Site 2. The type of sample and party responsible for each sample are also listed. Soil-gas results are shown in Fig. 3.5.2.i. Because soil-gas results were inconclusive (ORNL 1991), the groundwater test hole technique was developed (Fig. 3.5.2.ii). Field screening results were used to determine locations for fifteen groundwater monitoring wells (Appendix B). Laboratory analysis of groundwater samples and soil samples taken from the monitoring wells have provided quantitative information concerning the magnitude and extent of the contamination underlying the area. Phase II site-characterization results have facilitated preparation of the Preliminary Site Characterization Summary, Engineering Evaluation/Cost Analysis (EE/CA) which addresses the design of a free-product removal system for Site 2 (ORNL 1991). As Phase II work progresses, remediation achieved through interim free-product removal will be incorporated into the facility-wide feasibility study. The results from Phase II field screening and site-characterization activities at Site 2 are included in the PSCS EE/CA.

As shown in Fig. 3.5.2.ii, five areas of floating product contamination have been delineated: 1) the area east of underground tank 204-1, 2) the area between the pumping station and the fuel farm, 3) the area near a former sump used for collecting fuel from leaking tanker trucks at the fuel farm, 4) the oil/water separator and associated leach field area, and 5) the area just north of the top-off rack. Areas 2, 4, and 5 may actually be connected, but the testing required to make this determination was blocked by cultural features such as underground piping, utilities, tanks, and paved areas.

Table 3.5.2.i Group I Sites: Site 2, New Fuel Farm; Site 4, Transportation Yard. Summary of environmental sampling

ENVIRONMENTAL SAMPLING SUMMARY		
Responsible Party	**Assessment Method**	**Number of Sample Locations**
ORNL/GJ	Soil gas	140
	Soil borings	4
	Groundwater test holes	97
	Groundwater wells	15
	Piezometers	7
	Staff gauges	4
ERM-West	Soil gas	85
	Soil borings	5
	Groundwater wells	8

Note: Multiple samples often collected at each sample location.

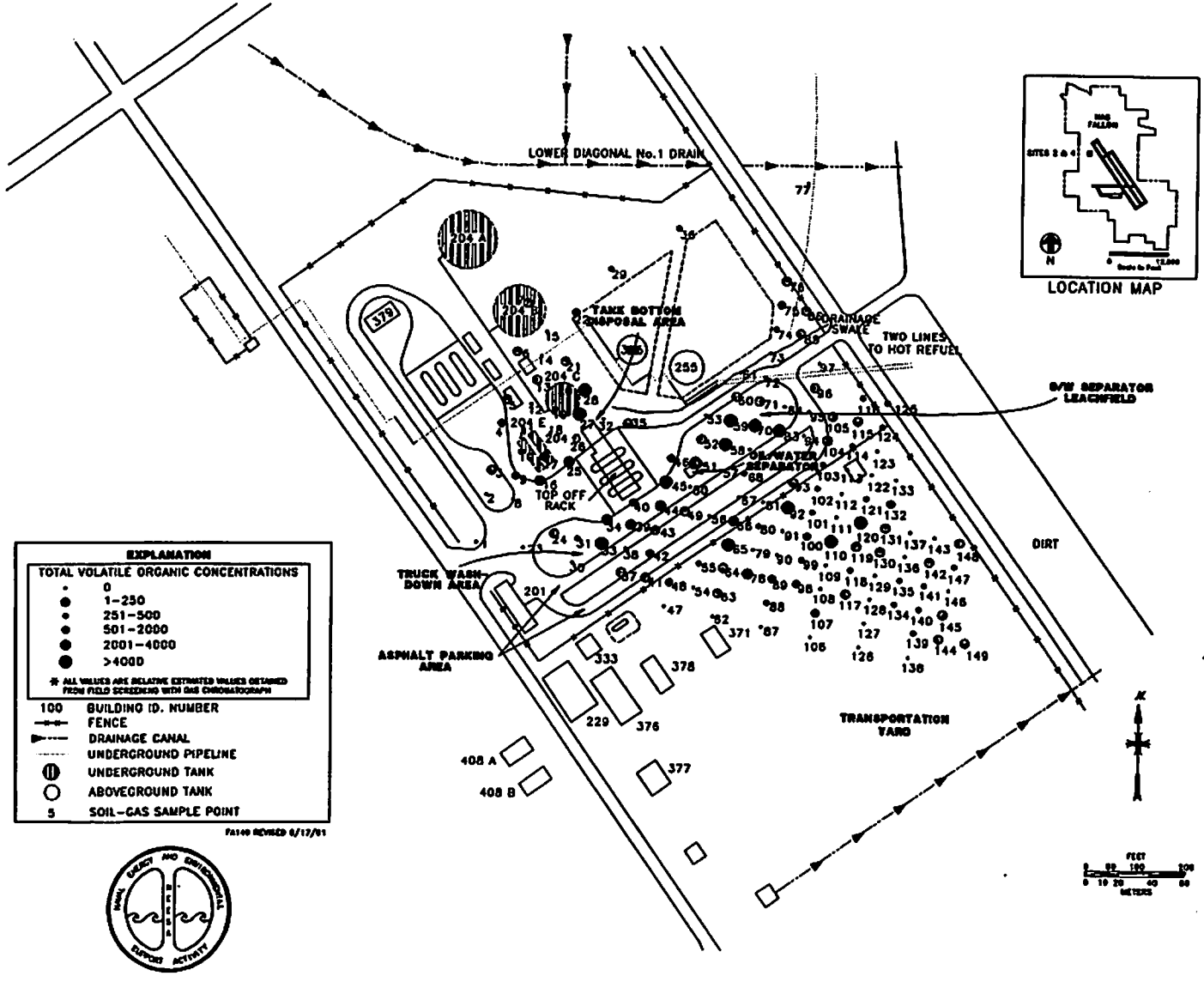

Fig. 3.5.2.i. Group I sites: Site 2, New Fuel Farm; Site 4, Transportation Yard. Soil-gas total volatile organic concentrations.

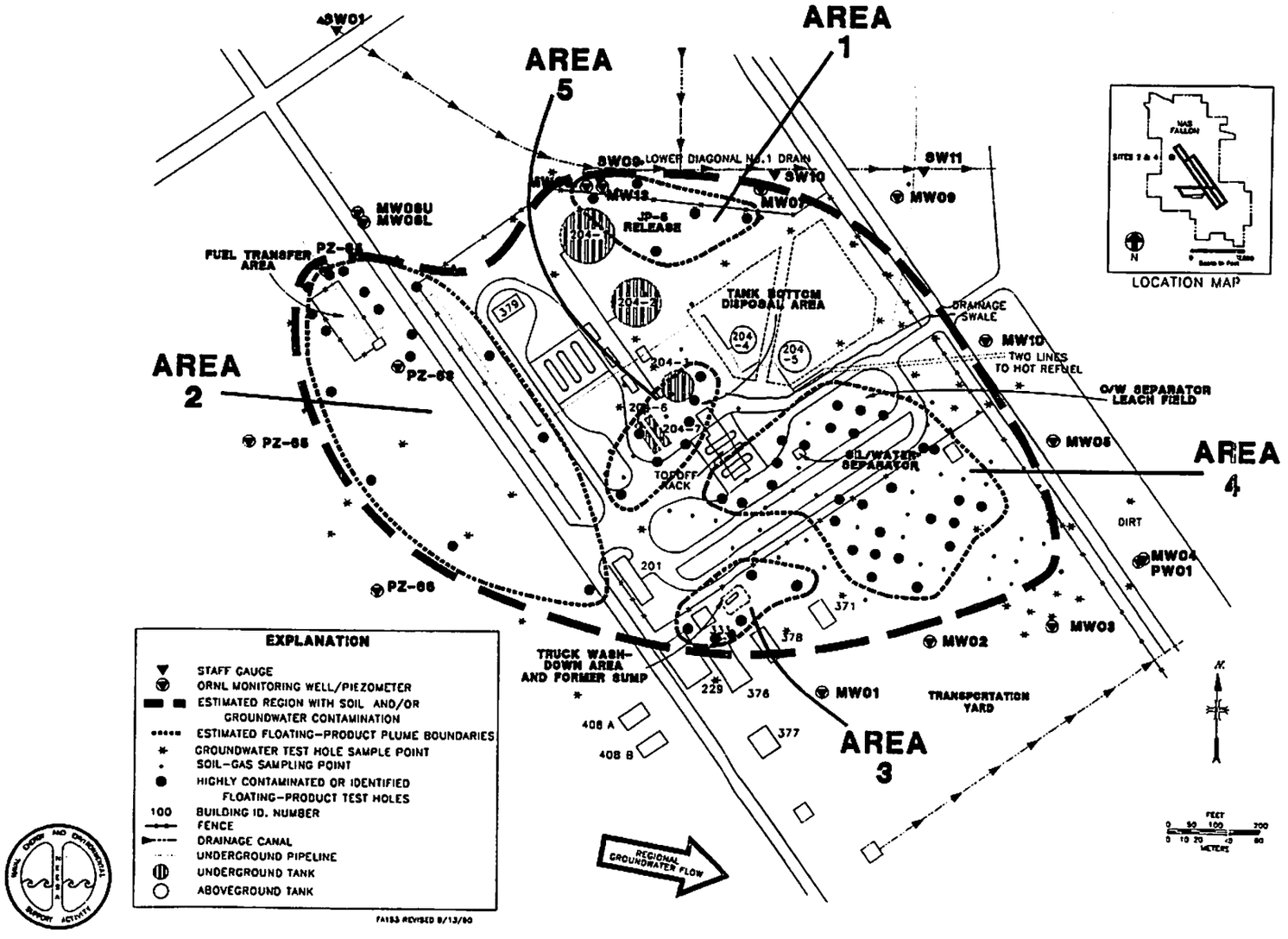

Fig. 3.5.2.ii. Group I sites: Site 2, New Fuel Farm; Site 4, Transportation Yard. Groundwater test hole locations.

Phase II site-characterization work also included installing fifteen 5-cm-(2-in.)diameter monitoring wells and one 13-cm-(5-in.)diameter pumping well in and around the Group I Sites (Fig. 3.5.2.iii). Most of the wells were installed to confirm the limits of the dissolved product plume as defined by the groundwater test holes. Monitoring wells MW06U & L were installed as dual completion, "clean", upgradient wells. Wells MW07 (single completion), MW08U & L (dual completion), and MW09 (single completion) were installed between the fuel farm and the Lower Diagonal No. 1 Drain. MW08U failed to recharge after purging and was replaced with MW13. The remaining six wells were installed downgradient along the southern and eastern site boundaries. MW03U & L and MW05U & L are dual completions and the other four wells are single completions. The 13-cm-(5-in.)diameter pumping well, PW01, was installed as an offset to MW04. The pumping well was used to determine hydrological parameters for the underlying aquifer (Appendix D).

Well placement resulted in collecting both soil samples and two rounds of groundwater samples. Soil samples were taken continuously with a split spoon or a California sampler during well installation. Sampling methodologies are described in the Phase II Remedial Investigation/Feasibility Study Work Plan (ORNL 1989). Additional sampling activities (Appendix E) consisted of taking several surface-soil samples, as well as surface-water and sediment samples from the Lower Diagonal No.1 Drain (Fig. 3.5.2.iii). Groundwater samples from four existing wells installed during the ERM-West investigation were also taken (Fig. 3.5.2.iii). Groundwater and soil sampling results are given in Tables 3.5.2.ii and iii.

Analytical data for soil samples collected from borings in the weed control area, SF001, SF002, and SF003, all contained low concentrations of the pesticide DDT and its derivatives. This compound was used extensively by the military during the 40's, 50's and 60's and due to an extremely long environmental half-life is common in some areas. No record of its use at this location is presented in the PA/SI, however, it is not present at high concentrations and has a low environmental mobility, thus, it is not considered a significant environmental threat.

The groundwater metals and anion analyses indicate naturally high total dissolved solids (TDS) occurring in the upper aquifer of the region. These dissolved solids have rendered the groundwater in parts of the Carson Desert unfit for domestic use

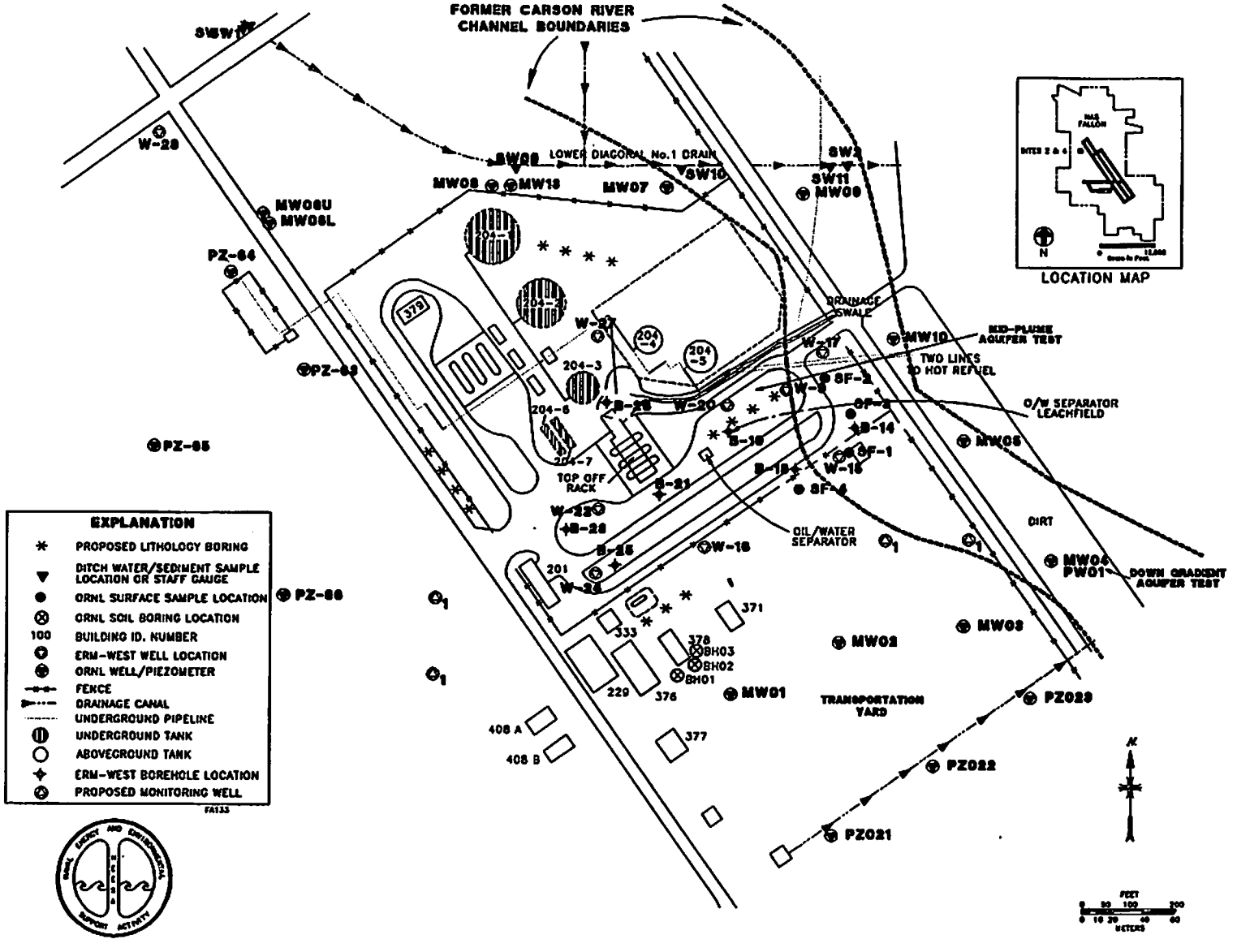

Fig. 3.5.2.iii. Group I sites: Site 2, New Fuel Farm; Site 4, Transportation Yard. ORNL wells, piezometers, soil-sample, surface-water-sample, and sediment-sample locations.

Table 3.5.2.ii. Water sample results for Group I Sites

Location	Sample Number	Date	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	Total PHC Method 418.1 mg/L QL: 1 mg/L	Semivolatiles Method 625, ug/L QL: 10 ug/L		Volatiles Method 624, ug/L QL: 5 ug/L	
W016	3473	07/15/90	NP	NP	U	Bis2	120.0	U	
W016	3516	10/31/90	U	U	NP	NP		Methcl	1.0
W017	3471	07/15/90	NP	NP	U	TIC 1 TIC 2 TIC 3 2 Unknowns	11.0 15.0 16.0 8.2 12.0	Acet	2.0
W017	3471R	07/15/90	NP	NP	NP	TIC 4 TIC 5	11.0** 11.0**	NP	
W017	3517	10/31/90	U	U	NP	NP		U	
W022	3474	07/15/90	NP	NP	U	Bis2 TIC 6 1 Unknown	36.0 8.0 24.0	Methcl	3.0**
W022	3475	07/15/90	NP	NP	U	Bis2 TIC 5 1 Unknown	30.0** 14.0 48.0	Methcl	1.0**
W022	3515	10/30/90	U	U	NP	NP		Carbdi	1.0
W027	3476	07/15/90	NP	NP	U	Bis2 TIC 5	39.0 17.0	Acet Methcl	1.0 1.0**
W027	3477	07/15/90	NP	NP	U	Bis2 TIC 5	19.0** 33.0	Methcl	1.0**
W027	3533	11/02/90	U	U	NP	NP		U	
W027	8453	02/14/91	U	U	NP	NP		NP	
MW001	3463	07/13/90	NP	NP	U	TIC 1 TIC 9 TIC 3 2 Unknowns	16.0 73.0 140.0 10.0 11.0	Acet	2.0
MW001	3532	11/02/90	U	U	NP	NP		U	
MW002	3464	07/13/90	NP	NP	U	TIC 1 TIC 9 TIC 3 1 Unknown	11.0 42.0 27.0 14.0	Acet	4.0
MW002	3526	11/01/90	U	U	NP	NP		Methcl	1.0
MW003L	3466	07/13/90	NP	NP	U	1 Unknown	15.0	U	
MW003L	3530	11/02/90	U	140.0	NP	NP		U	
MW003U	3470	07/14/90	NP	NP	U	1 Unknown	24.0	U	
MW003U	3531	11/02/90	U	U	NP	NP		U	

Table 3.5.2.ii. (continued)

Location	Sample Number	Date	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	Total PHC Method 418.1 mg/L QL: 1 mg/L	Semivolatiles Method 625, ug/L QL: 10 ug/L	Volatiles Method 624, ug/L QL: 5 ug/L
MW003U	3564	11/05/90	U	U	NP	NP	U
MW003U	8450	02/14/91	JP5 50.0	U	NP	NP	NP
MW004	3454	07/11/90	NP	NP	U	U	U
MW004	3538	11/03/90	U	U	NP	NP	U
MW004	3565	11/05/90	U	U	NP	NP	U
MW004	8452	02/14/91	U	U	NP	NP	NP
MW005L	3456	07/12/90	NP	NP	U	U	Acet 1.0
MW005L	3536	11/03/90	U	84.0 T 1.0 X 6.0	NP	NP	U
MW005U	3459	07/12/90	NP	NP	U	Bis2 2.0** TIC 10 20.0 TIC 11 12.0	U
MW005U	3537	11/03/90	U	U	NP	NP	Methcl 3.0
MW006L	3461	07/13/90	NP	NP	U	Bis2 19.0** TIC 12 71.0 1 Unknown 13.0	U
MW006L	3544	11/04/90	U	U	NP	NP	Methcl 4.0
MW006U	3465	07/13/90	NP	NP	U	TIC 3 14.0 TIC 13 9.5 2 Unknowns 8.6 86.0	U
MW006U	3542	11/04/90	U	U	NP	NP	Methcl 2.0
MW006U	3543	11/04/90	U	U	NP	NP	Methcl 4.0
MW006U	8451	02/14/91	U	U	NP	NP	NP
MW007	3478	07/15/90	NP	NP	U	Bis2 70.0 3 Unknowns 8.0 9.3	U
MW007	3507	07/26/90	NP	NP	3	NP	NP
MW007	3523	11/01/90	U	U	NP	NP	U
MW007	3524	11/01/90	U	U	NP	NP	U
MW008L	3480	07/16/90	NP	NP	U	TIC 14 12.0 TIC 15 36.0 TIC 16 26.0 TIC 17 170.0 1 Unknown 16.0	U
MW008L	3480R	07/16/90	NP	NP	NP	TIC 18 10.0 TIC 14 12.0 TIC 15 30.0 TIC 16 14.0 TIC 17 140.0 2 Unknowns 12.0 28.0	NP

Table 3.5.2.ii. (continued)

Location	Sample Number	Date	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	Total PHC Method 418.1 mg/L QL: 1 mg/L	Semivolatiles Method 625, ug/L QL: 10 ug/L		Volatiles Method 624, ug/L QL: 5 ug/L	
MW008L	3521	11/01/90	U	U	NP	NP		U	
MW009	3460	07/12/90	NP	NP	U	TIC 19	12.0	Acet	4.0
MW009	3535	11/02/90	U	U	NP	NP		U	
MW010	3457	07/12/90	NP	NP	2	Bis2	63.0**	U	
MW010	3541	11/04/90	U	U	NP	NP		Methcl	2.0
MW013	3508	07/26/90	NP	NP	U	TIC 3 1 Unknown	8.9 9.1	TIC 20 TIC 21 TIC 22 TIC 23 TIC 24 TIC 25 TIC 26 3 Unknowns	5.2 9.6 13.0 17.0 8.1 20.0 7.5 5.3 15.0
MW013	3522	11/01/90	U	110.0 B 0.9	NP	NP		E X TIC 21 TIC 22 TIC 27	3.0 2.0 5.6 4.4 5.2

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 50 ug/L
*2 - Method 8015/8020, quantitation limit: 50 ug/L
Acet - acetone
B - benzene
Bis2 - bis(2-Ethylhexyl) phthalate
Bro - bromoform
Carbdi - carbon disulfide
Dibro - dibromochloromethane
E - ethylbenzene
HBP - high boiling point
JP5 - HBP PHC as compared to JP-5 jet fuel
LBP - low boiling point
Methcl - methylene chloride
NP - analysis not performed
PHC - petroleum hydrocarbons
QL - quantitation limit
T - toluene
TIC - tentatively identified compound
U - no compounds detected
X - xylenes (total)

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-hexenal
TIC 2 - butane, 1-(2-methoxyethoxy)-
TIC 3 - cyclohexanol, 2-bromo-
TIC 4 - 1,2-benzenedicarboxylic acid
TIC 5 - 2-pentanone, 4-hydroxy-4-met
TIC 6 - hexadecanoic acid
TIC 7 - 1,3-cyclopentanedione
TIC 8 - cyclohexanol, 2-chloro-
TIC 9 - cyclohexanol, 1-bromo-2-chlor
TIC 10 - 2-pentanone rt=3.43
TIC 11 - caprolactam rt=11.12
TIC 12 - sulfur, mol. (s8)
TIC 13 - ethanol, 2-(2-butoxyethoxy)-
TIC 14 - 7-oxabicyclo
TIC 15 - cyclohexane
TIC 16 - ethanol
TIC 17 - furan
TIC 18 - 2-pentanone
TIC 19 - 2-pentanone rt=3.42
TIC 20 - benzene, 1,2,4-trimethyl-
TIC 21 - benzene, 1-ethyl-2-methyl-
TIC 22 - cyclohexane (dot)
TIC 23 - cyclohexane, methyl-
TIC 24 - cyclopentane, 1,2-dimethyl-
TIC 25 - cyclopentane, 1-(ethenloxy)-2-
TIC 26 - propane
TIC 27 - cyclopentane, methyl-

Table 3.5.2.ii. (continued)

Anions, mg/L Method 429 Quantitation limit: 0.5 mg/L				
Compound	#	Average	Minimum	Maximum
Chloride	20	916	7.20	2,400.00
Fluoride	4	2	0.61	3.60
Nitrate, as N	5	11	4.60	18.00
Phosphate	0	ND	ND	ND
Sulfate	20	1,514	2.60	3,900.00

Includes samples from 7/90 and 11/90.

Metals, ug/L Method 200.7 Quantitation limit: 1 ug/L				
Compound	#	Average	Minimum	Maximum
Aluminum	13	181	41.70	1,460.00
Antimony	1	38	38.20	38.20
*Arsenic	37	1,290	15.30	4,660.00
Barium	37	58	13.60	139.00
*Beryllium	2	1	1.20	1.40
Boron	43	30,322	1,050.00	91,700.00
Cadmium	0	ND	ND	ND
Calcium	22	43,147	1,880.00	205,000.00
Chromium	0	ND	ND	ND
Cobalt	0	ND	ND	ND
*Copper	18	31	10.60	77.20
Iron	20	142	26.00	1,420.00
Lead	9	3	2.00	5.50
Lithium	43	81	27.90	153.00
Magnesium	22	17,254	971.00	59,300.00
Manganese	20	374	2.20	2,050.00
Mercury	1	0	0.21	0.21
Molybdenum	19	430	30.10	1,310.00
Nickel	0	ND	ND	ND
Potassium	22	37,317	5,630.00	130,000.00
Selenium	3	26	21.50	30.70
Silver	5	7	5.00	9.00
Sodium	25	2,552,800	131,000.00	8,790,000.00
Thallium	0	ND	ND	ND
Vanadium	30	277	16.70	1,230.00
*Zinc	28	57	7.30	338.00

\# - number of samples with detectable quantities of analyte
* - some or all results contain unusable data
ND - analyte not detected
Includes samples from 7/90 and 11/90.

Table 3.5.2.iii. Soil sample results for Group I Sites

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Total PHC Method 418.1 mg/kg QL: 1 mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg	Volatiles Method 8240, ug/kg QL: 5 ug/kg
BH001 Bldg. 378 3/91	3688	0-2 ft	U	U	NP	NP	Bis2 330.0*J TIC 1 230.0 TIC 2 11000.0** TIC 3 190.0 TIC 4 610.0** TIC 5 370.0 TIC 6 16000.0 2 Unknowns 260.0*? 270.0	Methcl 6.0**
BH001 Bldg. 378 3/91	3689	5.5-7.5 ft	U	U	NP	NP	Bis2 260.0** TIC 2 13000.0** TIC 4 600.0** TIC 5 570.0 TIC 6 11000.0 2 Unknowns 190.0*? 230.0	Methcl 10.0
BH001 Bldg. 378 3/91	3690	5.5-7.5 ft	U	U	NP	NP	TIC 2 1200.0** TIC 6 1500.0	Methcl 8.0**
BH001 Bldg. 378 3/91	3690R	5.5-7.5 ft	NP	NP	NP	NP	Bis2 130.0** TIC 1 210.0 TIC 2 16000.0** TIC 3 240.0 TIC 7 210.0** TIC 4 1000.0 TIC 5 510.0 6 Unknowns 180.0*? 1400.0	NP
BH002 Bldg. 378 3/91	3691	0-2 ft	U	U	NP	NP	Bis2 150.0** TIC 1 230.0 TIC 2 9700.0** TIC 7 440.0** TIC 4 1100.0 TIC 5 290.0 TIC 6 7600.0 14 Unknowns 160.0*? 420.0	Methcl 4.0**
BH002 Bldg. 378 3/91	3692	5.5-7.5 ft	U	U	NP	NP	Bis2 100.0** TIC 1 200.0 TIC 2 10000.0** TIC 7 250.0** TIC 4 460.0** TIC 5 430.0 3 Unknowns 250.0*? 300.0	Methcl 13.0

Table 3.5.2.iii. (continued)

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Total PHC Method 418.1 mg/kg QL: 1 mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH003 Bldg. 378 3/91	3693	0-2 ft	U	U	NP	NP	Bis2 TIC 2 TIC 3 TIC 7 TIC 4 TIC 5 TIC 6 14 Unknowns	110.0** 9800.0** 640.0 330.0** 1500.0 350.0 11000.0 320.0*? 730.0	Methcl	12.0
BH003 Bldg. 378 3/91	3694	5.5-7.5 ft	U	U	NP	NP	Bis2 TIC 2 TIC 7 TIC 4 TIC 5 TIC 6 TIC 8 1 Unknown	79.0** 13000.0** 330.0** 480.0** 350.0 17000.0 170.0 290.0*?	Methcl	7.0**
MW002 6/90	3436	6.5'-7'	NP	NP	U	NP	Bis2 TIC 9 TIC 10 TIC 11 TIC 12 1 Unknown	430.0 630.0 33000.0** 4300.0** 170.0 580.0*?	Acet Methcl	10.0** 8.0
MW004 6/90	3439	8.5'-9'	NP	NP	U	NP	Bis2 TIC 13 TIC 14 TIC 15 TIC 16 TIC 17 TIC 18 TIC 19 5 Unknowns	1600.0 940.0 46000.0** 5400.0** 200.0** 160.0** 450.0** 370.0 160.0*? 200.0	Acet Methcl T	6.0 4.0** 1.0
MW005 6/90	3443	6.5'-7'	NP	NP	U	NP	Bis2 TIC 13 TIC 20 TIC 15 TIC 17 TIC 19 3 Unknowns	3900.0 820.0** 36000.0** 4500.0** 370.0** 250.0 200.0 660.0	Acet Methcl T	8.0 6.0** 4.0
MW005 6/90	3444	8.5'-9'	NP	NP	U	NP	Bis2 TIC 20 TIC 21 TIC 22 TIC 23 1 Unknown	800.0 40000.0** 180.0 4800.0** 350.0** 220.0	Methcl T	5.0** 3.0

Table 3.5.2.iii. (continued)

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Total PHC Method 418.1 mg/kg QL: 1 mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg	Volatiles Method 8240, ug/kg QL: 5 ug/kg
MW006 6/90	3447	6.5'-7'	NP	NP	13	NP	Bis2 190.0** TIC 13 370.0** TIC 24 290.0** TIC 25 33000.0** TIC 26 3900.0** TIC 18 290.0**	Methcl 15.0 TIC 27 3.5
MW008 6/90	3450	6.5'-7'	NP	NP	16	NP	Bis2 2100.0 TIC 28 290.0** TIC 29 250.0** TIC 30 40000.0** TIC 26 4500.0** TIC 17 210.0** TIC 18 380.0** 1 Unknown 290.0	Acet 2.0** Methcl 32.0 TIC 27 4.7
MW009 6/90	3451	6.5'-7'	NP	NP	U	NP	Bis2 1100.0** TIC 13 630.0** TIC 14 36000.0 TIC 26 4000.0** TIC 15 160.0 TIC 18 280.0** 1 Unknown 240.0	Acet 1.0** Methcl 19.0 TIC 27 4.5
SD001 6/90	3154	0-1 ft	NP	NP	7	U	Bis2 1200.0 TIC 31 1800.0 TIC 14 68000.0** TIC 32 5700.0** TIC 33 2400.0 5 Unknowns 640.0 3600.0	Acet 31.0 Methcl 10.0**
SD002 9/89	3158	0-1 ft	NP	NP	11	U	Bis2 2800.0 TIC 31 2600.0** TIC 14 120000.0 TIC 32 8300.0** TIC 33 4600.0 TIC 33 4600.0 3 Unknowns 1100.0 6000.0	Acet 57.0 Methcl 14.0** 1 Unknown 21.0
SF001 Weed Area 9/89	3175	0-2 ft	NP	NP	40	4,4DDE 24.0 4,4DDT 10.0	Bis2 300.0** TIC 31 760.0 TIC 14 32000.0** TIC 34 380.0 TIC 35 600.0 TIC 15 840.0** TIC 36 680.0 1 Unknown 2700.0	NP

Table 3.5.2.iii. (continued)

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Total PHC Method 418.1 mg/kg QL: 1 mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg	Volatiles Method 8240, ug/kg QL: 5 ug/kg
SF001 Weed Area 9/89	3176	2-4 ft	NP	NP	15	U	Bis2 460.0** TIC 37 1600.0** TIC 38 24000.0** TIC 39 140.0** TIC 15 370.0** TIC 36 750.0 TIC 5 190.0 TIC 40 49.0 3 Unknowns 170.0*? 2700.0	NP
SF002 Weed Area 9/89	3177	0-2 ft	NP	NP	140	4,4DDD 31.0 4,4DDE 22.0 4,4DDT 170.0	Bis2 330.0** TIC 37 1100.0** TIC 14 65000.0** 1 Unknown 3400.0	NP
SF002 Weed Area 9/89	3177D	0-2 ft	NP	NP	NP	4,4DDD 34.0 4,4DDE 23.0 4,4DDT 160.0	NP	NP
SF002 Weed Area 9/89	3178	2-4 ft	NP	NP	2	U	Bis2 300.0** TIC 1 190.0 TIC 37 760.0** TIC 14 18000.0** TIC 35 200.0** TIC 15 380.0** TIC 36 1500.0 TIC 5 200.0 TIC 40 49.0 3 Unknowns 260.0*? 1700.0	NP
SF003 Weed Area 9/89	3179	0-2 ft	NP	NP	43	4,4DDD 7.8 4,4DDE 29.0 4,4DDT 37.0	Bis2 330.0** TIC 13 680.0 TIC 14 34000.0** TIC 35 570.0 TIC 15 880.0** 1 Unknown 2200.0	NP
SF003 Weed Area 9/89	3180	2-4 ft	NP	NP	U	U	Bis2 290.0** TIC 41 150.0 TIC 1 190.0 TIC 37 1500.0** TIC 14 19000.0** TIC 15 270.0** TIC 36 1600.0 3 Unknowns 280.0*? 2300.0	NP

Table 3.5.2.iii. (continued)

Location Date	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Total PHC Method 418.1 mg/kg QL: 1 mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg
SF004 Weed Area 9/89	3181	0-2 ft	NP	NP	4	U	Bis2 TIC 13 TIC 37 TIC 14 TIC 35 TIC 15 TIC 36 TIC 19 1 Unknown	360.0** 850.0 910.0** 56000.0** 370.0 1400.0** 300.0 3200.0 3200.0	NP
SF004 Weed Area 9/89	3182	2-4 ft	NP	NP	U	U	Bis2 TIC 37 TIC 14 TIC 15 TIC 42 TIC 43 TIC 19 TIC 6 TIC 40 3 Unknowns	460.0** 1200.0** 21000.0** 620.0** 1000.0 180.0 350.0 690.0 58.0 250.0*? 1800.0	NP
SF004 Weed Area 9/89	3183	2-4 ft	NP	NP	U	U	Bis2 TIC 13 TIC 44 TIC 45 TIC 37 TIC 14 TIC 34 TIC 15 TIC 46 TIC 36 4 Unknowns	380.0** 880.0 230.0 470.0 630.0** 33000.0** 500.0 1700.0** 370.0** 170.0 180.0 2600.0	NP

Table 3.5.2.iii. (continued)
Date: 7/90

Metals, mg/kg Method 6010 Quantitation limit: 1 mg/kg				
Compound	#	Average	Minimum	Maximum
Aluminum	7	10,617	3,960.00	19,400.00
Antimony	0	ND	ND	ND
Arsenic	7	16	4.70	40.00
Barium	7	111	55.50	226.00
Beryllium	7	0	0.22	0.82
Boron	7	34	9.40	62.40
Cadmium	0	ND	ND	ND
Calcium	7	8,877	3,200.00	13,700.00
Chromium	7	9	3.90	13.80
Cobalt	7	7	2.40	13.60
Copper	7	114	30.80	285.00
Iron	7	16,710	7,020.00	27,700.00
Lead	7	11	5.20	23.10
Lithium	7	17	8.10	29.00
Magnesium	7	5,286	2,510.00	8,840.00
Manganese	7	462	149.00	1,560.00
Mercury	5	0	0.03	0.07
Molybdenum	1	3	3.00	3.00
Nickel	7	8	3.30	14.50
Potassium	7	2,664	1,080.00	4,270.00
Selenium	0	ND	ND	ND
Silver	0	ND	ND	ND
Sodium	7	5,456	1,020.00	11,100.00
Thallium	1	0	0.30	0.30
Vanadium	7	35	15.10	55.10
Zinc	7	184	46.20	382.00

\# - number of samples with detectable quantities of analyte
ND - analyte not detected

Table 3.5.2.iii. (continued)

**	- unusable data due to method blank contamination	Bis2	- bis(2-Ethylhexyl) phthalate
*1	- Method 8015 Modified, quantitation limit: 10 mg/kg	HBP	- high boiling point
*2	- Method 8015/8020, quantitation limit: 5 mg/kg	LBP	- low boiling point
*3	- Method 3550/8080, quantitation limit: 8.3 ug/kg	Methcl	- methylene chloride
*?	- some or all unknowns contain unusable data	NP	- analysis not performed
*J	- concentration estimated	PHC	- petroleum hydrocarbons
4,4DDD	- 1,1'(2,2dichloroethylidene) bis(4-chlorobenzene)	QL	- quantitation limit
4,4DDE	- 1,1'(dichloroethenylidene) bis(4-chlorobenzene)	T	- toluene
4,4DDT	- 1,1(2,2,2trichloroethylidene) bis(4-chlorobenzene)	TIC	- tentatively identified compound
Acet	- acetone	U	- no compounds detected
NOTE	- concentrations are estimated for TICs and unknowns	TIC 24	- 2-pentanone rt=3.07
TIC 1	- 2,5-hexanedione	TIC 25	- 2-pentanone rt=3.73
TIC 2	- 2-pentanone, 4-hydroxy-4-met	TIC 26	- 3-hexen-2-one
TIC 3	- 3-heptanone, 2,4-dimethyl-	TIC 27	- trichlorofluoromethane
TIC 4	- 5-hexen-2-one, 5-methyl-	TIC 28	- 2(5h)-furanone rt=5.77
TIC 5	- hexadecanoic acid	TIC 29	- 2(5h)-furanone rt=5.97
TIC 6	- hexanedioic acid, dioctyl es	TIC 30	- 2-pentanone rt=3.78
TIC 7	- 3-penten-2-one, 4-methyl-	TIC 31	- 2-heptanol
TIC 8	- octadecanoic acid	TIC 32	- acetic acid
TIC 9	- 2(5h)-furanone rt=6.92	TIC 33	- hexene-2-one
TIC 10	- 2-pentanone rt=4.92	TIC 34	- 2-propanone
TIC 11	- 3-penten-2-one rt=3.77	TIC 35	- 3-heptanone
TIC 12	- 4-penten-2-one rt=2.70	TIC 36	- 5-hexen-2-one
TIC 13	- 2(5h)-furanone	TIC 37	- 2-hexanone
TIC 14	- 2-pentanone	TIC 38	- 2-pentanone (1)
TIC 15	- 3-penten-2-one	TIC 39	- 2-pentanone (2)
TIC 16	- 3-penten-2-one rt=2.42	TIC 40	- n-nitrosodiphenylamine (1)
TIC 17	- 4-penten-2-one	TIC 41	- 1-heptanol
TIC 18	- formamide	TIC 42	- 5-hexen-2-one (1)
TIC 19	- hexanedioic acid	TIC 43	- 5-hexen-2-one (2)
TIC 20	- 2-pentanone, 4-hydroxy-	TIC 44	- 2-butanone
TIC 21	- 3-penten-2-one rt=2.43	TIC 45	- 2-butenal
TIC 22	- 3-penten-2-one rt=3.75	TIC 46	- 3-penten-2-one (2)
TIC 23	- 4-penten-2-one rt=2.68		

(Appendix C). This problem will not be addressed by the RI/FS, because activities conducted at Site 2 have no potential to introduce these contaminants into the soil or groundwater.

The Phase II RI activities, combined with results from previous investigations, provide a comprehensive data base for characterization of contaminants underlying the New Fuel Farm; however, contaminant concentration gradients in the portion of the dissolved plume between the leach field and the southern plume boundary and the western plume boundary are not well characterized . This is further complicated by the preferential flow path provided by the former Carson River channel which runs along the eastern part of the plume. The influence of the channel on the migration of the dissolved contaminants needs to be addressed in order to completely characterize the plume. Additional investigation is recommended to acquire this data.

3.5.2.iii Exposure Pathways

A synopsis of media-specific contaminant transport pathways, assimilation routes, exposure points, and affected biota for NAS Fallon is given in Appendix C. The following paragraphs expand on these initial evaluations in light of the characterization activities completed at the Group I Sites.

The contaminated media of concern at the Group I Sites include the soils and shallow groundwater underlying the area. The atmosphere is not considered to be a contaminated medium of concern because volatile constituents introduced into the shallow subsurface will rapidly volatilize, and PID measurements taken at the site indicated no detectable VOC. The air quality of the surrounding region is good, and prevailing air currents will rapidly disperse any volatile contaminants that may be released, rendering them innocuous to the environment.

Direct exposure pathways for contaminated soils at Group I Sites include dermal contact, ingestion, and inhalation of dust particles and volatile constituents. Potentially affected biota include indigenous plants and burrowing animals as well as personnel associated with site excavation activities. Plant and animal populations are controlled on NAS Fallon property, thus minimizing exposures associated with these biota. Because NAS Fallon is a restricted area, direct exposure to the human populace is restricted to naval personnel and subcontractors. Restricted access and lack of surface soil contamination thus prevent contaminated soils at the Group I Sites from constituting a primary exposure pathway.

Direct exposure pathways for groundwater include use of contaminated groundwater extracted from the shallow aquifer and the intermediate aquifer. The shallow aquifer is not pumped on NAS Fallon property and, due to its high salinity, is used sparingly for human consumption in the surrounding area (Appendix C). Thus, the potential for direct exposures to contaminants through extraction of the shallow groundwater in the area is believed to be minimal.

Available site-characterization results indicate that contaminants are not migrating into the intermediate aquifer. The PA/SI report postulates the existence of an upward flow gradient in the surrounding area (Dames and Moore 1988). Phase II characterization data confirm it (Appendix D). Additionally, a confining clay layer is known to exist between the contaminated shallow aquifer and the intermediate aquifer over the entire facility as demonstrated by installation of IR Program wells at several other sites. It is believed that these natural containment mechanisms prevent contaminants from reaching the intermediate aquifer.

Inspection of the drainage ditch map (Fig. E.1), the groundwater potentiometric map (Fig. D.7), and the plume map (Fig. 3.5.2.ii) associated with the site indicate that the plume is in contact with the Lower Diagonal No. 1 Drain (LD #1) on the north; however, preferred flow appears to be more toward the Lower Diagonal Drain more than two miles south of the site. It is also more than two miles to the nearest off-site downgradient domestic well (Fig. C.2). (Note: None of the wells south of the facility are used for drinking water.) Seasonal fluctuations in the water levels in LD #1, however, may cause local development of a flow gradient toward LD #1 and allow discharge of contaminated groundwater into LD #1. This potential pathway will be mitigated by the installation of the proposed weir gate in LD #1. The weir gate will be used to maintain a positive head between the ditch and the shallow groundwater, thus, ensuring flow of groundwater and contaminants away from the ditch. The weir will also be constructed with a floating boom which could be used to catch any accidental releases of floating product from the fuel farm.

Contaminants presently associated with the shallow groundwater could theoretically migrate downgradient for eventual seepage discharge into the Lower Diagonal Drain;

however, considering the time and distance involved, it is not likely that contaminants would escape degradation in order to migrate to the south ditch. Restricted access and institutional controls again minimize surface-water exposures on NAS Fallon property. Contaminated surface water does, however, have the potential to transport contaminants off site to exposure points. As explained in Appendix C, off-site exposure points associated with surface water include recreational exposure, direct exposure to biota which inhabit contaminated surface-water channels and wetlands, secondary exposure to humans who consume contaminated biota, and exposures associated with the final deposition of contaminated waters into downstream reservoirs and wetlands (Stillwater Point Reservoir and Stillwater Wildlife Refuge).

As with groundwater, contaminated soils associated with Group I Sites do not constitute a substantial direct exposure pathway. Soils may, however, serve as a source term for atmospheric transport of contaminated particulates, and both contaminated soils and groundwater may act as a source for contaminating surface water. Contaminated surface water may then serve as an exposure pathway to receptors. The nearest surface water is the Lower Diagonal No. 1 Drain, which occasionally receives surface runoff from the area.

Exposures to wind-blown transport of contaminated soils are minimal due to restricted access in the immediate vicinity, the natural cohesive properties of native surface soils, and dust-control measures employed during construction activities. In addition, the air quality of the region is good, and airborne particulate matter is quickly dispersed. Hence, atmospheric transport is not considered a threat to the environment.

Except in areas where ponding of precipitation occurs, downward transport of residual soil contamination to the underlying aquifer via surface-water percolation is not considered significant because of the semiarid climate. Indeed, the alkali flats in the surrounding area indicate a negative regional water balance. It is surmised that where contaminants were originally introduced at or near the ground surface, the downward transport necessary to produce existing groundwater contamination resulted from gradients introduced from excessive spills or disposal and not from natural percolation processes.

Ground- and surface-water transport to off-site receptors is thus the primary exposure pathway for contaminants of concern at the Group I Sites. Potential off-site transport mechanisms include: 1) eventual seepage discharge of groundwater contaminants to surface water migrating off site, and 2) discharge of contaminated surface water (from rainfall and human activity) to surface-water drainage systems. The principal exposure pathway of concern is thus the regional surface-water system including the Lower Diagonal No. 1 Drain which borders Site 2 on the north and the Lower Diagonal Drain which runs along the southeastern edge of the facility. The weir gate proposed for the Lower Diagonal No. 1 Drain will mitigate the potential for contaminated groundwater discharge into that drainage ditch, and the two-mile distance to the Lower Diagonal Drain will prevent significant contaminant transport by that route.

While the existence of soil and groundwater contaminants in excess of action limits does not in itself mandate active remediation, according to NDEP regulations the existence of free-phase product on the groundwater in excess of 1.27 cm (0.5 in.) does require the implementation of an active removal action (Appendix D). Design of a free-product removal system for the Group I Sites has been initiated as an interim removal action in conjunction with Phase II activities (ORNL 1991).

3.5.3 Recommendations

Two additional shallow single completion wells will be installed within the plume along the edge of the former Carson River channel (Fig. 3.5.2.iii). The purpose of these wells is to define the contaminant concentration gradient between the product plume and the distal dissolved-plume boundary and to determine the influence of the former river channel on the plume. Two other wells will be installed in the western portion of the plume to establish concentration gradients in that portion of the plume. Groundwater test holes will be drilled at all proposed well locations prior to installation to ensure optimum placement. Approximately 3-4 test borings will also be drilled at the proposed location of each of the recovery trenched recommended in the Site 2 EE/CA. These borings will be sampled for lithology to assist with the final engineering trench design. No additional field investigations are proposed for Site 4 other than those listed for Site 2.

3.6 GROUP II SITES: SITE 6, DEFUEL DISPOSAL AREA; SITE 7, NAPALM BURN PIT; SITE 21, RECEIVER SITE LANDFILL; SITE 22, NORTHEAST RUNWAY LANDFILL

3.6.1 Site History

The Group II Sites consist of four areas of interest: Site 6, Defuel Disposal Area; Site 7, Napalm Burn Pit; Site 21, Receiver Landfill; and Site 22, Northeast Runway Landfill. As shown in Fig. 1.3.ii, the Group II Sites are located in the northeastern portion of NAS Fallon. A discussion of the history of each of these sites follows.

3.6.1.i Site 6, Defuel Disposal Area

The Defuel Disposal Area consists of two regions of relatively level, unpaved surface soils. As shown in Fig. 3.6.1.i, one of the suspected disposal areas lies within Site 21, the Receiver Landfill. Activities at Site 6 consisted of disposal of off-specification JP-5 and JP-4 removed from aircraft fuel tanks. This fuel was contaminated with water or sediment and is commonly referred to as "defuel". Due to the amount of liquid waste disposed of, soils and groundwater contamination was deemed likely (Dames and Moore 1988).

3.6.1.ii Site 7, Napalm Burn Pit

The Napalm Burn Pit is also located within Site 21, Receiver Site Landfill (Fig. 3.6.1.i). Disposal activities consisted of burning excess napalm- generated ordnance between the early 1960s and 1983. Burning was accomplished by placing napalm canisters in the pit where they were axed open, saturated with diesel fuel, and ignited. Testimony by the former NAS Fallon Fire Chief at a public meeting held September 4, 1991, in Fallon refuted

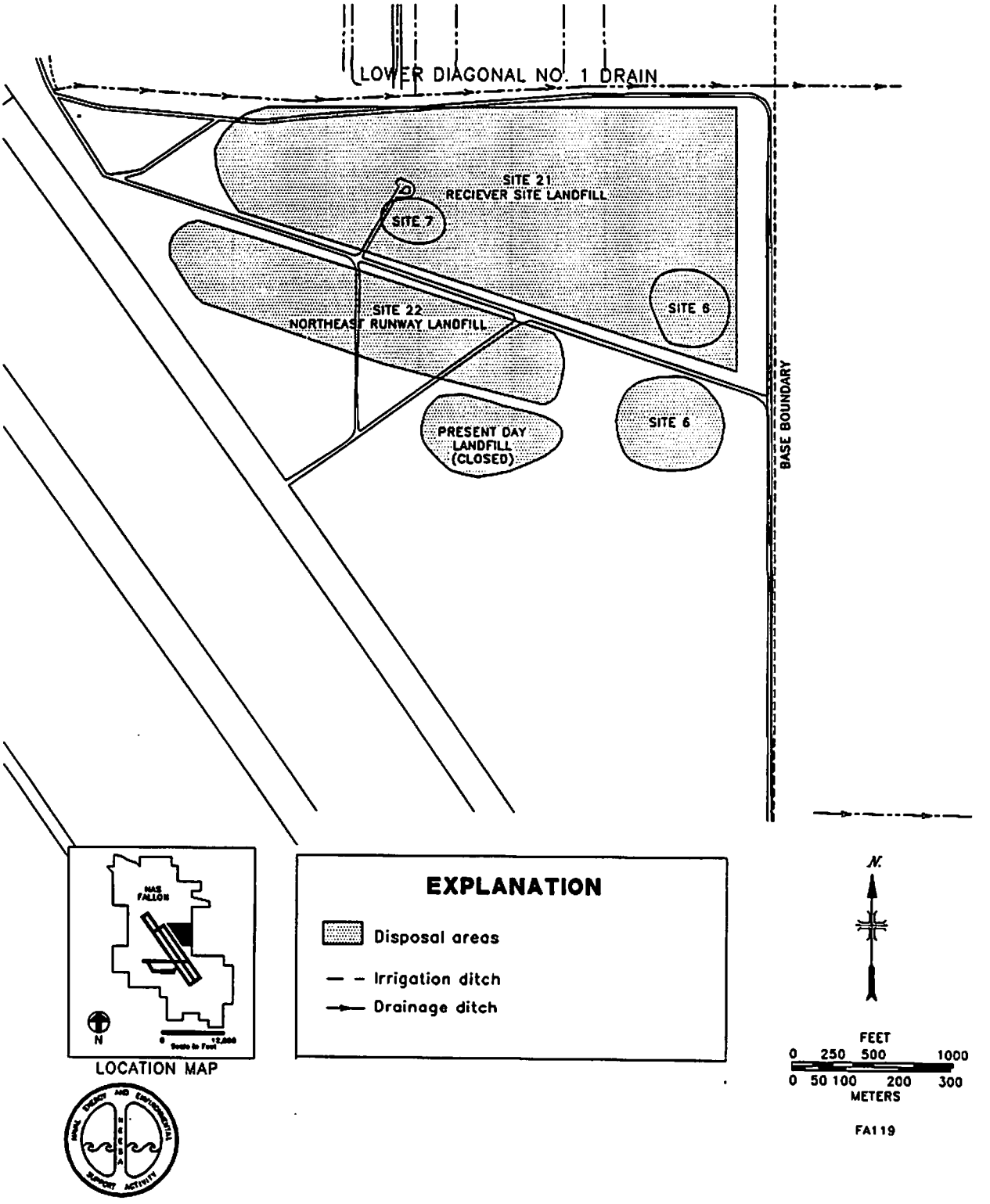

Fig. 3.6.1.i. Group II Sites: Site 6, Defuel Disposal Area; Site 7, Napalm Burn Pit; Site 21, Receiver Site Landfill; and Site 22, Northeast Runway Landfill.

the existence of this site. He stated that napalm was burned at Site 1, the Crash Crew Training Area.

3.6.1.iii Site 21, Receiver Site Landfill

Site 21, Receiver Site Landfill, received waste generated at NAS Fallon between the years of 1965 and 1980. As shown in Fig. 3.6.1.i, the site also includes two other areas of interest: the napalm burn pit and one of the defuel disposal areas. Land disposal activities consisted of burying waste in trenches. Solid waste included wet garbage, trash, and rubble. It is surmised that liquid waste included JP-5, gasoline, diesel fuel, waste oils, and hydraulic fluids generated from aircraft maintenance and Public Works Transportation. Burning of liquid wastes on site is reported to have occurred. Disposal of hydrocarbon waste at the site was prohibited in 1975, and after 1979 only dry trash and rubble were allowed in the landfill. Disposal activities on the site were discontinued in 1980-81 when landfill operations were moved to the adjacent northeast runway landfill (Fig. 3.6.1.i).

3.6.1.iv Site 22, Northeast Runway Landfill

As shown in Fig. 3.6.1.i, the Northeast Runway Landfill is located south of the Receiver Site Landfill. Landfill disposal activities were transferred from the Receiver Site Landfill to Site 22 in 1980-81 and continued until 1987. Disposal consisted of burying wastes in north-south excavated trenches. Wastes were similar to those disposed of at the Receiver Site Landfill except that waste disposal was more restrictive and fewer hazardous materials were included.

3.6.2. Investigative Approach, Extent of Contamination, and Exposure

Phase I activities identified the sites of concern. No quantitative site-characterization was conducted at the Group II Sites during the Phase I PA/SI investigation. Based on a visual

inspection and records search, the Phase I study concluded that because disposal of liquid hydrocarbons and other hazardous materials (paint wastes and metals) was suspected (although not confirmed), soil and groundwater contamination in the area was likely (Dames and Moore 1988).

Conclusions drawn from the Phase I study are summarized as follows (Dames and Moore 1988):

> Site 6, Defuel Disposal Area: due to the amount of liquid-hydrocarbon waste applied to the site, soil and groundwater contamination is probable.
>
> Site 7, Napalm Burn Pit: landfill operations in the vicinity of the site prevent location of the napalm burn pit. Contamination of soils may have resulted from incomplete incineration of napalm and diesel fuel; however, the high viscosity of napalm and small quantities of unburned waste should limit this possibility.
>
> Site 21, Receiver Site Landfill: because liquid-hydrocarbon wastes were disposed of at the site, soil and possibly groundwater contamination may be present. In addition, it is suspected that other hazardous substances such as paint wastes and metals may have been discarded at the site.
>
> Site 22, Northeast Runway Landfill: although monitored, the landfill may have received minor amounts of paint wastes and metals included in accepted wastes. These hazardous substances may have resulted in soil and groundwater contamination.

3.6.2.i Investigative Approach

Records indicating the type and amount of wastes disposed of were taken as verification that contamination existed at the sites. The approach taken to fulfill the data needs based on the preliminary risk screening performed during Work Plan development

was to: (1) determine if the contaminants have reached groundwater around the sites; (2) characterize the type, extent, and concentration of contaminants in the groundwater; and (3) determine if contaminants are migrating off site. It was assumed that some soil contamination existed within the landfill areas; however, characterizing the contents of a landfill is impractical, and the important issue was whether or not contaminants were migrating from the sites. The Work Plan describes the approach and rationale for the investigation of the sites (ORNL 1989). The primary modification to the approach outlined in the Work Plan was made based on an improvement in field investigation techniques. A method of direct groundwater screening was developed to replace the proposed soil-gas survey. The number and locations of downgradient wells were modified based on the groundwater-test-hole results.

3.6.2.ii Extent of Contamination

Because of the close proximity and similarity of potential contaminants at the Group II Sites, Phase II site-characterization activities assessed the four sites of interest collectively as one study area. Screening consisted of evaluating ninety-five groundwater test holes drilled in and around the area. Locations for the groundwater test holes are shown in Fig. 3.6.2.i, and results are given in Appendix B, Tables B.8 and B.11. (Note: Screening activities along the Lower Diagonal No. 1 Drain [Table B.11] were conducted as a separate activity but, due to the close proximity to the Group II Sites the results are relevant). As shown in Fig. 3.6.2.i, groundwater screening revealed the location of a petroleum hydrocarbon plume emanating from the southern-most disposal area of Site 6. Contaminants were not detected in any of the other test holes and it appears that there was only one disposal area for Site 6. An attempt to locate the napalm burn pit by drilling groundwater test holes was unsuccessful because buried trash and rubble fouled the drilling augers (Fig. 3.6.2.i) and because the site apparently never existed.

After initial screening was completed, site-characterization activities included the installation of seven monitoring wells, eight piezometers, and two staff gauges (Fig. 3.6.2.i). One upgradient well (MW12L) was completed in the intermediate aquifer (Appendix C),

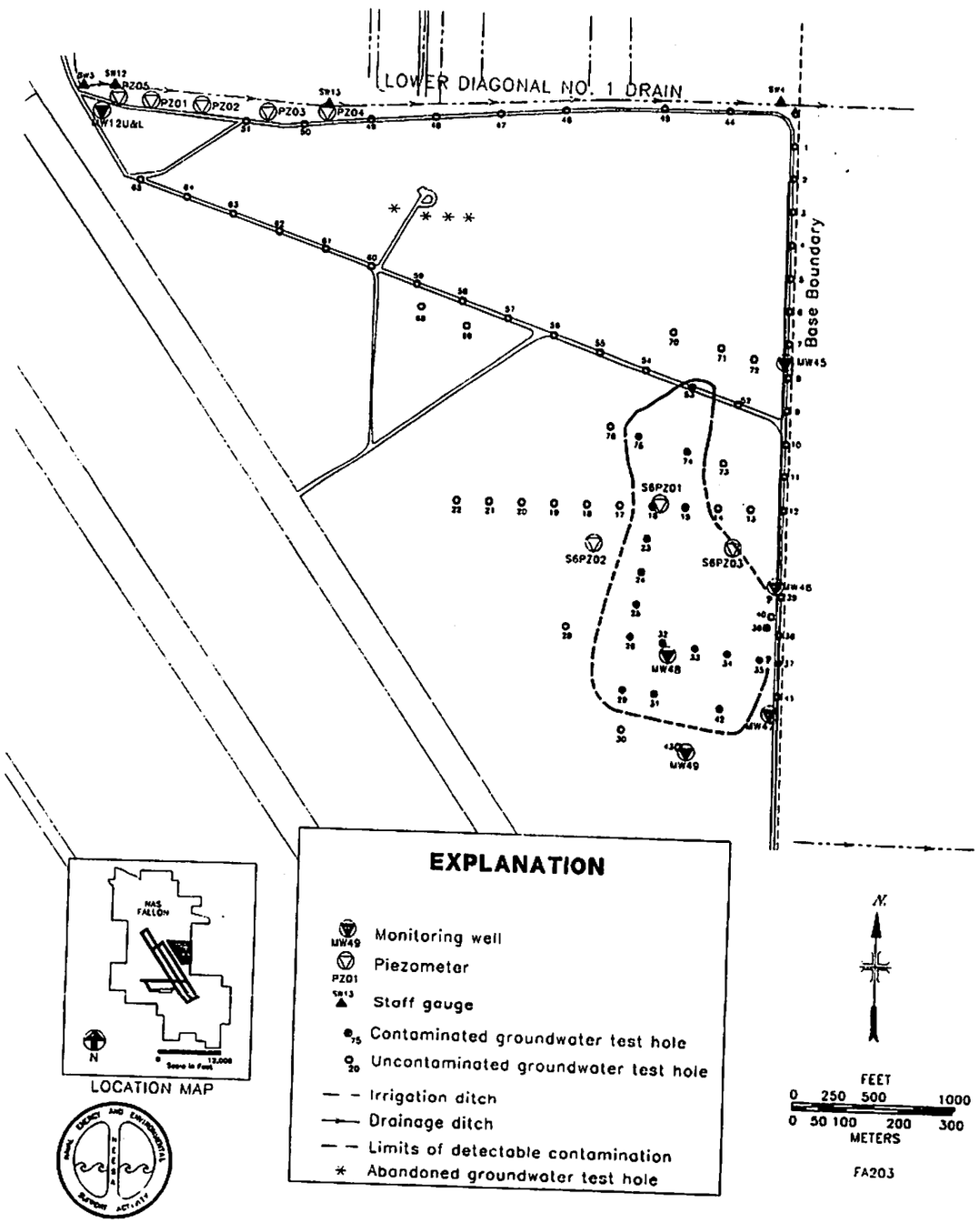

Fig. 3.6.2.i. Group II sites: Site 6, Defuel Disposal Area; Site 7, Napalm Burn Pit; Site 21, Receiver Site Landfill; Site 22, Northeast Runway Landfill. Groundwater test hole and analytical sampling locations.

and the remaining wells were completed across the top of the water table in the shallow alluvial aquifer. Five piezometers were installed north of the study area in conjunction with the Lower Diagonal No. 1 Drain investigation. Three additional piezometers were installed in and around the Site 6 plume.

Screening and characterization activities at the Group II Sites indicate that the primary contaminants of concern are petroleum hydrocarbon compounds. Soil-sample results from monitoring well boreholes are presented in Table 3.6.2.i. Contaminants included 5-methyl-5-hexene-2-one at 200 μg/kg, hexadecanoic acid at concentrations ranging around 500 μg/kg, and other exotic organic compounds. The soil sample for MW48 showed only minor concentrations of contaminants due to the fact that it was taken from the 7 to 9-ft depth interval, and the water level in the well is only about 5 ft below ground surface. Thus, the soil sample was taken deeper than the top of the water table and missed the contaminants shown by the water-sample results.

Monitoring well water-sample results confirm the plume boundaries as defined by groundwater test holes (Table 3.6.2.ii). MW45, MW46, MW47 and MW49 were installed near areas shown as uncontaminated by the limits of detection of the test hole method. These wells were essentially clean except for minor TIC at low ppb levels. The TIC were considered fuel-related compounds such as 3-methylpentane. The upgradient wells, MW12U and MW12L, were clean with respect to suspected contaminants, although concentrations of some metals and anions indicate poor water quality in the shallow alluvial aquifer. The head differences in the two wells confirmed the upward flow gradient between the intermediate and shallow aquifers (Appendix D).

MW48 was intentionally installed within the plume boundaries and showed significant levels of petroleum hydrocarbons and minor concentrations of solvent-related compounds although no free product was present. The downgradient wells confirm the plume boundaries as delineated by groundwater test holes; however, the proximity of the plume to the facility boundary is cause for concern, and additional characterization is recommended between MW46 and MW47. Additionally, the groundwater test holes near the source of the plume indicate that free product may be floating on the shallow groundwater. Further assessment is recommended to determine the existence and extent of product and to characterize the aquifer parameters for transport modeling.

Table 3.6.2.i. Soil sample results for Group II Sites
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
MW045	3605	9-11 ft	U	U	Bis2	99.0**	Methcl	8.0**
					TIC 1	11000.0**		
					TIC 2	200.0		
					TIC 3	520.0		
					2 Unknowns	200.0		
						240.0		
MW046	3606	7-9 ft	U	U	Bis2	110.0**	Methcl	7.0**
					TIC 1	11000.0**		
					TIC 3	420.0		
					TIC 4	42000.0		
					2 Unknowns	230.0		
						620.0		
MW047	3607	7-9 ft	U	U	Bis2	91.0**	Methcl	8.0**
					TIC 1	14000.0**		
					TIC 5	430.0		
					TIC 2	200.0		
					TIC 4	17000.0		
					2 Unknowns	270.0		
						370.0		
MW048	3609	7-9 ft	U	U	Bis2	130.0**	Methcl	7.0**
					TIC 1	12000.0**		
					TIC 5	380.0		
					3 Unknowns	180.0		
						290.0		

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
Bis2 - bis(2-Ethylhexyl) phthalate
HBP - high boiling point
LBP - low boiling point
Methcl - methylene chloride
PHC - petroleum hydrocarbons
QL - quantitation limit
TIC - tentatively identified compound
U - no compounds detected

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanone, 4-hydroxy-4-met
TIC 2 - 5-hexen-2-one, 5-methyl-
TIC 3 - hexadecanoic acid
TIC 4 - hexanedioic acid, dioctyl es
TIC 5 - 3-penten-2-one, 4-methyl-

Table 3.6.2.ii. Water sample results for Group II Sites

Location / Date	Sample Number	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	PCB/Pesticide (*3) ug/L	Semivolatiles Method 625, ug/L QL: 10 ug/L	Volatiles Method 624, ug/L QL: 5 ug/L
MW012L 7/90	3503	NP	NP	U	U	Acet 1.0
MW012U 7/90	3502	NP	NP	U	U	U
MW012U 4/91	3815	U	U	U	TIC 1 11.0 1 Unknown 34.0	U
MW045 4/91	3813	U	U	U	U	TIC 2 55.0
MW046 4/91	3812	U	U	U	U	U
MW047 4/91	3817	U	U	U	U	TIC 3 12.0
MW048 4/91	3819	Die 1100.0	Gas 350.0	U	TIC 4 8.6 4 Unknowns 9.0 16.0	TIC 5 9.1 TIC 5 14.0 TIC 6 7.8 TIC 7 5.6 1 Unknown 16.0
MW048 4/91	3820	Die 820.0	Gas 350.0	U	TIC 4 9.2 4 Unknowns 8.2 14.0	Clform 1.0*J Tetra 17.0 TIC 5 8.4 TIC 5 12.0 TIC 6 6.7 TIC 7 5.3 1 Unknown 21.0
MW049 4/91	3814	U	U	U	TIC 8 11.0 TIC 9 67.0** 2 Unknowns 11.0 14.0	TIC 10 5.2**

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 50 ug/L
*2 - Method 8015/8020, quantitation limit: 50 ug/L
*3 - Method 608, quantitation limit: 0.05 ug/L
*J - concentration estimated
Acet - acetone
Clform - chloroform
Die - HBP PHC as compared to diesel fuel
Gas - LBP PHC as compared to gasoline

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-heptenal, (z)-
TIC 2 - pentane, 3-methyl-
TIC 3 - cyclotetrasiloxane, (iodomet
TIC 4 - trimethyl benzene
TIC 5 - 1-pentene, 2-methyl-

HBP - high boiling point
LBP - low boiling point
NP - analysis not performed
PHC - petroleum hydrocarbons
QL - quantitation limit
Tetra - tetrachloroethene
TIC - tentatively identified compound
U - no compounds detected

TIC 6 - butane, 2-methyl-
TIC 7 - cyclobutane, methyl-
TIC 8 - 1h-indene, 1,1-dimethyl-
TIC 9 - 2-pentanone, 4-hydroxy-4-met
TIC 10 - cyclotetrasiloxane, octameht

Table 3.6.2.ii. (continued)

Anions, mg/L Method 429 Quantitation limit: 0.5 mg/L				
Compound	#	Average	Minimum	Maximum
Chloride	9	8,019	37.00	30,000.00
Fluoride	2	5	5.10	5.80
Nitrate, as N	0	ND	ND	ND
Phosphate	2	23	22.00	24.00
Sulfate	9	3,846	9.70	13,000.00

Metals, ug/L Method 200.7 Quantitation limit: 1 ug/L				
Compound	#	Average	Minimum	Maximum
Aluminum	7	97	41.70	290.00
Antimony	4	35	32.70	37.70
Arsenic	8	3,337	15.00	6,360.00
Barium	7	32	19.30	71.10
Beryllium	0	ND	ND	ND
Boron	9	74,882	3,070.00	133,000.00
Cadmium	1	6	6.10	6.10
Calcium	8	20,361	1,310.00	104,000.00
Chromium	0	ND	ND	ND
Cobalt	0	ND	ND	ND
Copper	7	41	10.20	56.80
Iron	7	37	23.10	47.50
Lead	0	ND	ND	ND
Lithium	9	125	41.40	185.00
Magnesium	7	7,541	3,630.00	24,300.00
Manganese	7	63	4.80	382.00
Mercury	1	2	2.00	2.00
Molybdenum	7	913	23.30	1,440.00
Nickel	0	ND	ND	ND
Potassium	7	195,571	13,200.00	295,000.00
Selenium	0	ND	ND	ND
Silver	6	9	5.90	10.90
Sodium	9	10,307,556	128,000.00	19,300,000.00
Thallium	0	ND	ND	ND
Vanadium	8	691	11.00	1,090.00
Zinc	7	75	26.00	221.00

- number of samples with detectable quantities of analyte
ND - analyte not detected
Includes samples from 7/90 and 4/91.

3.6.2.iii Exposure Pathways

A synopsis of media-specific contaminant transport pathways, assimilation routes, exposure points, and affected biota for NAS Fallon is given in Appendix C. The following paragraphs expand on these initial evaluations in light of the characterization activities completed and the additional characterization recommended at the Group II Sites.

The atmosphere is not considered to be a contaminated medium of concern because volatile constituents introduced into the shallow subsurface rapidly evaporate. PID measurements taken around the area during field work detected no VOC in the ambient air. The air quality of the surrounding region is good, and prevailing air currents will rapidly disperse any volatile contaminants that may be released, rendering them innocuous to the environment.

Direct exposure pathways for contaminated soils at the Group II Sites include dermal contact, ingestion, and inhalation of dust particles and volatile constituents. Potentially affected biota include indigenous plants and burrowing animals as well as personnel associated with site excavation activities. Plant and animal populations are controlled on NAS Fallon property, and exposures associated with these biota are thus minimized. Because NAS Fallon is a restricted area, direct exposure to the human populace is restricted to naval personnel and subcontractors. Restricted access and site activities geared towards environmental safety thus prevent contaminated soils at the Group II Sites from constituting a primary exposure pathway.

Direct exposure pathways for groundwater include use of contaminated groundwater extracted from the shallow aquifer and the intermediate aquifer. The shallow aquifer is not pumped on NAS Fallon property and, due to its high salinity, is used sparingly for human consumption in the surrounding area (Appendix C). There is one well tapping the shallow aquifer approximately one-quarter mile northeast of the plume; however, examination of the potentiometric map (Fig. D.8) indicates that the plume is migrating away from the well. The well is used only for domestic water, not drinking water. Other wells in the vicinity are farther away and even less likely to become contaminated based on groundwater flow

patterns. Direct exposures to contaminants through extraction of the shallow groundwater in the area are thus believed to be minimal.

Available site-characterization results indicate that contaminants are not migrating into the intermediate aquifer. The PA/SI report postulates the existence of an upward flow gradient in the surrounding area (Dames and Moore 1988). Investigative results confirm this theory. Additionally, a confining clay layer is known to exist between the contaminated shallow aquifer and the intermediate aquifer over the entire facility (Appendix C). It is believed that these natural containment mechanisms prevent contaminants from reaching the intermediate aquifer.

As with groundwater, contaminated soils associated with Group II Sites do not constitute a substantial direct exposure pathway. Soils may, however, serve as a source term for atmospheric transport of contaminated particulates, and both contaminated soils and groundwater may act as a source for contaminating surface water. Contaminated surface water may then serve as an exposure pathway.

Exposures to wind-blown transport of contaminated soils are minimal due to restricted access in the immediate vicinity, the natural cohesive properties of native surface soils, and dust-control measures employed during construction activities. In addition, the air quality of the region is good, and airborne particulate matter is quickly dispersed. Hence, atmospheric transport is not considered a threat to the environment.

Downward transport of residual soils contamination to the underlying aquifer via surface-water percolation is not considered significant because of the semiarid climate. Indeed, the alkali flats in the surrounding area indicate a negative regional water balance. It is surmised that because contaminants were originally introduced at or near the ground surface, the downward transport necessary to produce existing groundwater contamination resulted from gradients introduced from excessive spills or disposal and not from the natural percolation process.

Surface-water runoff resulting from excessive precipitation or human activities may transport contaminated surface sediments or dissolved constituents to the regional surface drainage system. In addition, contaminants presently associated with the shallow groundwater may migrate downgradient for eventual seepage discharge into the drainage ditches.

Restricted access, lack of surface contamination, and institutional controls again minimize any surface-water exposures on NAS Fallon property. Surface water contaminated by groundwater seepage does, however, have the potential to transport contaminants off site to exposure points. As explained in Appendix C, off-site exposure points associated with surface water include recreational exposure, direct exposure to biota which inhabit contaminated surface-water channels and wetlands, secondary exposure to humans who consume contaminated biota, and exposures associated with the final deposition of contaminated waters into the downstream reservoirs and wetlands (Stillwater Point Reservoir and Stillwater Wildlife Refuge).

Ground- and surface-water transport to off-site receptors are the primary exposure pathway for contaminants of concern at the Group II Sites. The principal potential off-site transport mechanism is eventual seepage discharge of groundwater contaminants to surface water migrating off site. Thus, the principal exposure pathway of concern is the regional surface-water system extending from the downgradient (southeastern) edge of the facility to Stillwater Point Reservoir and the Stillwater Wildlife Refuge. An unnamed tributary to the Lower Diagonal Drain located about one-half mile southeast of the Site 6 plume is the nearest potential surface-water pathway (Fig. E.1). The irrigation ditch, located approximately 50 feet east of the base boundary, is shallow and is not used south of the Heal ranch. Thus, is does not pose on potential pathway. Wells at the distal portion of the plume will serve to monitor the movement of the plume and provide warning of any potential discharge to the drainage ditch tributary.

3.6.3 Recommendations

The discussion of results and potential receptors points out the need for additional investigations at Site 6. There is need for more information on the concentration of contaminants within the identified plume and a more concise plume definition near the facility boundary. There is also the need for additional aquifer parameter data in order to model the flow and transport of the plume. To meet these data needs the following investigations are recommended.

One upgradient well will be installed. The well will be a 5-in.-diameter pumping well for aquifer testing and will be surrounded by four 2-in.-diameter piezometers for observation points. The 5-in. well will be fully penetrating and fully screened. Two additional wells will be installed within the boundaries of the identified plume to assess floating-product extent and contaminant concentration gradients. One additional well will be installed at the distal part of the plume to monitor for potential off-site contaminant migration. If floating product is found within the plume, then three piezometers will be installed to assess the extent and thickness of the product. Groundwater test holes will be drilled at all proposed well and piezometer locations prior to installation to ensure optimum placement (Fig. 3.6.3.i).

Because no contaminants were detected downgradient of Site 7, the Napalm Burn Pit, no additional field investigations are proposed. Similarly, because no contaminants were detected in the groundwater downgradient of Site 21, the Receiver Site Landfill, and Site 22, the Northeast Runway Landfill, no additional field investigations are proposed for these sites.

3.7 GROUP III SITES: SITE 9, WASTEWATER TREATMENT PLANT; SITE 18, SOUTHEAST RUNWAY LANDFILL

3.7.1 Site History

The Group III Sites consist of Site 9, the Wastewater Treatment Plant, and Site 18, the Southeast Runway Landfill. As shown in Fig. 1.3.ii, the Group III Sites are located in the southern portion of NAS Fallon in the old section of the facility. A discussion of the history of each of the sites follows.

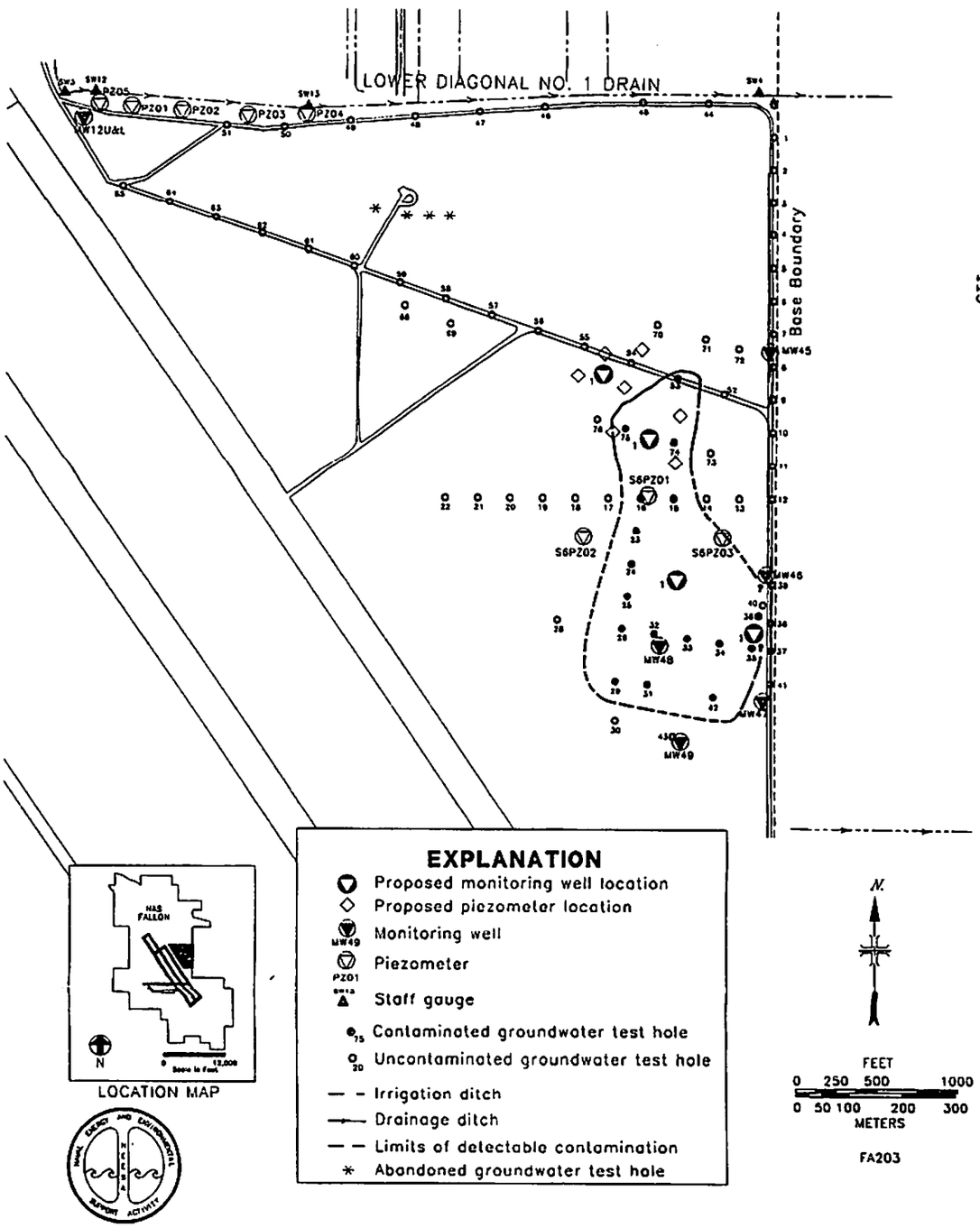

Fig. 3.6.3.i. Group II sites. Proposed locations for additional investigations.

3.7.1.i Site 9, Wastewater Treatment Plant

Potential areas of contamination at Site 9, Wastewater Treatment Plant, include: 1) the grit chamber disposal pit and Imhoff tank sludge disposal pit, 2) settling ponds used for the percolation/evaporation of treated sanitary sewer effluent, and 3) the soils and groundwater underlying a diesel underground storage tank which was reportedly leaking upon removal in 1985. These potentially contaminated areas are shown in Fig. 3.7.1.i.

Waste disposal activities at the grit chamber disposal pit consisted of burying sludge produced in the grit chamber from the Imhoff tank. In addition, sludge from the Imhoff tank was buried in a pit to the east of the settling ponds (Fig. 3.7.1.i).

Contaminants may have entered soils and groundwater underlying the settling ponds through percolation of treated effluent. Additional contamination may have resulted from a leaking diesel storage tank located north of the wastewater treatment building (Fig. 3.7.1.i). Leaching of the sludge may have contaminated soil and groundwater at the burial pits.

Contaminants of concern at Site 9 include diesel fuel, hazardous materials removed from the sanitary sewer discharge as grit, tank sludges, and contaminants contained in treated effluent. Suspected hazardous materials include metals, oils, paint wastes, and photographic chemicals (including silver, gold, and mercury) which may have been discharged to the sanitary sewer.

3.7.1.ii Site 18, Southeast Runway Landfill

As shown in Fig. 3.7.1.i, Site 18, Southeast Runway Landfill, is located near the southeast corner of the wastewater treatment facility. It is reported that municipal refuse and industrial trash were buried at the site during World War II (1943 to 1946). Although no details of the exact landfill location or disposal activities are available, it is expected that burial was conducted in bulldozed trenches no deeper than the area water table. Suspected contaminants include paints, metals, and petroleum hydrocarbons.

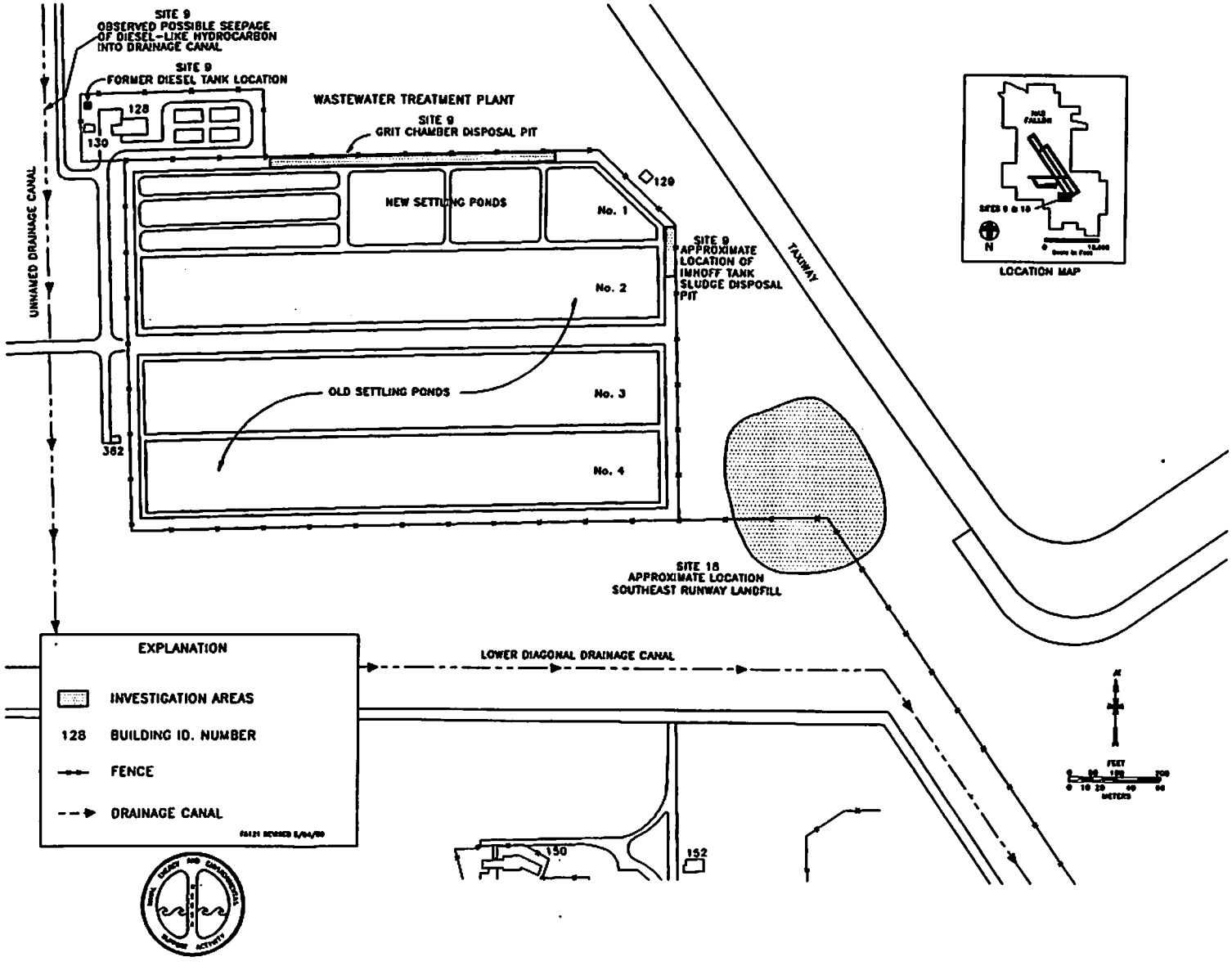

Fig. 3.7.1.i. Group III Sites: Site 9, Wastewater Treatment Plant; Site 18, Southeast Runway Landfill.

3.7.2 Investigative Approach, Extent of Contamination, and Exposure Pathways

No site-characterization activities were conducted at the Group III Sites during the Phase I PA/SI. Because of the amount and type of wastes disposed of, it was suspected that soil and groundwater contamination were present at both sites. In addition, visual inspection of the unnamed drainage ditch west of Site 9 (Fig. 3.7.1.i) located a diesel fuel-like product emanating from the subsurface. Presumably the product resulted from the leaking underground storage tank removed in 1985 (Dames and Moore 1988).

3.7.2.i Investigative Approach

Records indicating the type and amount of wastes disposed of at the sites were taken as verification that contamination existed at the sites. The approach taken to fulfill the data needs for the Group III Sites was to: (1) determine if the contaminants have reached the groundwater around the sites; (2) characterize the type, extent, and concentration of contaminants in the groundwater; and (3) determine if contaminants are migrating off site. It was assumed that some soil contamination existed within the landfill area and the settling ponds. However, characterizing the contents of a landfill or drilling in active settling ponds is an impractical undertaking, and the important issue at the site was whether or not contaminants were migrating from the site. The Work Plan describes the approach and rationale for the investigation of the site (ORNL 1989). The only modification to the approach outlined in the Work Plan was made based on an improvement in field investigation techniques. A method of direct groundwater screening was developed to replace the proposed soil-gas survey. The locations of downgradient wells was not modified based on the groundwater-test-hole results because there were no organic compounds detected during the screening. Phase II screening activities consisted of assessing ten groundwater test holes as shown in Fig. 3.7.2.i. Results of the screening are given in Appendix B, Table B.6, and indicated that no contamination was detected.

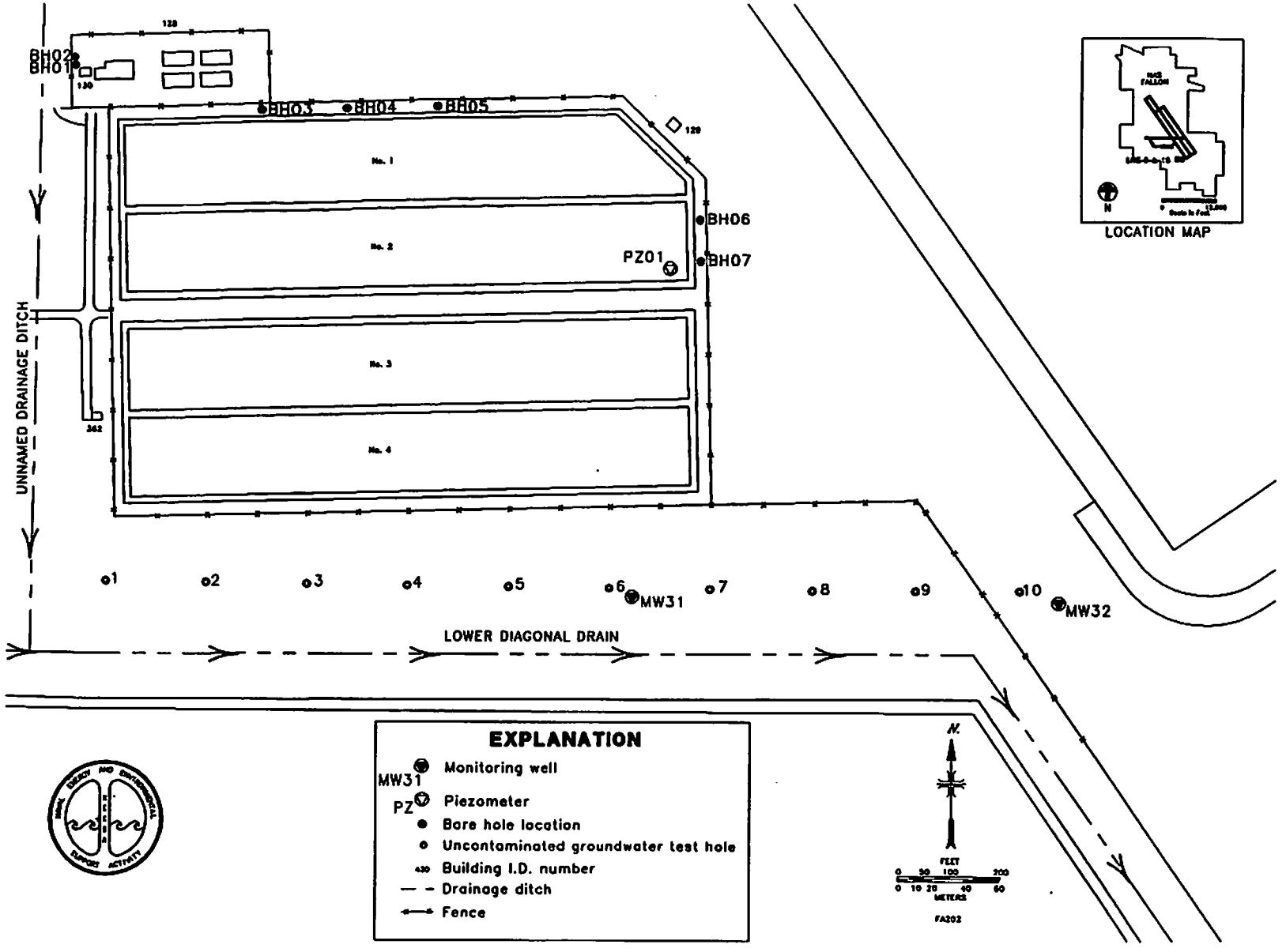

Fig. 3.7.2.i. Group III sites: Site 9, Wastewater Treatment Plant; Site 18, Southeast runway Landfill. Groundwater test hole and analytical sampling locations.

3.7.2.ii Extent of Contamination

Site-characterization studies completed at the Group III Sites include the installation of two monitoring wells, one piezometer, and seven soil borings (Fig. 3.7.2.i).

Soil Contamination

Two of the soil borings (BH01 and BH02) were drilled near the former location of the underground diesel fuel storage tank. Soil samples for these two borings were taken continuously from the surface to the water table. BH02 contained 260 mg/kg of TPH and some associated volatile and semivolatile organic compounds in the sample taken from 5 to 7-ft deep (Table 3.7.2.i). The remaining soil borings were drilled to a depth of 1.2 m (4 ft) in the grit chamber disposal pit and the Imhoff tank sludge disposal pit. The only organic contaminants detected in any of the other soil borings were in the 0 to 2-ft intervals of BH04 and BH06 where motor oil was footnoted in laboratory results as possibly present at below detection limits of 10 mg/kg. None of the soil borings associated with the two grit disposal pits contained concentrations of metals which are higher than levels noted at other sites (Table 3.7.2.i). No contaminants other than laboratory-related contamination were detected in the soil samples taken from the two downgradient monitoring well borings, MW31 and MW32.

Shallow Groundwater Contamination

Groundwater samples taken from the two wells revealed no significant contamination. MW31 had two unknown semivolatile compounds detected in the low ppb range, and MW32 showed toluene at 2 ppb (Table 3.7.2.ii). The MCL for toluene is 40 ppb, thus, there does not appear to be any substantial groundwater contamination associated with the Group III Sites.

Table 3.7.2.i. Soil sample results for Group III Sites
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH001	3646	0-2 ft	U	U	NP	Bis2	290.0*J	Acet	9.0*J
						TIC 1	12000.0**	Methcl	210.0
						TIC 2	160.0		
						TIC 3	800.0**		
						TIC 4	200.0		
						3 Unknowns	180.0		
							260.0		
BH001	3647	3-5 ft	U	U	NP	Bis2	200.0**	Acet	10.0*J
						TIC 5	200.0	Methcl	40.0
						TIC 1	12000.0**	TIC 7	7.5
						TIC 2	350.0		
						TIC 6	200.0		
						TIC 3	1000.0		
						TIC 4	300.0		
						3 Unknowns	220.0		
							270.0		
BH001	3648	5-7 ft	U	U	NP	Bis2	410.0	Methcl	21.0
						TIC 5	180.0		
						TIC 1	13000.0**		
						TIC 2	550.0		
						TIC 6	260.0		
						TIC 3	1600.0		
						TIC 4	300.0		
						3 Unknowns	190.0		
							220.0		
BH002	3655	0-2 ft	U	U	NP	Bis2	110.0**	Methcl	6.0**
						TIC 1	12000.0**		
						TIC 6	330.0		
						TIC 3	560.0		
						TIC 4	170.0		
						TIC 8	11000.0		
						4 Unknowns	170.0		
							730.0		
BH002	3656	3-5 ft	U	U	NP	Bis2	130.0**	Methcl	7.0**
						TIC 1	17000.0**		
						TIC 6	410.0		
						TIC 3	400.0		
						3 Unknowns	330.0		
							670.0		
BH002	3657	5-7 ft	U	260.00	NP	2-Meth	8400.0	1,2DCP	2.0*J
				X 1.20		Fluor	1200.0*J	Acet	27.0
						Naph	3900.0*J	E	10.0
						Phena	3500.0*J	Methcl	9.0**
						20 Unknowns	44000.0	X	150.0
							190000.0	TIC 9	500.0
								TIC 10	490.0
								TIC 11	690.0
								TIC 12	1200.0
								TIC 13	1700.0
								TIC 14	600.0
								TIC 15	1200.0
								TIC 16	900.0
								TIC 17	750.0
								TIC 17	2200.0

Table 3.7.2.i. (continued)
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH003	3705	0-2 ft	U	U	U	Bis2 TIC 1 TIC 18 TIC 17 3 Unknowns	53.0** 6700.0** 180.0** 210.0** 230.0*? 710.0	Methcl	6.0**
BH003	3706	2-4 ft	U	U	U	Bis2 TIC 1 TIC 18 TIC 17 3 Unknowns	42.0** 7600.0** 170.0** 200.0** 200.0*? 630.0	Acet Methcl	11.0*J 10.0**
BH004	3707	0-2 ft	U	U	U	Bis2 TIC 1 TIC 6 TIC 17 3 Unknowns	53.0** 6300.0** 190.0 190.0** 200.0*? 610.0	Methcl	8.0
BH004	3708	2-4 ft	U	U	U	Bis2 TIC 1 TIC 18 TIC 17 5 Unknowns	50.0** 6500.0** 200.0** 240.0** 180.0*? 670.0	Acet Methcl	9.0*J 17.0
BH005	3709	0-2 ft	U	U	U	TIC 1 TIC 18 TIC 17 4 Unknowns	6300.0** 190.0** 240.0** 170.0*? 620.0	Methcl	30.0
BH005	3710	2-4 ft	U	U	U	Bis2 TIC 1 TIC 18 TIC 17 11 Unknowns	50.0** 6500.0** 180.0** 230.0** 160.0*? 2700.0	Methcl	15.0
BH006	3711	0-2 ft	U	U	U	Bis2 TIC 1 TIC 18 TIC 17 4 Unknowns	56.0** 5300.0** 160.0** 190.0** 150.0*? 1700.0	Methcl	11.0
BH006	3712	2-4 ft	U	U	U	Bis2 TIC 1 TIC 17 2 Unknowns	44.0** 5900.0** 160.0** 380.0 720.0	Methcl	7.0
BH007	3713	0-2 ft	U	U	U	Bis2 TIC 1 2 Unknowns	43.0*J 4800.0** 310.0 690.0	Methcl	8.0
BH007	3714	2-4 ft	U	U	U	Bis2 TIC 1 TIC 17 4 Unknowns	40.0** 5300.0** 150.0** 150.0*? 700.0	Methcl	4.0**

Table 3.7.2.i. (continued)
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
MW031	3588	7-9 ft	U	U	NP	Bis2 TIC 1 TIC 4 TIC 19 3 Unknowns	65.0*J 9600.0 600.0 190.0 190.0 690.0	Acet Methcl	12.0*J 9.0**
MW032	3589	5-7 ft	U	U	NP	Bis2 TIC 1 TIC 3 TIC 4 TIC 8 3 Unknowns	67.0*J 12000.0 230.0 210.0 6200.0 180.0 720.0	Acet Methcl	11.0*J 9.0**

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
*3 - Method 3550/8080, quantitation limit: 8.3 ug/kg
*? - some or all unknowns contain unusable data
*J - concentration estimated
1,2DCP - 1,2-dichloropropane
2-Meth - 2-methylnaphthalene
Acet - acetone
Bis2 - bis(2-Ethylhexyl) phthalate
E - ethylbenzene
Fluor - fluorene

HBP - high boiling point
LBP - low boiling point
Methcl - methylene chloride
Naph - naphthalene
NP - analysis not performed
PHC - petroleum hydrocarbons
Phena - phenanthrene
QL - quantitation limit
TIC - tentatively identified compound
U - no compounds detected
X - xylenes (total)

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanone, 4-hydroxy-4-met
TIC 2 - 3-heptanone, 2,4-dimethyl-
TIC 3 - 5-hexen-2-one, 5-methyl-
TIC 4 - hexadecanoic acid
TIC 5 - 2,5-hexanedione
TIC 6 - 3-penten-2-one, 4-methyl-
TIC 7 - cyclopentasiloxane, decameth-
TIC 8 - hexanedioic acid, dioctyl es
TIC 9 - cyclohexane, 1,1,2-trimethyl
TIC 10 - cyclohexane, 1,2,4-trimethyl-
TIC 11 - cyclohexane, 1-ethyl-2-methyl-
TIC 12 - cyclohexane, propyl-
TIC 13 - cyclopentane, (2-methylbutyl-
TIC 14 - heptane, 4-propyl-
TIC 15 - octane, 3,5-dimethyl-
TIC 16 - octane, 3,6-dimethyl-
TIC 17 - octane, 4-methyl-
TIC 18 - octane, 3-methyl-
TIC 19 - octadecanoic acid

Table 3.7.2.i. (continued)

Metals, mg/kg Method 6010 Quantitation limit: 1 mg/kg				
Compound	#	Average	Minimum	Maximum
Aluminum	16	9,439	3,540.00	20,700.00
Antimony	0	ND	ND	ND
Arsenic	16	8	3.00	13.60
Barium	16	92	28.90	219.00
Beryllium	16	0	0.17	0.89
Boron	15	32	4.30	79.50
Cadmium	0	ND	ND	ND
Calcium	16	7,794	2,450.00	20,200.00
Chromium	16	8	4.10	14.60
Cobalt	16	8	4.10	15.90
Copper	16	58	9.30	225.00
Iron	16	16,247	9,260.00	29,500.00
Lead	16	6	2.60	13.70
Lithium	16	19	5.10	42.80
Magnesium	16	5,144	1,650.00	11,300.00
Manganese	16	313	120.00	831.00
Mercury	9	0	0.02	0.09
Molybdenum	1	4	3.50	3.50
Nickel	16	8	3.50	16.10
Potassium	16	2,724	843.00	5,880.00
Selenium	0	ND	ND	ND
Silver	8	1	0.67	1.30
Sodium	16	4,226	7.30	12,300.00
Thallium	0	ND	ND	ND
Vanadium	16	36	17.30	64.90
Zinc	16	89	35.80	258.00

- number of samples with detectable quantities of analyte
ND - analyte not detected
Includes samples from 3/91.

Table 3.7.2.ii. Water sample results for Group III Sites
Date: 4/91

Location	Sample Number	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	PCB/Pesticide (*3) ug/L	Semivolatiles Method 625, ug/L QL: 10 ug/L	Volatiles Method 624, ug/L QL: 5 ug/L
MW031	3766	U	U	U	2 Unknowns 12.0 17.0	Methcl 1.0**
MW032	3764	U	T 2.0	U	TIC 1 12.0 2 Unknowns 44.0 52.0	Methcl 3.0**

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 50 ug/L
*2 - Method 8015/8020, quantitation limit: 50 ug/L
*3 - Method 608, quantitation limit: 0.05 ug/L
HBP - high boiling point
LBP - low boiling point
TIC 1 - 2-pentanone, 4-hydroxy-4-met

NOTE - concentrations are estimated for TICs and unknowns

Methcl - methylene chloride
PHC - petroleum hydrocarbons
QL - quantitation limit
T - toluene
TIC - tentatively identified compound
U - no compounds detected

Table 3.7.2.ii. (continued)

Anions, mg/L Method 429 Quantitation limit: 0.5 mg/L				
Compound	#	Average	Minimum	Maximum
Chloride	2	3,960	520.00	7,400.00
Fluoride	0	ND	ND	ND
Nitrate, as N	0	ND	ND	ND
Phosphate	0	ND	ND	ND
Sulfate	2	1,150	300.00	2,000.00

Metals, ug/L Method 200.7 Quantitation limit: 1 ug/L				
Compound	#	Average	Minimum	Maximum
Aluminum	1	48	47.70	47.70
Antimony	0	ND	ND	ND
Arsenic	2	1,196	741.00	1,650.00
Barium	2	21	17.70	25.20
Beryllium	0	ND	ND	ND
Boron	2	41,050	15,200.00	66,900.00
Cadmium	0	ND	ND	ND
Calcium	2	21,105	5,510.00	36,700.00
Chromium	0	ND	ND	ND
Cobalt	0	ND	ND	ND
Copper	2	24	23.20	25.40
Iron	2	28	19.40	36.20
Lead	0	ND	ND	ND
Lithium	2	189	45.20	332.00
Magnesium	2	52,655	4,310.00	101,000.00
Manganese	2	46	7.90	83.50
Mercury	0	ND	ND	ND
Molybdenum	2	1,150	230.00	2,070.00
Nickel	0	ND	ND	ND
Potassium	2	98,150	21,300.00	175,000.00
Selenium	1	10	9.60	9.60
Silver	1	8	7.60	7.60
Sodium	2	5,415,000	1,040,000.00	9,790,000.00
Thallium	0	ND	ND	ND
Vanadium	2	437	74.20	800.00
Zinc	2	113	76.90	149.00

- number of samples with detectable quantities of analyte
ND - analyte not detected
Includes samples from 4/91.

Summary

Screening and characterization activities at the Group III Sites indicate that the primary contaminants of concern are diesel fuel associated with the former underground tank location. The contaminated media of concern include a strip of soil a few feet wide above the water table leading west from the former tank location to the unnamed drainage ditch and some near-surface soils at the grit disposal areas (Fig. 3.7.1.i).

3.7.2.iii Exposure Pathways

A synopsis of media-specific contaminant transport pathways, assimilation routes, exposure points, and affected biota for NAS Fallon is given in Appendix C. The following paragraphs expand on these initial evaluations in light of the characterization activities completed at the Group III Sites.

The atmosphere is not considered to be a contaminated medium of concern because sludge and grit waste are contained in a buried state and volatile constituents associated with treated effluents will rapidly evaporate in the settling ponds. The air quality of the surrounding region is good, and prevailing air currents will rapidly dilute and disperse any volatile contaminants that may be released once they enter the atmosphere.

Direct exposure pathways for contaminated soils at the Group III Sites include dermal contact, ingestion, and inhalation of dust particles and volatile constituents. Affected biota include indigenous plants and burrowing animals as well as personnel associated with site excavation activities. Plant and animal populations are controlled on NAS Fallon property, and potential exposures associated with these biota are thus minimized. Because NAS Fallon is a restricted area, direct exposure to the human populace is restricted to naval personnel and subcontractors. Restricted access, lack of surface soil contamination, and site activities geared towards environmental safety thus prevent contaminated soils at the Group III Sites from constituting a primary exposure pathway.

Direct exposure pathways for groundwater include use of potentially contaminated groundwater extracted from the shallow aquifer and the intermediate aquifer. The shallow aquifer is not pumped on NAS Fallon property and, due to its high salinity, is used sparingly for human consumption in the surrounding area (Appendix C). In fact, there are no wells tapping the shallow aquifer downgradient of the Group III sites that are used for drinking water. In light of the fact that no groundwater contamination was detected, direct exposures to contaminants through extraction of the shallow groundwater in the area are believed to be minimal.

Available site-characterization results indicate that contaminants are not migrating into the intermediate aquifer. The PA/SI report postulates the existence of an upward flow gradient in the surrounding area (Dames and Moore 1988). Investigative results confirm this theory. Additionally, drilling logs indicate that a confining clay layer exists between the shallow aquifer and the intermediate aquifer over the entire facility. It is believed that these natural containment mechanisms prevent contaminants from reaching the regional domestic water source.

As with groundwater, contaminated soils associated with the Group III Sites do not constitute a substantial direct exposure pathway. Surface soils may, however, serve as a source term for atmospheric transport of contaminated particulates, and both contaminated soils and groundwater may act as a source for contaminating surface water. Contaminated surface water may then serve as an exposure pathway to receptors. Lack of significant surface-soil contamination; however, makes this pathway relatively unimportant.

Exposures to wind-blown transport of contaminated soils are minimal due to restricted access in the immediate vicinity, the natural cohesive properties of native surface soils, and dust-control measures employed during construction activities. In addition, the air quality of the region is good, and airborne particulate matter is quickly dispersed. Hence, atmospheric transport is not considered a threat to the environment.

Downward transport of residual soils contamination to the underlying aquifer via naturally occurring surface-water percolation is not considered significant because of the semiarid climate. Indeed, the alkali flats in the surrounding area indicate a negative regional water balance. It is surmised that because contaminants were originally introduced at or near

the ground surface, the downward transport necessary to produce existing groundwater contamination (i.e., diesel contamination from the formerly buried storage tank) resulted from gradients introduced from the leak and not from the natural percolation process. Thus, there is no mechanism for contaminants such as metals associated with the grit disposal areas to be transported to the groundwater.

While downward transport of contaminants via percolation of natural surface water is minimal, Site 9 does afford a substantial transport mechanism for transport of near-surface contaminants to the underlying aquifer. The settling ponds of the water treatment system afford a continuous source of potential contaminants and also produce a substantial downward flow gradient. The resulting flow system may induce downward percolation of the treated effluent into the underlying upper aquifer. As discussed in the Phase I study, as much as 10% of the treated effluent may percolate to the water table and, hence, contribute to groundwater contamination. However, downgradient wells and groundwater test holes indicate that no significant contamination of groundwater has resulted.

Surface-water runoff resulting from excessive precipitation or human activities may transport contaminated surface sediments or dissolved constituents to the regional surface drainage system. In addition, contaminants presently associated with the shallow groundwater (from previous spills or percolation from settling ponds) may migrate downgradient for eventual seepage discharge into the surrounding drainage ditches. Restricted access and institutional controls again minimize any surface-water exposures on NAS Fallon property. Contaminated surface water does, however, have the potential to transport contaminants off site to exposure points. As explained in Appendix C, off-site exposure points associated with surface water include recreational exposure, direct exposure to biota which inhabit contaminated surface-water channels and wetlands, secondary exposure to humans who consume contaminated biota, and exposures associated with the final deposition of contaminated waters into the neighboring reservoirs and wetlands (Stillwater Point Reservoir and Stillwater Wildlife Refuge).

Ground- and surface-water transport to off-site receptors are the primary exposure pathways for contaminants of concern at the Group III Sites. Potential off-site transport

mechanisms include: 1) eventual seepage discharge of groundwater contaminants to surface water migrating off site, and 2) discharge of contaminated surface water (from rainfall and human activity) to surface-water drainage systems. The principal exposure pathway of concern is thus the regional surface-water system extending from the downgradient (southeastern) edge of the facility to Stillwater Point Reservoir and the Stillwater Wildlife Refuge.

As explained in Appendix C, the regional drainage system was constructed to intercept and drain the shallow aquifer. As shown in Fig. 3.7.1.i, the unnamed drainage ditch and the Lower Diagonal Drain located along the western and southern boundaries of the area of concern are the primary receptors for groundwater or surface-water transport of contaminants from the Group III Sites. Thus the unnamed tributary, the Lower Diagonal Drain, and the downstream surface water are the primary exposure pathways associated with the Group III Sites.

3.7.3 Recommendations

Based on the natural containment of contaminants at the sites and the lack of groundwater contamination, no additional site investigation is recommended.

3.8 GROUP IV SITES: SITE 10, GROUND TO AIR TRANSMITTING AND RECEIVING (GATAR) COMPOUND; SITE 11, PAINT SHOP; SITE 12, PEST CONTROL SHOP; SITE 13, BOILER PLANT TANKS; SITE 14, OLD VEHICLE MAINTENANCE SHOP; SITE 16, OLD FUEL FARM; SITE 17, HANGAR 4; SITE 19, POST-WORLD WAR II BURIAL SITE; AND SITE 23, SHIPPING AND RECEIVING DISPOSAL SITE.

3.8.1 Site History

All of the sites are located in the old portion of the facility (Fig. 1.3.ii). A discussion of the history of each site follows.

3.8.1.i Site 10, GATAR Compound

Site 10, GATAR Compound, is located in the southeastern portion of the old area of NAS Fallon (Fig. 3.8.1.i). The site originally belonged to the Air Force and came under Navy control in 1975. The area was apparently unused until 1984 when reported storage activities were initiated. Since 1986, the site has provided interim storage for hazardous wastes (Dames and Moore 1988). The site consists of a graveled area which was used for interim storage of hazardous materials pending removal to disposal facilities.

Hazardous wastes stored at Site 10 included PCB (polychlorinated biphenyl) laden oil, paints, solvents, waste oils, and hydraulic fluids. PCBs were stored primarily as transformer oil in electrical transformers. Several containers of waste oil containing PCBs were reportedly buried on the site in 1984. The exact location of burial is unknown. Other hazardous liquids were stored in aboveground containers, primarily 208-L (55-gal) drums.

3.8.1.ii Site 11, Paint Shop

As shown in Fig. 3.8.1.i, Site 11, the Paint Shop, is located in the north-central portion of the old section of the facility. Paint wastes were disposed of or spilled on the unpaved ground surface to the north of the paint shop. Disposal activities stopped in 1986 at which time the ground surface was paved with concrete. Although the paint shop has been in operation since the early 1960s, documented disposal activities could be obtained only for the period from 1976 to 1986. Waste paints and thinners were introduced to soils either deliberately or from spills associated with transferal from drums.

3.8.1.iii Site 12, Pest Control Shop

Site 12, the Pest Control Shop, has been located in the northwestern part of the old portion of NAS Fallon since the early 1960s (Fig. 3.8.1.i). Records of activities at the

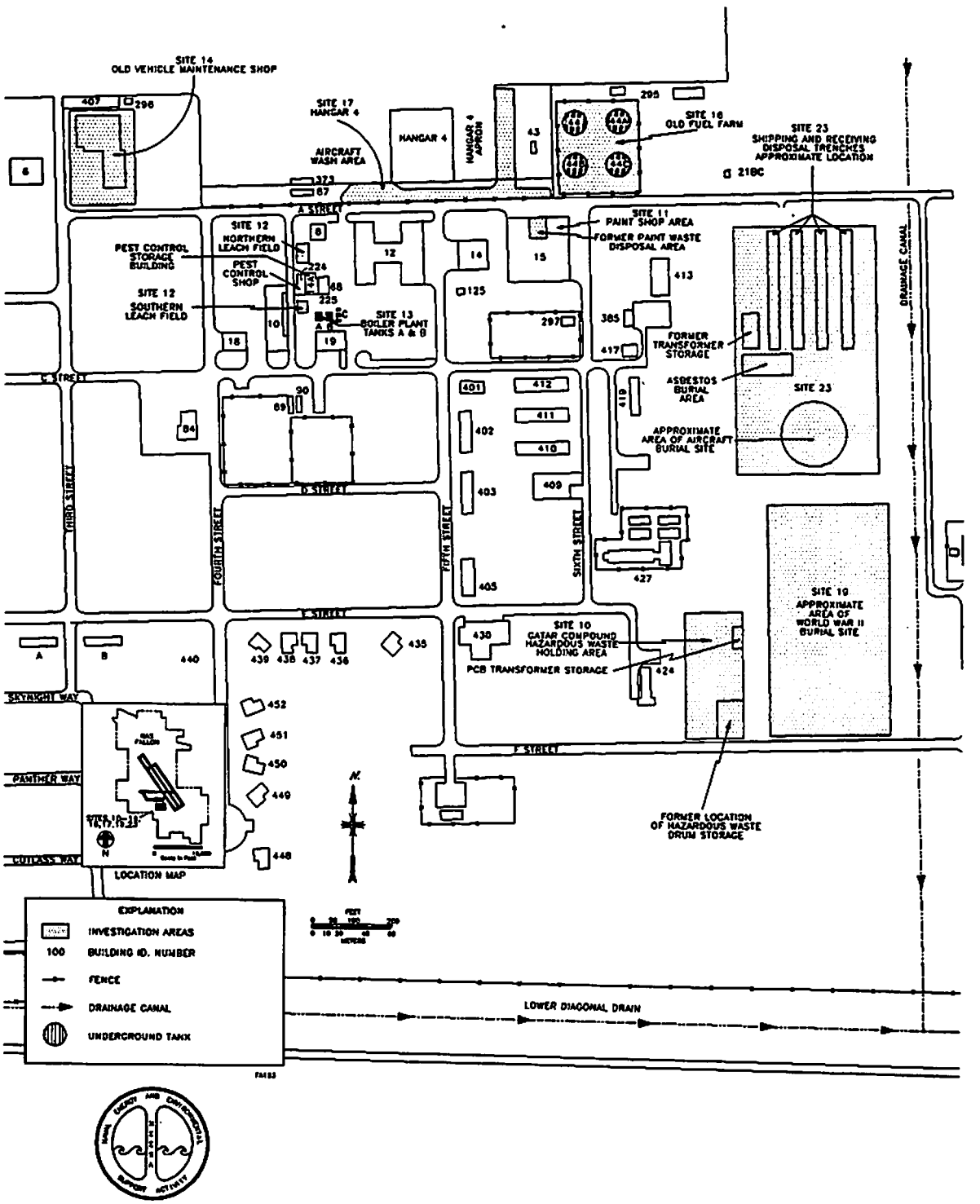

Fig. 3.8.1.i. Group IV sites: Sites 10 - 14, 16, 17, 19, and 23.

site are available from 1974 to present. Although the Pest Control Shop continues to be operational, the site is considered a past operation with respect to changes in the type of pesticides used.

Prior to 1974, pesticides handled at the site included DDT (dichlorodiphenyl-trichloroethane). Later activities included handling and storing the pesticides malathion, parathion, pyrethrin, diazinon, and 2,4-D.

Areas of contamination at the site include the north and south leach fields (Fig. 3.8.1.i). The south leach field receives runoff generated from rinsing of pest control vehicles. Rinse water from mixing pesticides and rinsing empty containers is directed to the north leach field. At this time neither leach field appears to be operational; however, wastewater has been observed running off to the leach field areas and infiltrating the soil.

3.8.1.iv Site 13, Boiler Plant Tanks

Site 13, the Boiler Plant Tanks, consists of two underground 98,420-L (26,000-gal) storage tanks formerly used to store fuel for the boiler plant. The tanks are located near the boiler house to the southeast of the Pest Control Shop (Fig. 3.8.1.i). Boiler plant fuels storage was discontinued in 1981 at which time the tanks were used for intermittent storage of other fuels and oils until about 1986. Although emptied in 1986, some liquids remained in the tanks as of September 1988.

Fuels were reportedly spilled on surface soils around inlets to the tank during filling operations. Spills may have consisted of No. 6 fuel oil, waste lubrication oil, hydraulic fluid, JP-5, and diesel fuel. The area around the tanks is heavily stained and assumed to be contaminated; however, the tanks are scheduled to be removed by the Underground Storage Tank Program.

3.8.1.v Site 14, Old Vehicle Maintenance Shop

As shown on Fig. 3.8.1.i, Site 14 is located in the northwestern part of the old portion of NAS Fallon. The site consists of a concrete slab which served as the

foundations for a mechanic bay, fueling area, and support building. The facility was used from 1943 to 1971 (exclusive of the years 1947-1950 when activity operations were closed) to service and fuel Public Works Transportation and other vehicles. From 1971 to 1973, the shop reportedly served as the auto hobby shop. The shop was razed some time after 1973.

Areas of concern at the site include the former lube pits and two underground storage tanks. The lube pits apparently contained hydraulic lifts and are now filled with soil. The depth of the pits is estimated at 1.8 to 2.1 m (6 to 7 ft), and they have concrete floors. The underground storage tanks were used to store leaded gasoline and diesel fuel. The tanks were removed in 1989 and were found to have been leaking unidentified petroleum hydrocarbons into the tank excavation pits.

3.8.1.vi Site 16, Old Fuel Farm

Site 16, the Old Fuel Farm, served as the main fuel storage and dispensing facility for the activity from 1943 to 1962 (exclusive of the years 1947-50). The site consists of four concrete underground storage tanks located in the north-central part of the old portion of the facility (Fig. 3.8.1.i). In 1963, active operations at the site were transferred to the New Fuel Farm, and the storage tanks were used for dead storage of various fuels. Dead storage continued until 1985 at which time the four storage tanks were emptied. They have not been used since, although at least one of the tanks still contains some form of petroleum hydrocarbons reported to be #6 fuel oil. These tanks are scheduled for removal by the Underground Storage Tank Program.

Fuels stored at the site over the lifetime of operations include avgas, JP-4, JP-5, diesel fuel, gasoline, and No. 6 fuel oil. Excavations in the area have encountered petroleum hydrocarbon contaminated soils which likely resulted from past leaks and spills at Site 16.

3.8.1.vii Site 17, Hangar 4

Potentially contaminated soils associated with Site 17, Hangar 4, are shown in Fig. 3.8.1.i. The potential areas of contamination consist of the formerly unpaved soils lying to the south and east of Hangar 4. These areas received runoff from aircraft washing activities and aircraft fluids spilled on the parking apron. Contaminant introduction took place between the years of 1943 and 1987 (exclusive of the years 1947-50). Although the southern portion of the site remains open, soils to the east of Hangar 4 were capped with paving in 1985. Potential contaminants of concern include cleaning solvents (Turco), lubrication oil, hydraulic fluid, grease, avgas, JP-4, JP-5, MEK (methyl ethyl ketone), isopropyl alcohol, and PD-680.

3.8.1.viii Site 19, Post-World War II Burial Site

Site 19, the Post-World War II Burial Site, is located in the southeastern part of the old portion of NAS Fallon (Fig. 3.8.1.i). The site reportedly received trash and refuse generated during facility decommissioning activities between the years of 1946 to 1949. Landfilling was conducted through trench burial. The disposal trenches were probably excavated with a bulldozer to a depth of less than 2.4 m (8 ft). Wastes reportedly deposited included trash, vehicles, wood, paints, thinners, and solvents.

3.8.1.ix Site 23, Shipping and Receiving Disposal Site

Site 23, the Shipping and Receiving Disposal Site, is located in the northeastern part of the old portion of the facility (Fig. 3.8.1.i). The site consists of the shipping and receiving disposal area, the aircraft burial area, and an area where asbestos was reportedly buried. Transformers containing PCB fluids were also allegedly stored at the site. Disposal activities at the shipping and receiving disposal area consisted of landfilling unsalvageable material and equipment formerly stored on the site. Although the source of this material is unknown, it is surmised that the salvage items originated through Public Works and aircraft maintenance

activities. Landfilling was accomplished by burial in four bulldozed trenches. Buried wastes reportedly included junk, debris, metal, rubble, paints, thinners, petroleum liquids, oils, and lubricants (Dames and Moore 1988).

Additional disposal activities at the site include the reported burial of a burned out DC-3 aircraft fuselage south of the landfill trenches (Fig. 3.8.1.i). It is not known if the plane contained fuel or other liquids, but it is irrelevant since no evidence of a buried aircraft was found by the geophysical surveys (Appendix A).

3.8.2 Investigative Approach, Extent of Contamination, and Exposure Pathways

A synopsis of media-specific contaminant transport pathways, assimilation routes, exposure points, and affected biota for NAS Fallon is given in Appendix C. The following paragraphs relate the investigative approach and extent of contamination. Possible exposure pathways are discussed in light of the characterization activities completed at the Group III Sites.

3.8.2.i Investigative Approach

Results from soil samples, record searches, and inspections conducted during the Phase I study support the following propositions and investigative activities (Dames and Moore 1988):

> Site 10, GATAR Compound: although no PCB leakage has been reported, the storage of transformer oils and reported burial of PCB containers suggest that some PCB soils contamination in the area is likely. Based on the quantities of waste routinely stored at the site, it is also probable that other hazardous materials (primarily paints, solvents, and waste oils) have been introduced to the subsurface environment. (Geophysical surveys and soil sampling were proposed to check for contaminants at the site [ORNL 1989]).

Site 11, Paint Shop: because of the amount of wastes (primarily paints and thinners) spilled or disposed of at the site, soils and shallow groundwater contamination is likely. (Downgradient wells for the entire group of sites were proposed to test for contamination [ORNL 1989]).

Site 12, Pest Control Shop: based on the amount of pesticides handled at the site over the period of operation, soil and groundwater contamination near the leach fields is suspected. (Soil borings and a downgradient well were proposed to test for contamination [ORNL 1989]).

Site 13, Boiler Plant Tanks: petroleum hydrocarbon contamination of soils and possibly groundwater is suspected near the fill ports of the two underground storage tanks. (Soil-gas surveys and downgradient monitoring wells were proposed to test for migrating contaminants [ORNL 1989]).

Site 14, Old Vehicle Maintenance Shop: it is surmised that contaminant spills in the lube pits were contained by the concrete floors. Contamination of the subsurface environment from the lube pits is thus considered unlikely. Contaminants are, however, expected to be present in the soils and possibly the groundwater near the underground storage tanks. (Soil-gas surveys and monitoring wells were proposed for the site [ORNL 1989]).

Site 16, Old Fuel Farm: based on the amount of petroleum product handled at the site and the contaminated soils exposed during excavation activities, soil and groundwater contamination at the site is probable. (Soil-gas testing, soil borings, and monitoring wells were proposed for the site [ORNL 1989]).

Site 17, Hangar 4: three soil samples were taken in the runoff area south of Hangar 4 during the Phase I investigation to assess the potential for soils contamination.

Samples were analyzed for TPH (EPA method 418.1) and VOC (EPA method 8240). Results indicate TPH values ranging from 57 ppm to 350 ppm. Acetone was detected in two of the samples (120 ppb and 710 ppb) and trace amounts of TCE and DCA (dichloroethane) were detected in one sample. Contamination of soils and possibly the groundwater in the area is thus considered likely. (Soil borings, downgradient soil-gas testing, and monitoring wells were proposed for the site [ORNL 1989]).

Site 19, Post-World War II Burial Site: wastes disposed of in the area (particularly solvents) may have contaminated soils and groundwater in the area. (Geophysical surveys, downgradient soil-gas testing, and monitoring wells were proposed for this site [ORNL 1989]).

Site 23, Shipping and Receiving Disposal Site: the type and quantity of waste materials buried in the four trenches may have the potential to contaminate the subsurface environment of the surrounding area. Asbestos contamination of subsoils is considered minimal because the materials were properly disposed of. Leakage of liquid wastes thought to be present in the allegedly buried aircraft may have contaminated the underlying soil and shallow groundwater. (Geophysical surveys, downgradient soil-gas testing, and monitoring wells were proposed for this site [ORNL 1989]).

3.8.2.ii Extent of Contamination

Geophysical Surveys

Phase II screening activities at the Group IV sites consisted of performing EM-31 geophysical surveys at Sites 10, 19, and 23, and analyzing numerous groundwater test holes throughout the area (Appendices A and B). The geophysical surveys attempted to locate the containers of PCB fluids reportedly buried at Site 10 and to delineate the buried waste

at Sites 19 and 23 inclusive (sites 19 and 23 are adjacent to one another; hence one survey was used to encompass both). Results of the geophysical activities (Appendix A) were inconclusive but may have outlined targets for the buried PCB oil containers. No indication of a buried aircraft was found at Sites 19 or 23.

Groundwater Test Holes

The groundwater test hole method was substituted for the proposed soil-gas surveys because when the results of the two techniques were compared at Site 2, the groundwater method proved more effective. Results from the groundwater test hole screening activities are given in Appendix B. Due to the close proximity of the Group IV Sites, the two contaminant plumes discovered by the groundwater test hole screening encompass several adjacent sites. Each of the contaminated areas delineated are discussed in the context of their anticipated source areas (as inferred from the regional groundwater flow direction). Groundwater screening activities were not conducted at Site 11, the Paint Shop, because concrete paving prevented drilling, and downgradient wells were already proposed for the other sites.

Phase II Sampling

Numerous soil, sediment, and groundwater samples taken from the Group IV sites were submitted for laboratory analysis in conjunction with Phase II RI activities. Phase II analytical sampling activities conducted to date are shown in Table 1.1.i and summarized below:

Site 10, GATAR Compound: metal detector survey and five soil borings taken to 1.2 m (4 ft) (Fig. 3.8.2.i);

Site 12, Pest Control Shop: six soil borings taken to the water table and one single completion monitoring well (MW22) was installed (Fig. 3.8.2.ii);

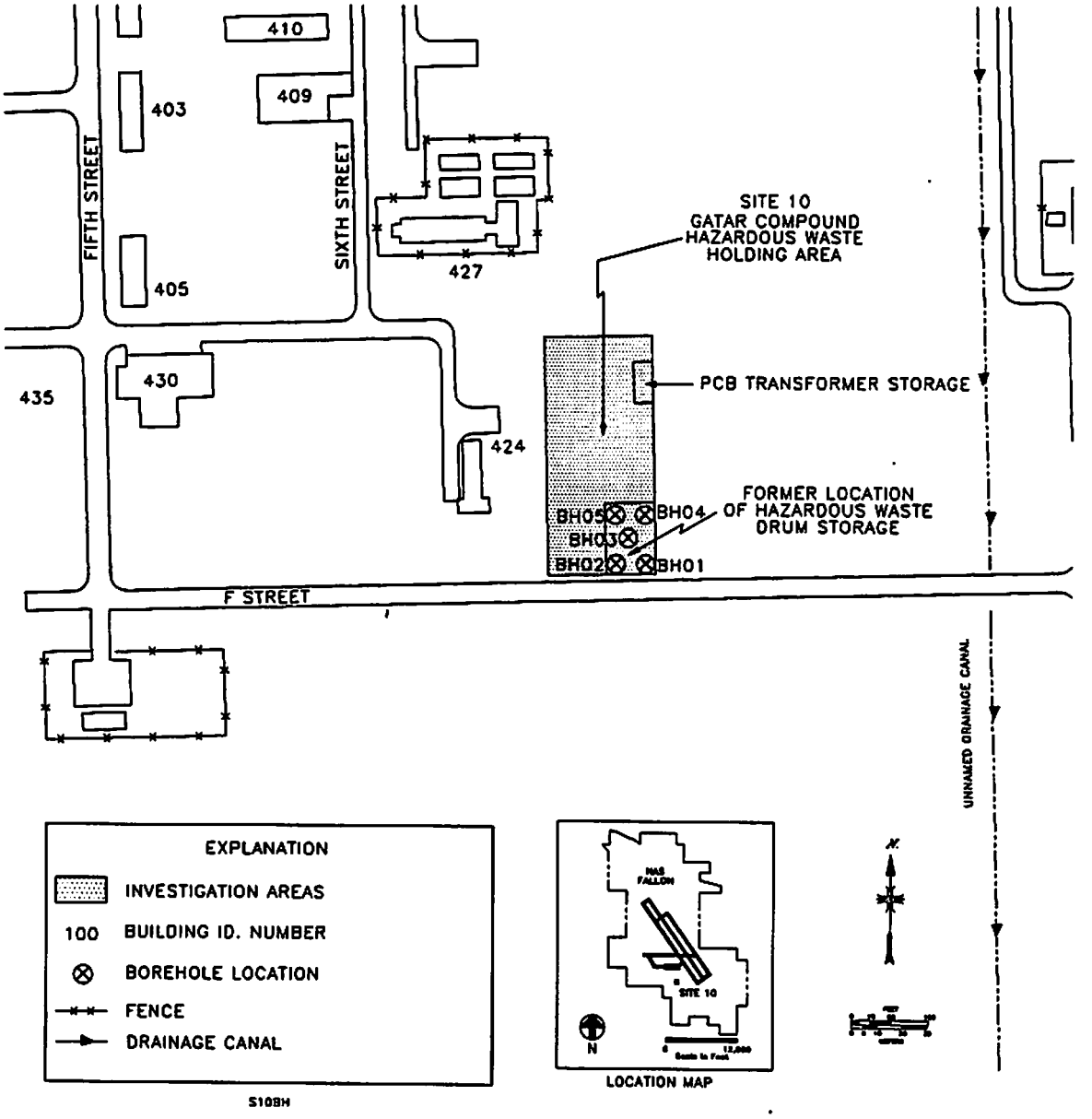

Fig. 3.8.2.i. Site 10, GATAR Compound. Soil boring locations.

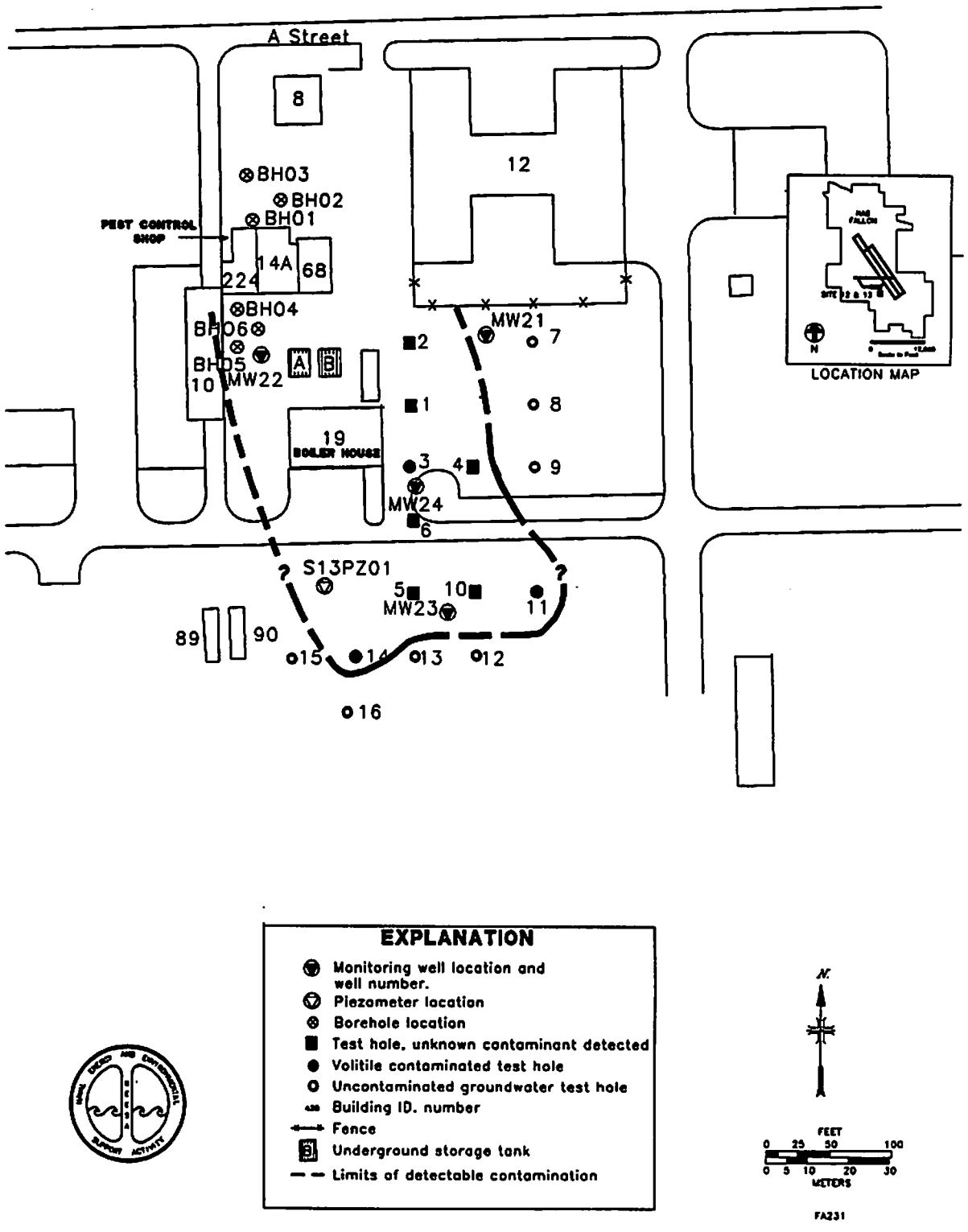

Fig. 3.8.2.ii. Site 12, Pest Control Shop, and Site 13, Boiler Plant Tanks. Groundwater test hole and analytical sampling locations.

Site 13, Boiler Plant Tanks: two single completion monitoring wells (MW23, MW24) and one piezometer were installed (Fig. 3.8.2.ii);

Site 14, Old Vehicle Maintenance Shop: one dual completion monitoring well (MW18U, MW18L), three single completion monitoring wells (MW19, MW20, MW21), and four piezometers were installed (Fig. 3.8.2.iii);

Site 16, Old Fuel Farm: two dual completion wells (MW25U, MW25L, MW29U, MW29L), four single completion wells (MW26, MW27, MW28, MW30), eight soil borings around the underground tanks, and eight piezometers were installed (Fig. 3.8.2.iv);

Site 17, Hangar 4: five soil borings were drilled to the water table (Fig. 3.8.2.iv);

Site 19, Post-World War II Burial Site: four downgradient monitoring wells and three piezometers were installed. These are shared with Site 16 (Fig. 3.8.2.iv);

Site 23, Shipping and Receiving Disposal Site: three soil borings were drilled to 1.2 m (4 ft) (Fig. 3.8.2.iv).

Analytical Data and Results

Site 10, GATAR Compound

Results of the five soil borings drilled at Site 10, the GATAR Compound, are shown in Table 3.8.2.i. No contamination was detected other than that related to laboratory sample preparation. A metal-detector survey was conducted, but only shallowly buried scrap metal was located. The only additional work recommended at this site is a metal-probe survey which will be used to test the three target areas delineated by the geophysical survey.

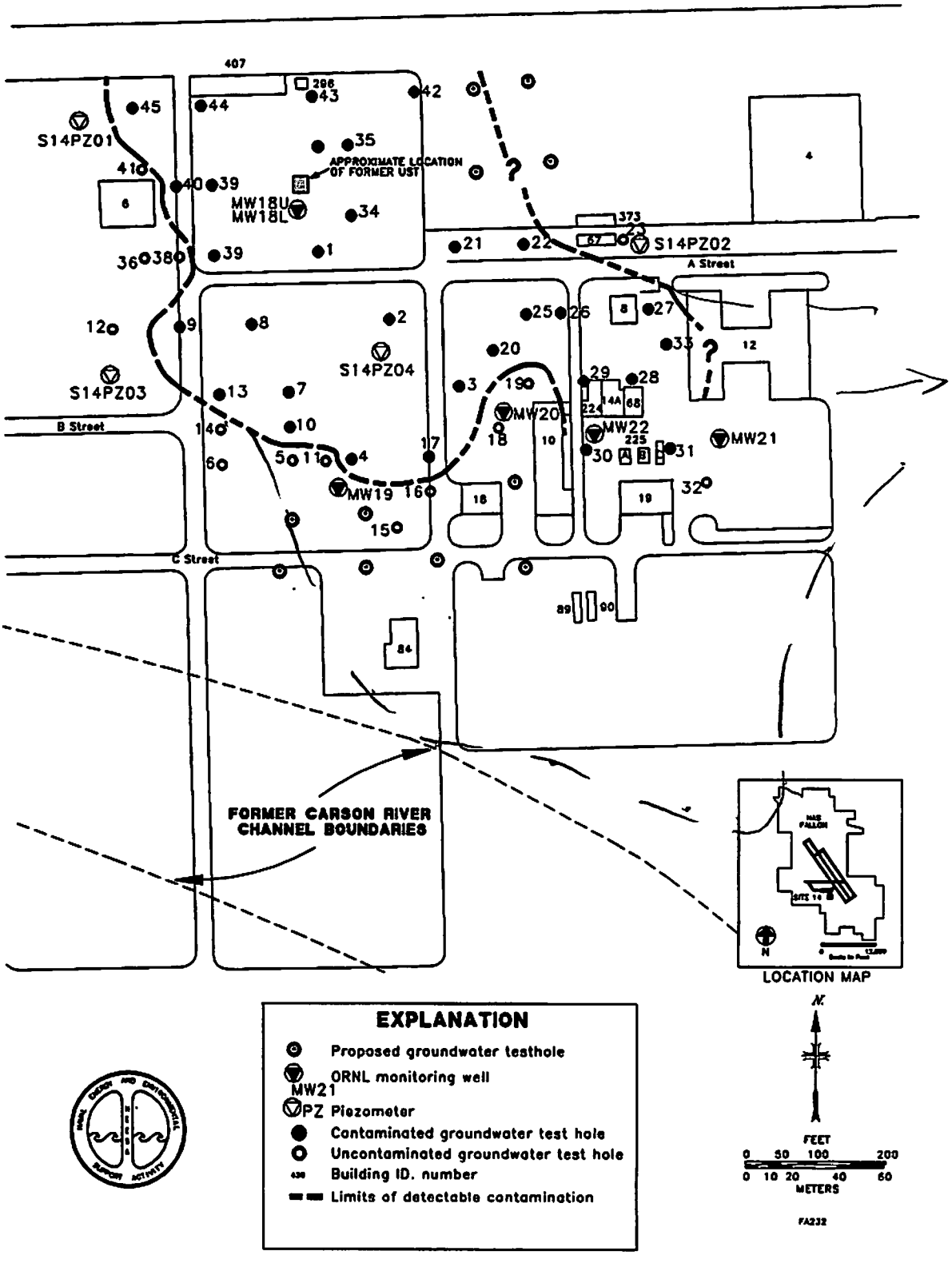

Fig. 3.8.2.iii. Site 14, Old Vehicle Maintenance Shop. Groundwater test hole and analytical sampling locations.

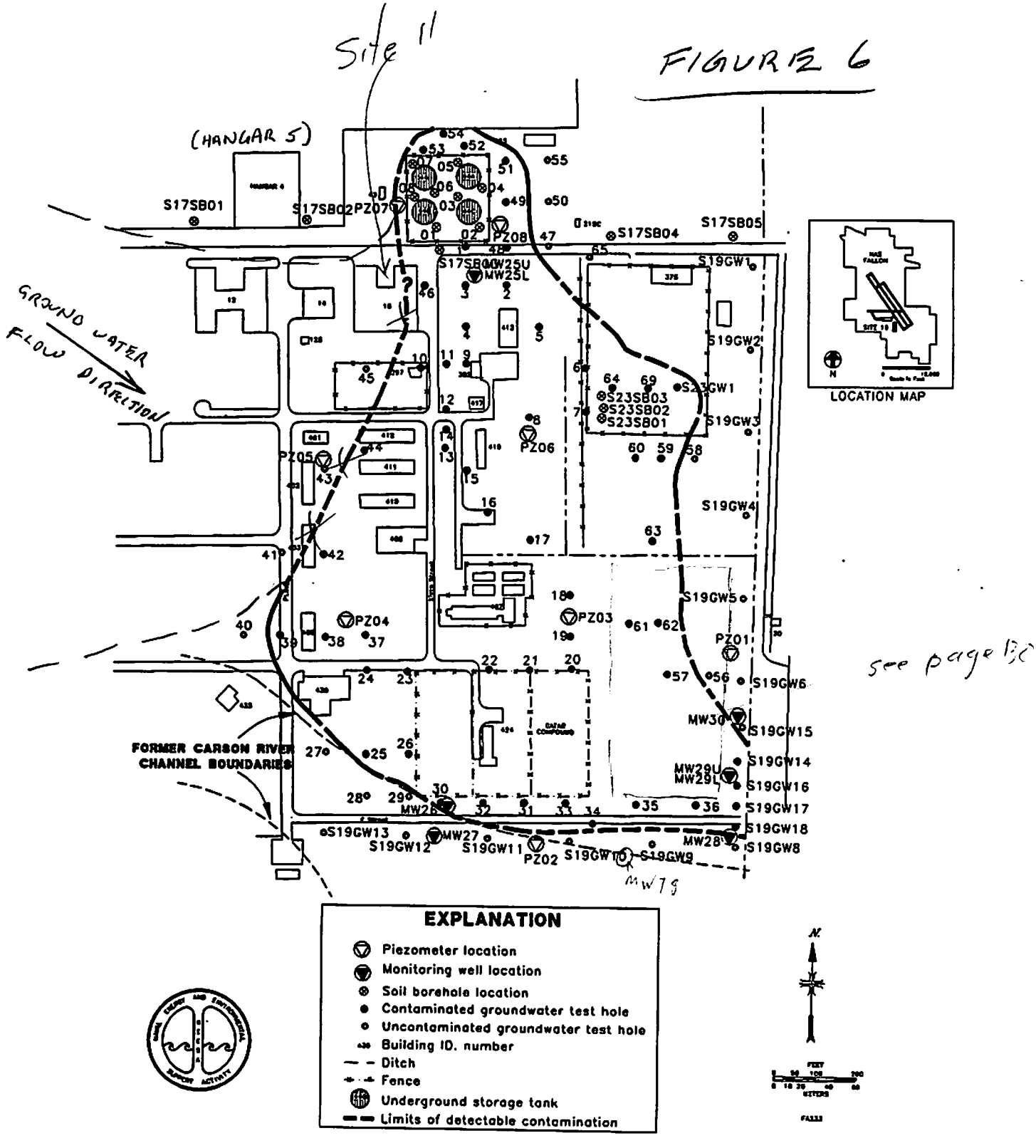

Fig. 3.8.2.iv. Site 10, GATAR Compound; Site 11, Paint Shop; Site 16, Old Fuel Farm; Site 17, Hangar 4; Site 19, Post-World War II Burial Site; Site 23, Shipping and Receiving Disposal Site. Groundwater test hole and analytical sampling locations.

Table 3.8.2.i. Soil sample results for Site 10 (GATAR Compound)
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg	Volatiles Method 8240, ug/kg QL: 5 ug/kg
BH001	3671	0-2 ft	U	U	U	Bis2 80.0** TIC 1 160.0 TIC 2 11000.0** TIC 3 230.0** TIC 4 800.0** TIC 5 290.0 TIC 6 14000.0 2 Unknowns 170.0*? 270.0	Methcl 5.0**
BH001	3672	2-4 ft	U	U	U	Bis2 62.0** TIC 7 170.0 TIC 2 11000.0** TIC 8 160.0 TIC 3 180.0** TIC 4 360.0** TIC 5 230.0 TIC 6 18000.0 1 Unknown 260.0*?	Methcl 17.0**
BH002	3673	0-2 ft	U	U	U	Bis2 58.0** TIC 7 190.0 TIC 2 8900.0** TIC 3 410.0** TIC 4 510.0** TIC 5 290.0 TIC 6 5200.0 3 Unknowns 220.0*? 290.0	Methcl 14.0**
BH002	3674	2-4 ft	U	U	U	Bis2 81.0** TIC 2 11000.0** TIC 3 230.0** TIC 4 630.0** TIC 5 500.0 TIC 6 6000.0 3 Unknowns 170.0*? 260.0	Methcl 16.0**
BH003	3675	0-2 ft	U	U	U	Bis2 46.0** TIC 2 7000.0** TIC 3 170.0** TIC 4 350.0** TIC 6 6700.0	Methcl 4.0**
BH003	3676	2-4 ft	U	U	U	Bis2 71.0** TIC 2 10000.0** TIC 8 190.0 TIC 3 580.0** TIC 4 680.0** TIC 5 350.0 4 Unknowns 200.0*? 310.0	Methcl 16.0**
BH004	3677	0-2 ft	U	U	U	Bis2 47.0** TIC 2 9000.0** TIC 8 180.0 TIC 3 500.0** TIC 4 760.0** TIC 5 290.0 TIC 6 1300.0 2 Unknowns 170.0*? 200.0	Methcl 8.0**

Table 3.8.2.i. (continued)

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH004	3678	2-4 ft	U	U	U	Bis2 TIC 2 TIC 3 TIC 4 TIC 5 TIC 6 2 Unknowns	89.0** 11000.0** 880.0 510.0** 280.0 14000.0 170.0*? 230.0	Methcl	11.0
BH005	3679	0-2 ft	U	U	U	Bis2 TIC 2 TIC 3 TIC 4 TIC 5 2 Unknowns	330.0*J 11000.0** 810.0 840.0 360.0 180.0*? 230.0	Acet Methcl	24.0** 11.0
BH005	3680	2-4 ft	U	U	U	Bis2 TIC 2 TIC 3 TIC 4 TIC 5 2 Unknowns	140.0** 8600.0** 810.0 590.0** 230.0 170.0*? 210.0	Acet Methcl	4.0** 13.0

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
*3 - Method 3550/8080, quantitation limit: 8.3 ug/kg
*? - some or all unknowns contain unusable data
*J - concentration estimated
Acet - acetone
Bis2 - bis(2-Ethylhexyl) phthalate

HBP - high boiling point
LBP - low boiling point
Methcl - methylene chloride
PHC - petroleum hydrocarbons
QL - quantitation limit
TIC - tentatively identified compound
U - no compounds detected

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-butanone, 3,4-epoxy-3-ethy
TIC 2 - 2-pentanone, 4-hydroxy-4-met
TIC 3 - 3-penten-2-one, 4-methyl-
TIC 4 - 5-hexen-2-one, 5-methyl-
TIC 5 - hexadecanoic acid
TIC 6 - hexanedioic acid, dioctyl es
TIC 7 - 2,5-hexanedione
TIC 8 - 3-heptanone, 2,4-dimethyl-

Table 3.8.2.i. (continued)

Metals, mg/kg Method 6010 Quantitation limit: 1 mg/kg				
Compound	#	Average	Minimum	Maximum
Aluminum	10	9,611	5,480.00	15,700.00
Antimony	0	ND	ND	ND
Arsenic	10	12	4.60	36.30
Barium	10	97	35.30	219.00
Beryllium	10	0	0.17	0.61
Boron	10	57	19.60	117.00
Cadmium	0	ND	ND	ND
Calcium	10	13,388	3,510.00	32,700.00
Chromium	10	9	5.40	13.10
Cobalt	10	7	3.80	11.00
Copper	10	86	24.00	320.00
Iron	10	16,440	10,600.00	27,700.00
Lead	10	7	3.20	12.00
Lithium	10	19	11.70	32.80
Magnesium	10	5,218	3,460.00	8,710.00
Manganese	10	291	115.00	527.00
Mercury	5	0	0.03	0.05
Molybdenum	0	ND	ND	ND
Nickel	10	8	4.50	11.90
Potassium	10	2,761	2,100.00	4,550.00
Selenium	0	ND	ND	ND
Silver	2	2	0.75	3.00
Sodium	10	8,527	2,590.00	13,400.00
Thallium	0	ND	ND	ND
Vanadium	10	38	24.20	62.90
Zinc	10	76	49.10	153.00

- number of samples with detectable quantities of analyte
ND - analyte not detected
Includes samples from 3/91.

Site 12, Pest Control Shop

As shown in Fig. 3.8.2.ii, results from screening sixteen groundwater test holes and one piezometer borehole delineated a contaminant plume thought to be emanating from Site 12, Pest Control Shop, and Site 13, Boiler Plant Tanks. The upper section of the plume appears to be contiguous with a plume emanating from Site 14, Old Vehicle Maintenance Shop (Fig. 3.8.2.iii). As indicated in Appendix B, Table B.3, several of the groundwater test holes contained contaminants of an unknown nature as inferred from GC and PID screening responses. It is possible that these anomalous screening responses are indicative of pesticide contaminants in the surrounding subsurface or from semivolatile compounds in the vadose zone but not in the groundwater. Three out of the six soil borings drilled around the site contained DDT, DDD (dichlorodiphenyldichloroethane), and DDE (dichlorodiphenyldichloroethene) (Table 3.8.2.ii). The soil sample associated with MW22 contained no detectable hydrocarbons or pesticides. The groundwater sample from MW22, however, contained petroleum hydrocarbons, benzene at 47 ppb, pesticides such as 2,4-dichlorophenol at 70 ppb, and other lesser contaminants (Table 3.8.2.iii). The well water had a distinct pesticide odor, yet the pesticide analysis yielded no detectable compounds. It is assumed that the odor of pesticides is from the chlorobenzene pesticides detected by the semivolatile analysis. However, currently used pesticides such as malathion, parathion, pyrethrin, and diazinon, which are not detected with the same analytical method as that used for the EPA-listed pesticides were not tested for. Therefore, a different analytical method was requested for pesticides on the second round of water samples taken in August 1991. These results will be included in the next report.

Site 13, Boiler Plant Tanks

Field screening indicated that there is a plume associated with the two underground tanks at Site 13, the Boiler Plant (Fig. 3.8.2.ii). Two wells were installed downgradient of the site. MW24 was installed within the plume boundary, and petroleum hydrocarbons

Table 3.8.2.ii. Soil sample results for Site 12 (Pest Control Shop)
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg	Volatiles Method 8240, ug/kg QL: 5 ug/kg
BH001	3633	5-7 ft	NP	NP	4,4DDD 3.6*J 4,4DDE 10.0*J 4,4DDT 32.0	NP	NP
BH001	3634	5-7 ft	NP	NP	U	NP	NP
BH001	3635	7-9 ft	NP	NP	4,4DDD 6.3*J 4,4DDE 18.0*J 4,4DDT 61.0	NP	NP
BH002	3636	5-7 ft	NP	NP	4,4DDT 42.0	NP	NP
BH002	3637	7-9 ft	NP	NP	4,4DDD 110.0 4,4DDE 100.0 4,4DDT 620.0	NP	NP
BH002	3637D	7-9 ft	NP	NP	4,4DDD 130.0*J 4,4DDE 140.0*J 4,4DDT 820.0	NP	NP
BH003	3638	5-7 ft	NP	NP	U	NP	NP
BH003	3639	7-9 ft	NP	NP	4,4DDE 3.0*J 4,4DDT 21.0	NP	NP
BH004	3640	5-7 ft	NP	NP	U	NP	NP
BH004	3641	7-9 ft	NP	NP	U	NP	NP
BH005	3642	5-7 ft	NP	NP	U	NP	NP
BH005	3643	7-9 ft	NP	NP	U	NP	NP
BH006	3644	5-7 ft	NP	NP	U	NP	NP
BH006	3645	7-9 ft	NP	NP	U	NP	NP
MW022	3578	7-9 ft	U	U	U	Bis2 60.0*J TIC 1 3900.0 1 Unknown 190.0	Methcl 140.0

*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
*3 - Method 3550/8080, quantitation limit: 8.3 ug/kg
*J - concentration estimated
4,4DDD - 1,1'(2,2dichloroethylidene) bis(4-chlorobenzene)
4,4DDE - 1,1'(dichloroethenylidene) bis(4-chlorobenzene)
4,4DDT - 1,1(2,2,2trichloroethylidene) bis(4-chlorobenzene)
Bis2 - bis(2-Ethylhexyl) phthalate

HBP - high boiling point
LBP - low boiling point
Methcl - methylene chloride
NP - analysis not performed
PHC - petroleum hydrocarbons
QL - quantitation limit
TIC - tentatively identified compound
U - no compounds detected

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanone, 4-hydroxy-4-met

Table 3.8.2.iii. Water sample results for Site 12 (Pest Control Shop)
Date: 4/91

Location	Sample Number	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	PCB/Pesticide (*3) ug/L	Semivolatiles Method 625, ug/L QL: 10 ug/L	Volatiles Method 624, ug/L QL: 5 ug/L
MW022	3760	U	Gas 170.0 B 47.0	U	2,4,6T 2.0*J 2,4Dic 70.0 2-Meth 2.0*J TIC 1 13.0 TIC 2 16.0 TIC 3 200.0 TIC 4 16.0 TIC 5 240.0 TIC 6 33.0 11 Unknowns 8.5 320.0	Clform 5.0 X 3.0*J

*1 - Method 8015 Modified, quantitation limit: 50 ug/L
*2 - Method 8015/8020, quantitation limit: 50 ug/L
*3 - Method 608, quantitation limit: 0.05 ug/L
*J - concentration estimated
2,4,6T - 2,4,6-trichlorophenol
2,4Dic - 2,4-dichlorophenol
2-Meth - 2-methylnaphthalene
B - benzene
Clform - chloroform

Gas - LBP PHC as compared to gasoline
HBP - high boiling point
LBP - low boiling point
PHC - petroleum hydrocarbons
QL - quantitation limit
TIC - tentatively identified compound
U - no compounds detected
X - xylenes (total)

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2(1h)-pyridinone, 4-phenyl-
TIC 2 - acetic acid, (2,4-dichloroph
TIC 3 - acetic acid, dichlorophenol
TIC 4 - benzenamine, dichloro-
TIC 5 - benzene, dichloro-isocyanato
TIC 6 - cyclohexane, 1-bromo-2-chlor

were detected in the groundwater but not the soil (Tables 3.8.2.iv and 3.8.2.v). It appears that the hydrocarbons may be a mixture of gasoline and/or diesel fuel from the Site 14 plume and fuel oil from the Boiler Plant Tanks. MW23 was installed at the distal end of the plume and contained concentrations of petroleum hydrocarbon compounds below levels of concern (Table 3.8.2.v). There is some question about the boundary on the west side of the plume and the possible continuation of the pesticide and gasoline plume in that area; thus, some additional characterization is recommended.

Site 14, Old Vehicle Maintenance Shop

Groundwater screening activities associated with Site 14, the Old Vehicle Maintenance Shop, consisted of analyzing samples from 45 groundwater test holes and four piezometer borings (Appendix B, Table B.2). Test-hole locations and the resulting plume boundary are shown in Fig. 3.8.2.iii. As mentioned above, the distal portion of the plume appears to merge with contaminants associated with Sites 12 and 13.

Soil sampling of monitoring well boreholes revealed a variety of petroleum hydrocarbon- and solvent-related compounds in MW18 but no detectable contamination other than laboratory-related compounds in soil samples from MW19, MW20, or MW21 (Table 3.8.2.iii). The concentrations of contaminants in the soils at MW18 are consistent with the product found floating on the groundwater. The extent of the floating product is not known.

Water-sampling activities confirmed floating hydrocarbon product in MW18U which appears to be a mixture of diesel fuel and leaded gasoline (Fig. 3.8.2.iii). The elevated lead concentrations indicate that leaded gasoline is one of the plume constituents, and the concentrations of naphthalene and other semivolatile compounds indicate that diesel fuel contamination is also present. Some solvents were also detected in MW18U. However, the concentration of solvent (1,2-DCA) was much lower in MW18L which was screened at the bottom of the shallow aquifer, indicating that a DNAPL plume is not present at the site. The groundwater test hole screening was not entirely successful at delineating the plume as indicated by contaminant concentrations in MW19 and MW20 which were supposed to be

Table 3.8.2.iv. Soil sample results for Sites 13 and 14
(Boiler Plant Tanks and Old Vehicle Maintenance Shop)
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg	Volatiles Method 8240, ug/kg QL: 5 ug/kg
MW018	3570	7-9 ft	73.00	5500.00 B 41.00 E 100.00 T 330.00 X 520.00	NP	2-Meth 3600.0 Bis2 70.0*J Fluor 50.0*J Naph 1600.0 TIC 1 5200.0 TIC 2 3200.0 TIC 2 2800.0 TIC 3 3100.0 TIC 4 4900.0 TIC 4 2700.0 TIC 5 2500.0 TIC 6 2800.0 TIC 7 4300.0 TIC 8 7400.0 TIC 9 1300.0 TIC 10 1100.0 TIC 11 1100.0 TIC 12 2100.0 TIC 13 2400.0 TIC 14 4100.0 4 Unknowns 1600.0 3700.0	B 20000.0 E 47000.0 T 130000.0 X 260000.0 TIC 15 110000.0 TIC 7 51000.0 TIC 16 43000.0 TIC 17 71000.0 TIC 18 46000.0 TIC 19 45000.0 TIC 20 73000.0 TIC 21 42000.0 TIC 22 75000.0 TIC 23 47000.0
MW018	3570D	7-9 ft	NP	NP	NP	NP	B 19000.0 E 46000.0 T 120000.0 X 270000.0 TIC 15 120000.0 TIC 7 56000.0 TIC 16 48000.0 TIC 17 78000.0 TIC 24 41000.0 TIC 18 45000.0 TIC 19 46000.0 TIC 20 77000.0 TIC 22 75000.0 TIC 23 50000.0
MW019	3575	7.5-8 ft	U	U	NP	Bis2 93.0*J TIC 1 4700.0	Methcl 3.0*J
MW020	3576	7-9 ft	U	U	NP	Bis2 55.0*J TIC 1 4300.0 1 Unknown 290.0	Acet 26.0 B 1.0*J Methcl 11.0 T 3.0*J
MW021	3577	7-9 ft	U	U	NP	TIC 1 4500.0 1 Unknown 250.0	Acet 16.0 Methcl 26.0 T 2.0*J
MW023	3579	8-10 ft	U	U	U	Bis2 77.0*J TIC 1 3900.0	Acet 14.0 Methcl 48.0
MW024	3580	7-9 ft	U	U	U	TIC 1 3900.0 1 Unknown 190.0	Acet 12.0*J Methcl 30.0 X 6.0*J

*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
*3 - Method 3550/8080, quantitation limit: 8.3 ug/kg
*J - concentration estimated
2-Meth - 2-methylnaphthalene
Acet - acetone
LBP - low boiling point
Methcl - methylene chloride
Naph - naphthalene
NP - analysis not performed
PHC - petroleum hydrocarbons
QL - quantitation limit

Table 3.8.2.iv. (continued)
Date: 3/91

B - benzene
Bis2 - bis(2-Ethylhexyl) phthalate
E - ethylbenzene
Fluor - fluorene
HBP - high boiling point
T - toluene
TIC - tentatively identified compound
U - no compounds detected
X - xylenes (total)

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanone, 4-hydroxy-4-met
TIC 2 - benzene, ethyl-dimethyl-
TIC 3 - benzene, ethyl-methyl-
TIC 4 - benzene, methyl-propenyl-
TIC 5 - benzene, methyl-propyl-
TIC 6 - benzene, tetramethyl
TIC 7 - benzene, trimethyl-
TIC 8 - dodecane
TIC 9 - dodecane, trimethyl-
TIC 10 - hexadecane
TIC 11 - naphthalene, 1-methyl-
TIC 12 - tetradecane
TIC 13 - tridecane
TIC 14 - undecane
TIC 15 - benzene, ethylmethyl-
TIC 16 - cyclohexane, methyl-
TIC 17 - cyclopentane, methyl-
TIC 18 - hexane (dot)
TIC 19 - hexane, 2,3-dimethyl-
TIC 20 - hexane, 2-methyl-
TIC 21 - pentane (acn) (dot)
TIC 22 - pentane, 2-methyl-
TIC 23 - pentane, 3-ethyl-2,2-dimethy
TIC 24 - heptane, 2-methyl-

Table 3.8.2.v. Water sample results for Sites 13 and 14
(Boiler Plant Tanks and Old Vehicle Maintenance Shop)
Date: 4/91

Location	Sample Number	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	PCB/Pesticide (*3) ug/L	Semivolatiles Method 625, ug/L QL: 10 ug/L	Volatiles Method 624, ug/L QL: 5 ug/L
MW018L	3762	U	Gas 260.0 B 65.0 T 6.0 X 14.0	U	Bis2 2.0*J Butyl 21.0 TIC 1 9.8 TIC 2 33.0 TIC 3 31.0 TIC 4 41.0 12 Unknowns 8.6 1400.0	1,2DCA 47.0 B 33.0 Methcl 2.0** T 2.0*J TIC 5 14.0 TIC 6 14.0 TIC 7 18.0 TIC 8 45.0 TIC 9 9.3 1 Unknown 7.5
MW018U	3753	U	Gas 850000000.0	U	2,4Dim 3600.0 2-Meth 3900.0 4-Metp 330.0*J Benzo 8500.0 Benzyl 2800.0 Bis2 4200.0 Naph 7900.0 TIC 10 4100.0 TIC 11 3400.0 TIC 12 8300.0 TIC 13 8300.0 TIC 14 2800.0 TIC 15 9200.0 TIC 16 7500.0 TIC 17 2800.0 TIC 18 9200.0 TIC 19 4900.0 TIC 20 12000.0 9 Unknowns 2300.0 14000.0	1,2DCA 2200.0 2-But 6100.0 Acet 16000.0 B 18000.0 E 2600.0 T 31000.0 X 15000.0 TIC 21 3100.0 TIC 8 1300.0 1 Unknown 1400.0
MW018U	3754	JP5 14000.0	Gas 100000.0 B 14000.0 E 2300.0 T 26000.0 X 13000.0	U	2,4Dim 1700.0 2-Meth 6000.0 4-Metp 160.0*J Benzo 4200.0 Benzyl 1500.0 Bis2 3400.0 Naph 7400.0 TIC 22 4900.0 TIC 11 8200.0 TIC 11 9200.0 TIC 12 7600.0 TIC 13 7400.0 TIC 23 11000.0 TIC 14 5600.0 TIC 15 8300.0 TIC 16 6500.0 TIC 17 6300.0 TIC 18 8000.0 TIC 24 10000.0 TIC 20 11000.0 7 Unknowns 6500.0 13000.0	1,2DCA 2000.0 2-But 7200.0 Acet 15000.0 B 15000.0 E 2400.0 T 29000.0 X 14000.0 TIC 21 1700.0

Table 3.8.2.v. (continued)
Date: 4/91

Location	Sample Number	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	PCB/Pesticide (*3) ug/L	Semivolatiles Method 625, ug/L QL: 10 ug/L	Volatiles Method 624, ug/L QL: 5 ug/L
MW019	3752	JP5 5100.0	Gas 10000.0	U	2,4Dim 10.0 2-Meth 6.0*J 4-Metp 20.0 Naph 35.0 Pent 2.0*J TIC 25 35.0 TIC 26 120.0 TIC 27 89.0 TIC 28 140.0 TIC 28 31.0 TIC 29 59.0 TIC 30 170.0 TIC 22 39.0 TIC 18 60.0 TIC 18 97.0 TIC 18 60.0 TIC 31 59.0 TIC 31 33.0 TIC 32 27.0 7 Unknowns 32.0 170.0	1,2DCA 550.0 B 2000.0 E 180.0 T 200.0 X 1100.0 TIC 33 62.0 TIC 34 240.0 TIC 35 110.0 TIC 36 160.0 TIC 5 140.0 TIC 37 250.0 TIC 38 69.0 TIC 39 390.0 TIC 40 310.0 TIC 41 70.0
MW020	3749	Die 270.0	U	U	TIC 42 8.6 3 Unknowns 8.0 51.0	1,2DCA 2.0*J 1,2DCE 3.0*J B 15.0 Clform 8.0 TCE 23.0
MW021	3743	U	U	U	TIC 42 12.0 2 Unknowns 26.0 85.0	U
MW023	3742	Die 70.0	U	U	TIC 42 8.2 3 Unknowns 8.0 72.0	X 2.0*J
MW024	3734	Die 50.0	210.0 B 0.9 T 18.0 X 14.0	U	Bis2 3.0*J Naph 3.0*J TIC 43 110.0 TIC 44 60.0 TIC 45 19.0 TIC 46 33.0 TIC 47 13.0 TIC 48 19.0 TIC 49 61.0 TIC 50 14.0 9 Unknowns 11.0 160.0	TIC 51 12.0 TIC 5 13.0 TIC 6 19.0 TIC 52 6.3 TIC 8 16.0

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 50 ug/L
*2 - Method 8015/8020, quantitation limit: 50 ug/L
*3 - Method 608, quantitation limit: 0.05 ug/L
*J - concentration estimated
1,2DCA - 1,2-dichloroethane
1,2DCE - 1,2-dichloroethene (total)
2,4Dim - 2,4-dimethylphenol
2-But - 2-butanone
2-Meth - 2-methylnaphthalene
4-Metp - 4-methylphenol
Acet - acetone
B - benzene
Benzo - benzoic acid
Clform - chloroform
Die - HBP PHC as compared to diesel fuel
E - ethylbenzene
Gas - LBP PHC as compared to gasoline
HBP - high boiling point
JP5 - HBP PHC as compared to JP-5 jet fuel
LBP - low boiling point
Methcl - methylene chloride
Naph - naphthalene
Pent - pentachlorophenol
PHC - petroleum hydrocarbons
QL - quantitation limit
T - toluene
TCE - trichloroethene

Table 3.8.2.v. (continued)
Date: 4/91

Benzyl - benzyl alcohol
Bis2 - bis(2-Ethylhexyl) phthalate
Butyl - butylbenzylphthalate

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanone, 4-hydroxy-4-met
TIC 2 - 2-propanol, 1-(2-propenyloxy
TIC 3 - 2-propanol, 1-(1-methyl-2-(2
TIC 4 - cyclohexane, 1,1,3,5-tetrame
TIC 5 - cyclohexane (dot)
TIC 6 - cyclohexane, methyl-
TIC 7 - cyclopentane (dot)
TIC 8 - cyclopentane, methyl-
TIC 9 - pentane, 3-methyl-
TIC 10 - benzene, 1-ethenyl-3-ethyl-
TIC 11 - benzene, ethenyl-ethyl-
TIC 12 - benzene, ethenyl-methyl-
TIC 13 - benzene, ethyl-dimethyl-
TIC 14 - benzene, methyl-methylethyl-
TIC 15 - benzene, methyl-propyl-
TIC 16 - benzene, propyl-
TIC 17 - benzene, tetramethyl
TIC 18 - benzene, trimethyl-
TIC 19 - benzoic acid, 2,3-dimethyl-
TIC 20 - undecane
TIC 21 - benzene, ethylmethyl-
TIC 22 - benzene, dimethyl-methylethy
TIC 23 - benzene, ethyl-methyl-
TIC 24 - dodecane
TIC 25 - 1(2h)-naphthalenone, 3,4-dih
TIC 26 - 1,4-hexadiene, 2,3-dimethyl-
TIC - tentatively identified compound
U - no compounds detected
X - xylenes (total)
TIC 27 - 1h-inden, 3-methyl-
TIC 28 - 1h-inden-1-one, 2,3-dihydro-
TIC 29 - 2-cyclohexen-1-one, 3,5-dime
TIC 30 - 2-hexenoic acid, 3,4,4-trime
TIC 31 - benzeneacetaldehyde, .alpha.
TIC 32 - ethanone, (methylphenyl)-
TIC 33 - 1,4-pentadiene, 3-methyl-
TIC 34 - 1-pentene, 2-methyl-
TIC 35 - 2-butene
TIC 36 - benzene, 1-ethyl-2-methyl-
TIC 37 - cyclopentene
TIC 38 - cyclopentene, 1-methyl-
TIC 39 - cyclopropane, 1,1-dimethyl-
TIC 40 - cyclopropane, ethyl-
TIC 41 - thiophene
TIC 42 - 2-heptenal, (z)-
TIC 43 - 1-hexanol, 2-ethyl-
TIC 44 - 2-butanol, 2,3-dimethyl-
TIC 45 - 2-pentanol, 2,4-dimethyl-
TIC 46 - cyclohexane, 1-bromo-2-chlor
TIC 47 - cyclohexane, 1-methyoxy-1-(1,
TIC 48 - cyclohexanol, 2-bromo-
TIC 49 - octane, 1-iodo-
TIC 50 - octane, 2-iodo-
TIC 51 - 3-hexanol, 5-methyl-
TIC 52 - cyclopentane, 1,2-dimethyl-

Table 3.8.2.v. (continued)

Anions, mg/L Method 429 Quantitation limit: 0.5 mg/L				
Compound	#	Average	Minimum	Maximum
Chloride	6	26,000	11,000.00	42,000.00
Fluoride	0	ND	ND	ND
Nitrate, as N	0	ND	ND	ND
Phosphate	0	ND	ND	ND
Sulfate	6	29,433	5,900.00	130,000.00

Metals, ug/L Method 200.7 Quantitation limit: 1 ug/L				
Compound	#	Average	Minimum	Maximum
Aluminum	6	72	52.40	137.00
Antimony	2	54	48.50	59.70
Arsenic	8	706	144.00	1,210.00
Barium	8	30	17.70	46.40
Beryllium	0	ND	ND	ND
Boron	8	60,850	11,000.00	136,000.00
Cadmium	0	ND	ND	ND
Calcium	8	47,625	11,800.00	113,000.00
Chromium	0	ND	ND	ND
Cobalt	0	ND	ND	ND
Copper	7	40	22.60	83.20
Iron	8	48	14.60	149.00
Lead	3	1,629	157.00	2,390.00
Lithium	8	389	261.00	484.00
Magnesium	8	153,350	75,400.00	234,000.00
Manganese	8	381	32.70	1,120.00
Mercury	1	1	0.76	0.76
Molybdenum	8	2,521	1,420.00	4,250.00
Nickel	1	21	21.10	21.10
Potassium	8	251,125	176,000.00	355,000.00
Selenium	2	23	21.60	24.00
Silver	5	13	12.00	15.60
Sodium	8	13,968,750	9,250,000.00	17,200,000.00
Thallium	0	ND	ND	ND
Vanadium	8	163	40.30	261.00
Zinc	5	73	12.90	160.00

- number of samples with detectable quantities of analyte
ND - analyte not detected
Includes samples from 4/91.

downgradient "clean" wells but which contained relatively high concentrations of contaminants. Additional characterization of the plume is warranted.

Groundwater Screening at Sites 10, 11, 16, 17, 19, and 23

The locations of the groundwater test holes and piezometers installed to assess contaminants at Sites 10, 11, 16, 17, 19, and 23 are shown in Fig. 3.8.2.iv. Eighty-eight groundwater test holes and eight piezometers were drilled in this area, and results from screening are given in Appendix B, Table B.4. Screening results facilitated delineation of a contaminant plume underlying the area (Fig. 3.8.2.iv). The principal source for this plume appears to be Site 16, the Old Fuel Farm. The downgradient edge of the plume (southeastern corner) affords a potential seepage discharge source into the unnamed drainage channel separating Site 9, Wastewater Treatment Plant, and the study area. A former Carson River channel apparently skirts the plume boundary on the southwest and may also represent a preferential flow path for contaminated groundwater. Additional investigation is recommended for this part of the plume.

Site 16 Sampling

Investigation of the Site 16 plume covered parts of other sites including Sites 10, 11, 17, 19, and 23. Thus, the downgradient monitoring wells served to assess potential contaminants migrating from these sites as well. The well pair drilled near the source area of the plume, MW25U and MW25L, revealed significant groundwater contamination. Air monitoring during drilling detected concentrations of total volatile organic contaminants in the work-area breathing zone which required the use of respirators. Soil-sample results from the well and from around the underground tanks contained fuel and solvent-related compounds (Table 3.8.2.vi). The groundwater sampling revealed much higher concentrations of similar compounds in both the sample and a duplicate (Table 3.8.2.vii). No floating product is present in the wells, and concentrations of all compounds including solvents were much lower in MW25L than in MW25U, indicating that no DNAPL plume is present and that the

Table 3.8.2.vi. Soil sample results for Site 16 (Old Fuel Farm)
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg	Volatiles Method 8240, ug/kg QL: 5 ug/kg
BH001	3629	5-7 ft	U	860.00 E 1.00 T 13.00 X 26.00	Bis2 520.0 TIC 1 5500.0** 2 Unknowns 320.0 590.0	T 3100.0*J X 39000.0 TIC 2 23000.0 TIC 3 38000.0 TIC 4 85000.0 TIC 5 55000.0 TIC 6 180000.0 TIC 7 84000.0 TIC 8 280000.0 TIC 9 57000.0 TIC 10 160000.0 TIC 11 52000.0
BH002	3630	5-7 ft	U	200.00 E 1.00 T 0.20 X 3.10	Bis2 200.0*J TIC 1 5000.0** 2 Unknowns 180.0 390.0	E 550.0*J X 2200.0 TIC 12 3200.0 TIC 5 8500.0 TIC 13 15000.0 TIC 14 19000.0 TIC 8 38000.0 TIC 15 27000.0 TIC 9 15000.0 TIC 16 11000.0 TIC 17 6800.0 1 Unknown 19000.0
BH003	3631	5-7 ft	U	68.00 X 0.80	Bis2 390.0*J TIC 1 5900.0** 8 Unknowns 220.0 980.0	B 9.0 E 22.0 T 2.0*J X 320.0 TIC 3 480.0 TIC 18 150.0 TIC 4 660.0 TIC 5 720.0 TIC 13 830.0 TIC 19 320.0 TIC 8 1800.0 TIC 20 1900.0 TIC 9 450.0 TIC 16 530.0
BH003	3631D	5-7 ft	NP	NP	NP	X 1500.0 TIC 3 3500.0 TIC 12 2000.0 TIC 13 6900.0 TIC 14 13000.0 TIC 19 3600.0 TIC 8 30000.0 TIC 20 20000.0 TIC 9 4600.0 TIC 16 4700.0 TIC 10 16000.0
BH004	3650	5-7 ft	U	U	Bis2 160.0** TIC 1 10000.0** TIC 21 500.0 TIC 22 2400.0** 2 Unknowns 340.0 550.0	Acet 10.0*J Methcl 11.0**

Table 3.8.2.vi. (continued)
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH005	3651	5-7 ft	U	U	Bis2	270.0*J	2-But	4.0*J
					TIC 1	14000.0**	Acet	61.0
					TIC 23	170.0	E	4.0*J
					TIC 21	580.0	Methcl	7.0**
					TIC 24	200.0	TIC 25	60.0
					TIC 22	5100.0**	TIC 5	40.0
					3 Unknowns	220.0	TIC 26	9.4
						750.0	TIC 26	13.0
							TIC 20	50.0
							TIC 16	7.8
BH006	3652	5-7 ft	U	U	Bis2	110.0**	Methcl	10.0**
					TIC 1	13000.0**	TIC 28	620.0
					TIC 27	250.0	TIC 25	620.0
					TIC 21	910.0	TIC 29	110.0
					TIC 24	170.0	TIC 4	360.0
					TIC 22	6100.0**	TIC 5	470.0
					7 Unknowns	170.0	TIC 26	190.0
						1300.0	TIC 26	190.0
							TIC 20	550.0
							TIC 16	98.0
							1 Unknown	130.0
BH007	3653	5-7 ft	U	U	Bis2	180.0**	Methcl	46.0
					TIC 30	180.0		
					TIC 1	15000.0**		
					TIC 27	170.0		
					TIC 21	980.0		
					TIC 24	220.0		
					TIC 22	2200.0**		
					4 Unknowns	220.0		
						720.0		
BH008	3654	5-7 ft	U	U	Bis2	300.0*J	Acet	23.0
					TIC 1	14000.0**	Methcl	8.0**
					TIC 31	440.0	TIC 40	28.0
					TIC 21	880.0	TIC 5	34.0
					TIC 32	160.0	TIC 20	56.0
					TIC 33	2700.0	3 Unknowns	73.0
					TIC 34	220.0		290.0
					TIC 35	4300.0		
					TIC 36	170.0		
					TIC 37	1200.0		
					TIC 24	180.0		
					TIC 22	7300.0		
					TIC 38	190.0		
					TIC 39	980.0		
					5 Unknowns	680.0		
						4200.0		

Table 3.8.2.vi. (continued)
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
MW025	3581	7 ft	U	U	Bis2	60.0*J	1,2DCA	8.0
					TIC 1	3800.0	Acet	22.0
					4 Unknowns	190.0	B	50.0
						660.0	E	120.0
							Methcl	19.0
							T	5.0*J
							X	4.0*J
							TIC 41	61.0
							TIC 42	110.0
							TIC 3	77.0
							TIC 43	140.0
							TIC 44	120.0
							TIC 5	92.0
							TIC 14	210.0
							TIC 8	320.0
							TIC 20	330.0
							TIC 10	290.0
MW026	3582	5-7 ft	U	U	TIC 1	4400.0	Methcl	5.0*J
					1 Unknown	190.0		
MW027	3583	5-7 ft	U	U	TIC 1	4300.0	Carbdi	1.0*J
					1 Unknown	230.0	Methcl	7.0*J
MW028	3584	7-9 ft	U	U	TIC 1	5300.0	Methcl	11.0
					1 Unknown	240.0	TIC 45	28.0
MW029	3585	7-9 ft	U	8.00	Bis2	50.0*J	Acet	6.0*J
					TIC 1	5300.0	Methcl	12.0
					TIC 46	470.0	TIC 48	33.0
					TIC 46	310.0	TIC 49	9.7
					TIC 47	670.0	TIC 50	15.0
					8 Unknowns	220.0	TIC 51	35.0
						600.0	TIC 52	140.0
							TIC 53	28.0
							TIC 54	18.0
							3 Unknowns	18.0
								42.0
MW030	3586	5-7 ft	U	U	Bis2	68.0*J	Carbdi	2.0*J
					TIC 1	5200.0	Methcl	7.0
					2 Unknowns	190.0	TIC 45	16.0
						220.0		

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
*J - concentration estimated
1,2DCA - 1,2-dichloroethane
2-But - 2-butanone
Acet - acetone
B - benzene
Bis2 - bis(2-Ethylhexyl) phthalate
Carbdi - carbon disulfide
E - ethylbenzene
HBP - high boiling point
LBP - low boiling point
Methcl - methylene chloride
NP - analysis not performed
PHC - petroleum hydrocarbons
QL - quantitation limit
T - toluene
TIC - tentatively identified compound
U - no compounds detected
X - xylenes (total)

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanone, 4-hydroxy-4-met
TIC 2 - benzene, ethylmethyl-
TIC 3 - butane, 2,3-dimethyl-
TIC 4 - hexane, 2,2,5-trimethyl-
TIC 5 - hexane, 2,3-dimethyl-
TIC 6 - hexane, 3,3-dimethyl-
TIC 28 - 2-butanol, 2,3-dimethyl-
TIC 29 - heptane, 2,3,6-trimethyl-
TIC 30 - 2,5-hexanedione
TIC 31 - 3-heptanone, 2,4-dimethyl-
TIC 32 - butanal, 2-ethyl-
TIC 33 - butanoic acid, 3,3-dimethyl-
TIC 34 - butanoic acid, ethenyl ester

Table 3.8.2.vi. (continued)
Date: 3/91

TIC 7 - hexane, 3-ethyl-3-methyl-
TIC 8 - pentane, 2,2,4-trimethyl-
TIC 9 - pentane, 2,3-dimethyl-
TIC 10 - pentane, 3-ethyl-
TIC 11 - pentane, dimethyl-
TIC 12 - hexane, 2,3,5-trimethyl-
TIC 13 - hexane, 2,4-dimethyl-
TIC 14 - octane, 3-methyl-
TIC 15 - pentane, 2,3,4-trimethyl-
TIC 16 - pentane, 2,4-dimethyl-
TIC 17 - pentane, 2-methyl-
TIC 18 - heptane, 2,2,4-trimethyl-
TIC 19 - octane, trimethyl-
TIC 20 - pentane, 2,3,3-trimethyl-
TIC 21 - 5-hexen-2-one, 5-methyl-
TIC 22 - hexanedioic acid, dioctyl es
TIC 23 - 2-pentene, 5-(pentyloxy)-
TIC 24 - hexadecanoic acid
TIC 25 - butane, 2,2,3,3-tetramethyl-
TIC 26 - pentane, 2,2,3,4-tetramethyl-
TIC 27 - 3-penten-2-one, 4-methyl-
TIC 35 - butanoic acid, methyl ester
TIC 36 - cyclopentane, (1-methylethen
TIC 37 - heptanoic acid, 2-methyl-,m
TIC 38 - pentanoic acid, methyl ester
TIC 39 - propanedioic acid, dimethyl-
TIC 40 - 3-heptanol, 6-methyl-
TIC 41 - 1-hexene
TIC 42 - benzene, (1-methylethyl)-
TIC 43 - butane, 2-methyl-
TIC 44 - hexane, 2,2,3,3-tetramethyl-
TIC 45 - ethane, 1,1,2-trichloro-1,2,2
TIC 46 - heptadecane
TIC 47 - hexadecane
TIC 48 - 1-heptanol, 2,4-dimethyl-, (r,
TIC 49 - cyclohexane, 1-ethyl-2-methyl-
TIC 50 - cyclohexane, 1-propenyl-
TIC 51 - cyclopentanone, 2-methyl-4-(2
TIC 52 - decane
TIC 53 - nonane
TIC 54 - octane, 2,6-dimethyl-

Metals, mg/kg
Method 6010
Quantitation limit: 1 mg/kg

Compound	#	Average	Minimum	Maximum
Aluminum	8	7,559	2,090.00	16,700.00
Antimony	0	ND	ND	ND
Arsenic	8	8	3.40	16.60
Barium	8	101	16.30	202.00
Beryllium	7	0	0.21	0.62
Boron	7	17	2.00	30.60
Cadmium	0	ND	ND	ND
Calcium	8	4,416	1,610.00	12,000.00
Chromium	8	8	4.10	13.10
Cobalt	8	7	3.80	11.70
Copper	8	55	16.60	205.00
Iron	8	15,086	8,440.00	24,100.00
Lead	8	10	3.20	20.80
Lithium	8	15	3.40	26.60
Magnesium	8	3,938	1,100.00	7,020.00
Manganese	8	316	54.70	763.00
Mercury	1	0	0.03	0.03
Molybdenum	0	ND	ND	ND
Nickel	8	8	4.20	12.50
Potassium	8	1,975	354.00	3,370.00
Selenium	0	ND	ND	ND
Silver	0	ND	ND	ND
Sodium	8	3,332	149.00	7,870.00
Thallium	1	0	0.27	0.27
Vanadium	8	36	21.20	56.90
Zinc	8	65	27.30	155.00

- number of samples with detectable quantities of analyte
ND - analyte not detected
Includes samples from 3/91.

Table 3.8.2.vii. Water sample results for Site 16 (Old Fuel Farm)
Date: 4/91

Location	Sample Number	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	PCB/Pesticide (*3) ug/L	Semivolatiles Method 625, ug/L QL: 10 ug/L	Volatiles Method 624, ug/L QL: 5 ug/L
MW025L	3786	JP5 60.0	Gas 200.0 B 22.0 E 14.0	U	TIC 1 8.6 TIC 2 12.0 TIC 3 15.0 TIC 4 81.0 TIC 5 9.0 3 Unknowns 22.0 32.0	1,2DCA 10.0 B 20.0 E 16.0 TIC 3 28.0 TIC 6 52.0 TIC 7 13.0 TIC 8 34.0 TIC 9 24.0
MW025L	3787	U	Gas 200.0 B 20.0 E 13.0 T 2.0	U	TIC 2 8.6 TIC 3 12.0 TIC 5 8.6 3 Unknowns 15.0 24.0	1,2DCA 9.0 B 15.0 E 12.0 TIC 10 9.7 TIC 3 23.0 TIC 6 42.0 TIC 8 28.0 TIC 9 19.0
MW025U	3781	JP5 8400.0	Gas 7800.0 B 300.0 E 1200.0 T 42.0 X 45.0	U	2,4Dim 59.0 2-Metp 5.0*J 4-Metp 16.0 Bis2 10.0** Naph 4.0*J Pent 34.0*J Phen 5.0*J TIC 1 81.0 TIC 2 190.0 TIC 3 320.0 TIC 11 77.0 TIC 12 64.0 TIC 13 110.0 TIC 14 170.0 TIC 15 69.0 12 Unknowns 63.0 1200.0	1,2DCA 80.0 B 410.0 E 990.0 T 40.0 X 50.0 TIC 16 200.0 TIC 17 140.0 TIC 18 460.0 TIC 6 1900.0 TIC 7 430.0 TIC 19 110.0 TIC 8 1200.0 TIC 9 1000.0 TIC 20 320.0 TIC 21 190.0
MW025U	3782	JP5 7200.0	Gas 5700.0 B 310.0 E 800.0 T 40.0 X 34.0	U	2,4Dim 69.0 2-Metp 7.0*J 4-Metp 17.0 Bis2 9.0** Pent 36.0*J TIC 1 84.0 TIC 2 200.0 TIC 3 330.0 TIC 11 78.0 TIC 12 68.0 TIC 13 120.0 TIC 22 110.0 TIC 14 210.0 TIC 15 83.0 11 Unknowns 63.0 1300.0	1,2DCA 56.0 B 150.0 E 850.0 T 17.0*J X 25.0*J TIC 16 300.0 TIC 3 310.0 TIC 6 1400.0 TIC 8 670.0 TIC 9 560.0 TIC 20 160.0 TIC 21 270.0 TIC 23 270.0
MW026	3780	Die 330.0	U	U	Dieth 9.0*J TIC 24 8.6 TIC 5 9.6 TIC 25 10.0 1 Unknown 17.0	U
MW027	3775	U	U	U	TIC 24 10.0 TIC 5 33.0	U
MW028	3772	U	U	U	U	U
MW029L	3770	U	U	U	TIC 26 11.0**	U

Table 3.8.2.vii. (continued)
Date: 4/91

Location	Sample Number	Total HBP PHC (*1) ug/L	Total LBP PHC (*2) ug/L	PCB/Pesticide (*3) ug/L	Semivolatiles Method 625, ug/L QL: 10 ug/L	Volatiles Method 624, ug/L QL: 5 ug/L
MW029U	3773	Die 320.0	U	U	TIC 26 14.0**	U
MW030	3771	U	U	U	U	U

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 50 ug/L
*2 - Method 8015/8020, quantitation limit: 50 ug/L
*3 - Method 608, quantitation limit: 0.05 ug/L
*J - concentration estimated
1,2DCA - 1,2-dichloroethane
2,4Dim - 2,4-dimethylphenol
2-Metp - 2-methylphenol
4-Metp - 4-methylphenol
B - benzene
Bis2 - bis(2-Ethylhexyl) phthalate
Die - HBP PHC as compared to diesel fuel
Dieth - diethylphthalate
E - ethylbenzene
Gas - LBP PHC as compared to gasoline
HBP - high boiling point
JP5 - HBP PHC as compared to JP-5 jet fuel
LBP - low boiling point
Naph - naphthalene
Pent - pentachlorophenol
PHC - petroleum hydrocarbons
Phen - phenol
QL - quantitation limit
T - toluene
TIC - tentatively identified compound
U - no compounds detected
X - xylenes (total)

NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanol, 2,3-dimethyl-
TIC 2 - 2-pentanol, 2,4-dimethyl-
TIC 3 - benzene, (1-methylethyl)-
TIC 4 - benzenemethanol, .alpha., .al
TIC 5 - cyclohexene, 3-bromo-
TIC 6 - butane, 2-methyl-
TIC 7 - cyclohexane (dot)
TIC 8 - cyclopentane (dot)
TIC 9 - cyclopentane, methyl-
TIC 10 - 1-pentene, 2-methyl-
TIC 11 - benzene, 1,3,5-trimethyl
TIC 12 - benzene, 1-ethenyl-2-methyl-
TIC 13 - benzene, 1-ethyl-2-methyl-
TIC 14 - diazene, bis(1,1-dimethyleth
TIC 15 - phenol, 2,3,5,6-tetrachloro-
TIC 16 - 3-pentanone, 2,2-dimethyl-
TIC 17 - benzene, 1,3,5-trimethyl-
TIC 18 - benzene, methylethyl-
TIC 19 - cyclohexane, methyl-
TIC 20 - pentane, 2,2,3-trimethyl-
TIC 21 - pentane, 2,3,3-trimethyl-
TIC 22 - benzeneacetic acid, .alpha.-
TIC 23 - pentane, 3-ethyl-2,2-dimethy
TIC 24 - 2-heptenal, (z)-
TIC 25 - furan, 2,5-diethyltetrahydro
TIC 26 - 1,13-tetradecadiene

Table 3.8.2.vii. (continued)

Anions, mg/L Method 429 Quantitation limit: 0.5 mg/L				
Compound	#	Average	Minimum	Maximum
Chloride	10	13,880	3,500.00	32,000.00
Fluoride	0	ND	ND	ND
Nitrate, as N	0	ND	ND	ND
Phosphate	0	ND	ND	ND
Sulfate	10	4,370	1,500.00	7,600.00

Metals, ug/L Method 200.7 Quantitation limit: 1 ug/L				
Compound	#	Average	Minimum	Maximum
Aluminum	3	50	41.60	54.40
Antimony	3	34	32.00	35.40
Arsenic	10	591	60.40	1,020.00
Barium	10	46	14.40	141.00
Beryllium	1	1	1.20	1.20
Boron	8	46,175	23,000.00	80,800.00
Cadmium	2	7	7.20	7.20
Calcium	10	77,758	7,380.00	304,000.00
Chromium	1	12	11.70	11.70
Cobalt	0	ND	ND	ND
Copper	10	32	16.50	59.20
Iron	10	71	10.80	233.00
Lead	2	10	9.00	11.00
Lithium	8	387	185.00	556.00
Magnesium	10	139,440	10,900.00	243,000.00
Manganese	10	558	14.50	2,190.00
Mercury	0	ND	ND	ND
Molybdenum	8	1,389	327.00	2,660.00
Nickel	2	49	20.10	76.90
Potassium	10	246,210	50,900.00	418,000.00
Selenium	0	ND	ND	ND
Silver	6	10	5.30	15.10
Sodium	10	12,098,000	2,250,000.00	19,500,000.00
Thallium	0	ND	ND	ND
Vanadium	10	144	33.70	268.00
Zinc	6	49	15.10	78.90

- number of samples with detectable quantities of analyte
ND - analyte not detected
Includes samples from 4/91.

contaminants are principally in the upper portion of the aquifer. One downgradient well pair was installed within the distal end of the plume, MW29U and MW29L. The upper completion, MW29U, revealed contamination in the soil at the water table and the groundwater at the top of the aquifer (Tables 3.8.2.vi and 3.8.2.vii). The variety and concentrations of contaminants are significantly decreased from those found in MW25U. Only fuel-related compounds persisted, and the concentrations were not at levels which are cause for concern. Thus, even if the plume is slowly seeping into the unnamed drainage ditch, the contaminant concentrations are low and after dilution by the surface water are probably undetectable by laboratory analytical methods. MW29L contained only one semivolatile TIC, indicating that the contamination has remained in the upper portion of the aquifer throughout the plume length. The soil and groundwater samples taken from the other downgradient wells, MW26, MW27, MW28, and MW30, were essentially clean, indicating that the downgradient boundary of the plume has been delineated. The concentration gradients within the plume, however, are not well-defined and warrant further investigation. Additionally, considering the variety and concentrations of contaminants in MW25U, there is likely to be product on the groundwater upgradient at the source. Soil samples taken from boreholes BH01-BH03 around the Old Fuel Farm were contaminated with petroleum hydrocarbons, and further investigation at the suspected source is recommended.

Site 17 Sampling

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Five soil borings were drilled along the drainage swale leading from Site 17, Hangar 4, to the unnamed drainage ditch (Fig. 3.8.2.iv). The results are shown in Table 3.8.2.viii. Only BH03, which is within the Old Fuel Farm plume, contained significant contamination. The contaminants were fuel-related and are assumed to be associated with the Site 16 plume. These results indicate that the samples taken during the Phase I investigation were collected at localized stained surface areas which have not resulted in wide-spread soil contamination. The solvents detected in MW25U, downgradient from BH03, may be related to the surface

Table 3.8.2.viii. Soil sample results for Site 17 (Hangar 4)
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH001	3618	0-1 ft	U	U	Bis2	150.0**	Methcl	13.0**
					TIC 1	11000.0**		
					TIC 2	390.0		
					8 Unknowns	320.0		
						2100.0		
BH001	3619	5-7 ft	U	U	Bis2	410.0*J	Methcl	15.0**
					Di-N-O	78.0*J		
					TIC 1	12000.0**		
					TIC 2	270.0		
					TIC 3	200.0		
					TIC 4	270.0		
					3 Unknowns	210.0		
						420.0		
BH002	3620	0-2 ft	U	U	Bis2	170.0**	Methcl	11.0**
					TIC 1	16000.0**		
					TIC 2	490.0		
					TIC 5	7300.0		
					2 Unknowns	560.0		
						650.0		
BH002	3621	5-7 ft	U	U	Bis2	210.0**	Methcl	22.0
					TIC 1	13000.0**	TIC 7	32.0
					TIC 6	170.0	TIC 8	9.9
					TIC 2	400.0	TIC 9	66.0
					TIC 3	190.0	TIC 10	8.4
					TIC 4	220.0	TIC 11	48.0
					TIC 5	3900.0	TIC 12	27.0
					3 Unknowns	230.0		
						610.0		
BH003	3623	0-1 ft	U	U	Bis2	2400.0	2-But	4.0*J
					TIC 1	8300.0**	Acet	44.0
					4 Unknowns	340.0	Methcl	57.0
						2300.0	TIC 13	12.0
							TIC 7	21.0
							TIC 10	7.6
							TIC 11	36.0
							TIC 12	15.0
BH003	3624	5-7 ft	U	U	Bis2	890.0	Acet	1100.0
					TIC 1	5000.0**	B	22.0
					TIC 5	1100.0	E	290.0
					3 Unknowns	170.0	T	240.0
						480.0	X	1600.0
							TIC 14	660.0
							TIC 15	880.0
							TIC 16	1300.0
							TIC 17	1800.0
							TIC 18	2800.0
							TIC 19	570.0
							TIC 20	1400.0
							TIC 21	1800.0
							TIC 22	1500.0
							1 Unknown	2600.0

Table 3.8.2.viii. (continued)
Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	Semivolatiles Method 3550/8270, ug/kg QL: 350 ug/kg		Volatiles Method 8240, ug/kg QL: 5 ug/kg	
BH003	3624D	5-7 ft	NP	NP	NP		E	410.0*J
							T	340.0*J
							X	3200.0
							TIC 23	6500.0
							TIC 17	11000.0
							TIC 7	21000.0
							TIC 18	20000.0
							TIC 24	13000.0
							TIC 19	1800.0
							TIC 11	30000.0
							TIC 20	4800.0
							TIC 21	5300.0
							TIC 22	3500.0
BH004	3625	0-1 ft	U	U	Bis2	140.0*J	Methcl	5.0**
					TIC 1	6700.0**		
					TIC 25	290.0		
					TIC 26	350.0		
					TIC 5	5200.0		
					5 Unknowns	270.0		
						770.0		
BH004	3626	5-7 ft	U	U	Bis2	180.0*J	Methcl	4.0**
					TIC 1	4300.0**		
					TIC 27	200.0		
					TIC 5	4400.0		
					1 Unknown	390.0		
BH005	3627	0-1 ft	U	U	Bis2	290.0*J	Methcl	6.0**
					TIC 1	7800.0**		
					TIC 5	8700.0		
					12 Unknowns	340.0		
						5300.0		
BH005	3628	5-7 ft	U	U	Bis2	310.0*J	Methcl	5.0**
					TIC 1	5400.0**		
					TIC 5	6200.0		
					3 Unknowns	230.0		
						580.0		

** - unusable data due to method blank contamination
*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
*J - concentration estimated
2-But - 2-butanone
Acet - acetone
B - benzene
Bis2 - bis(2-Ethylhexyl) phthalate
Di-N-O - di-n-octylphthalate
E - ethylbenzene
NOTE - concentrations are estimated for TICs and unknowns
TIC 1 - 2-pentanone, 4-hydroxy-4-met
TIC 2 - 3-penten-2-one, 4-methyl-
TIC 3 - 5-hexen-2-one, 5-methyl-
TIC 4 - hexadecanoic acid
TIC 5 - hexanedioic acid, dioctyl es
TIC 6 - 2-pentene, 5-(pentyloxy)-
TIC 7 - hexane, 3,3-dimethyl-
TIC 8 - octane, 2,2,6-trimethyl-
TIC 9 - octane, 2,3-dimethyl-
TIC 10 - octane, 2,7-dimethyl-
TIC 11 - pentane, 2,2,4-trimethyl-
TIC 12 - pentane, 3-ethyl-
TIC 13 - 2-pentanone, 4,4-dimethyl-
HBP - high boiling point
LBP - low boiling point
Methcl - methylene chloride
NP - analysis not performed
PHC - petroleum hydrocarbons
QL - quantitation limit
T - toluene
TIC - tentatively identified compound
U - no compounds detected
X - xylenes (total)
TIC 14 - benzene, 1,3,5-trimethyl-
TIC 15 - benzene, 1-ethyl-2-methyl-
TIC 16 - hexane, 2,2,5-trimethyl-
TIC 17 - hexane, 2,4-dimethyl-
TIC 18 - hexane, dimethyl-
TIC 19 - octane, trimethyl-
TIC 20 - pentane, 2,3-dimethyl-
TIC 21 - pentane, 2,4-dimethyl-
TIC 22 - pentane, 2-methyl-
TIC 23 - hexane, 2,3-dimethyl-
TIC 24 - hexane, trimethyl-
TIC 25 - benzene, 1-chloro-3-2, 2-dic
TIC 26 - cholestane, (5.alpha.)-
TIC 27 - benzene, bromo-chloro-

Table 3.8.2.viii. (continued)

Metals, mg/kg Method 6010 Quantitation limit: 1 mg/kg				
Compound	#	Average	Minimum	Maximum
Aluminum	10	7,453	3,050.00	18,700.00
Antimony	0	ND	ND	ND
Arsenic	10	11	0.37	22.40
Barium	10	112	15.60	260.00
Beryllium	10	0	0.14	0.87
Boron	10	26	6.00	102.00
Cadmium	1	1	0.57	0.57
Calcium	10	14,611	1,390.00	61,400.00
Chromium	10	7	4.00	14.40
Cobalt	10	6	3.00	11.50
Copper	10	41	10.70	71.70
Iron	10	13,305	7,800.00	28,200.00
Lead	10	11	1.80	30.70
Lithium	10	19	4.70	50.40
Magnesium	10	5,083	1,220.00	11,000.00
Manganese	10	354	64.50	989.00
Mercury	1	0	0.06	0.06
Molybdenum	0	ND	ND	ND
Nickel	10	7	2.90	15.20
Potassium	10	2,234	701.00	4,850.00
Selenium	0	ND	ND	ND
Silver	0	ND	ND	ND
Sodium	10	3,104	418.00	9,930.00
Thallium	0	ND	ND	ND
Vanadium	10	29	19.70	57.90
Zinc	10	58	28.80	89.40

- number of samples with detectable quantities of analyte
ND - analyte not detected
Includes samples from 3/91.

drainage from Hangar 4 or to past disposal at the Paint Shop, Site 11. Additional characterization on the west side of the Site 16 plume is recommended to determine the source of the non-fuel-related contaminants.

Site 23 Sampling

Three soil borings were drilled at Site 23 in the former transformer storage area to test for PCBs. No PCBs were detected; however, the samples revealed minor amounts of the pesticide DDT and degradation products DDD and DDE (Table 3.8.2.ix). It is significant to note that the pesticides were detected only in the top 2 ft of soil and have apparently not migrated. Another soil sample will be obtained and subjected to the TCLP (toxicity characteristic leaching procedure) to determine potential contaminant mobility.

Summary

The downgradient monitoring wells and piezometers associated with Site 16, the Old Fuel Farm, also served to assess contaminants from adjacent areas. A significant plume of groundwater contamination appears to be emanating from the area and flowing toward the unnamed drainage ditch. Other investigative activities confirmed floating hydrocarbon product at Site 14 which creates a plume that appears to merge with possible pesticide contamination coming from Site 12 and fuel oil contamination associated with Site 13.

Screening and characterization activities at the Group IV sites indicate that the primary contaminants of concern are petroleum hydrocarbon compounds and solvents which permeate the soils and shallow groundwater associated with two plumes in the area. Small localized areas of pesticides are also present.

3.8.2.iii Exposure Pathways

The atmosphere is not considered to be a contaminated medium of concern because high vapor pressure contaminants will rapidly volatilize and disperse.

Table 3.8.2.ix. Soil sample results for Site 23 (Shipping and Receiving Disposal Site) Date: 3/91

Location	Sample Number	Exact Location	Total HBP PHC (*1) mg/kg	Total LBP PHC (*2) mg/kg	PCB/Pesticide (*3) ug/kg
BH001	3681	0-2 ft	U	U	U
BH001	3682	2-4 ft	U	U	U
BH002	3683	0-2 ft	U	U	4,4DDD 11.0*J 4,4DDE 76.0 4,4DDT 64.0
BH002	3684	2-4 ft	U	U	U
BH003	3685	0-2 ft	U	U	4,4DDD 12.0*J 4,4DDE 87.0 4,4DDT 44.0
BH003	3686	2-4 ft	U	U	U
BH003	3687	2-4 ft	U	U	U

*1 - Method 8015 Modified, quantitation limit: 10 mg/kg
*2 - Method 8015/8020, quantitation limit: 5 mg/kg
*3 - Method 3550/8080, quantitation limit: 8.3 ug/kg
*J - concentration estimated
U - no compounds detected
4,4DDD - 1,1'(2,2dichloroethylidene) bis(4-chlorobenzene)
4,4DDE - 1,1'(dichloroethenylidene) bis(4-chlorobenzene)
4,4DDT - 1,1(2,2,2trichloroethylidene) bis(4-chlorobenzene)
HBP - high boiling point
LBP - low boiling point
PHC - petroleum hydrocarbons

Furthermore, PID measurements taken around the sites during field investigations detected no VOC in the ambient air other than during the installation of MW25. Even at this location no VOCs were detected after the well installation was complete. The air quality of the surrounding region is good, and prevailing air currents will further enhance the rapid dispersal into the atmosphere of any volatile contaminants that may be released.

Direct exposure pathways for contaminated soils at the Group IV sites include dermal contact, ingestion, and inhalation of dust particles and volatile constituents. Affected biota include indigenous plants and burrowing animals as well as personnel associated with site excavation activities. Plant and animal populations are controlled on NAS Fallon property, and exposures associated with these biota are thus minimized. Because NAS Fallon is a restricted area, direct exposure to the human populace is restricted to naval personnel and subcontractors. Health and safety measures, interim protective measures, and appropriate decontamination procedures further mitigate exposure from contaminated soils during on-site activities. Restricted access, lack of surface soil contamination, and site activities geared towards environmental safety help prevent contaminated soils at the Group IV sites from constituting a primary exposure pathway.

Direct exposure pathways for groundwater include use of contaminated groundwater extracted from the shallow aquifer and the intermediate aquifer. The shallow aquifer is not pumped on NAS Fallon property and, due to its high salinity, is used sparingly for human consumption in the surrounding area (Appendix C). There are no drinking-water wells downgradient of the Group IV sites. Poor water quality renders the water unfit for human consumption. Thus, direct exposures to contaminants through extraction of the shallow groundwater in the area are believed to be minimal.

Available site-characterization results indicate contaminants are not migrating into the intermediate aquifer. The PA/SI report postulates the existence of an upward flow gradient in the surrounding area (Dames and Moore 1988). Investigative results confirm this (Appendix D). Additionally, a confining clay layer is known to exist between the contaminated shallow aquifer and the intermediate aquifer beneath the facility. It is believed that these natural containment mechanisms prevent contaminants from reaching the intermediate aquifer.

As with groundwater, contaminated soils associated with Group IV sites do not constitute a substantial direct exposure pathway. Soils may, however, serve as a source term for atmospheric transport of contaminated particulates and both contaminated soils and groundwater may act as a source for contaminating surface water. Contaminated surface water may then serve as an exposure pathway to sensitive receptors.

Exposures to wind-blown transport of contaminated soils are minimal due to restricted access in the immediate vicinity, the natural cohesive properties of native surface soils, and dust-control measures employed during construction activities. In addition, the air quality of the region is good, and when released airborne particulate matter is quickly dispersed. Hence, atmospheric transport is not considered a threat to the environment. Downward transport of residual soils contamination to the underlying aquifer via naturally occurring surface-water percolation is not considered significant because of the semiarid climate. Indeed, the alkali flats in the surrounding area indicate a negative regional water balance. It is surmised that because contaminants were originally introduced at or near the ground surface, the downward transport necessary to produce existing groundwater contamination resulted from gradients introduced from excessive spills or disposal and not from the natural percolation process.

But High-groundwater may come in contact w/ contam. soil & become contaminated

The majority of groundwater contaminants present at the Group IV sites are the result of past spills, leaks, and handling activities. Most of these activities have been discontinued, removing the source areas and resulting gradients responsible for downward transport. Source termination and the negative regional water balance are expected to minimize percolation of surface contamination to the underlying water table at all Group IV sites with the exception of Sites 12 and 17. Site 12, the Pest Control Shop, does afford a substantial transport mechanism for downward transport of near- surface contaminants. Wash water which is allowed to runoff to the leach field areas creates a downward flow gradient which may cause percolation of contaminants to the underlying aquifer. Similarly, aircraft washing at Site 17, Hangar 4, produces runoff which infiltrates the soil south of the area and may cause percolation of residual soil contamination into the Site 16 plume, providing an increased flow gradient for the plume.

According to FEB. '92 Letter from Base, this has been rectified.

Surface water runoff resulting from excessive precipitation or human activities may transport contaminated surface sediments or dissolved constituents to the regional surface drainage system. In addition, contaminants presently associated with the shallow groundwater may migrate downgradient for eventual seepage discharge into the surrounding drainage ditches. Restricted access and institutional controls again minimize any surface-water exposures on NAS Fallon property. Contaminated surface water does, however, have the potential to transport contaminants downstream exposure points. As explained in Appendix C, downstream exposure points associated with surface water include recreational exposure, direct exposure to biota which inhabit contaminated surface-water channels and wetlands, secondary exposure to humans who consume contaminated biota, and exposures associated with the final deposition of contaminated waters into the downstream reservoirs and wetlands (Stillwater Point Reservoir and Stillwater Wildlife Refuge).

Ground- and surface-water transport to downstream receptors are the primary exposure pathways for contaminants of concern at the Group IV sites. Potential off-site transport mechanisms include: 1) eventual seepage discharge of groundwater contaminants to surface water migrating downstream, and 2) discharge of contaminated surface water (from rainfall and human activity) to surface-water drainage systems. Thus, the principal exposure pathway of concern is the regional surface-water system extending from the downgradient (southeastern) edge of the facility to Stillwater Point Reservoir and the Stillwater Wildlife Refuge.

While the existence of soil and groundwater contaminants in excess of action limits does not in itself mandate active remediation, the existence of free-phase product on the groundwater in excess of 1.27 cm (0.5 in.) does require the implementation of a removal action (Appendix D). In order to assess the risks to potential receptors and the need for remedial action, several site-specific investigations are recommended.

3.8.3 Recommendations

The following are recommendations for additional investigations on a site-specific basis.

Site 10, GATAR Compound

The only additional work recommended at this site is a metal-probe survey which will be used to test the three target areas delineated by the geophysical survey. The work will be conducted on a grid pattern to determine if the soil at the site has been disturbed. The assumption is that the probe will penetrate more readily into a disturbed vs a non-disturbed area and that the buried cans containing PCB-laden oil will be found in a disturbed area. In case the probe encounters buried metal, the probe will be withdrawn immediately. The technique will be used to try to narrow the targets for excavation from three to one (Appendix A).

Site 11, Paint Shop

Because contaminants identified in MW-25 included several phenol compounds believed to be associated with this site, two additional wells will be installed. One well will be installed through the concrete at the former disposal area, and the other well will be installed downgradient. Groundwater test holes will be drilled at all proposed well locations prior to installation to ensure optimum placement (Fig. 3.8.3.i).

Site 12, Pest Control Shop

Another soil boring will be drilled near BH02 to obtain a fresh soil sample at the water table. This sample will be tested for pesticides and subjected to the TCLP to determine leachable quantities of pesticides. Additional groundwater test holes will be drilled along the west side of the plume as defined by previous investigations. One additional well may

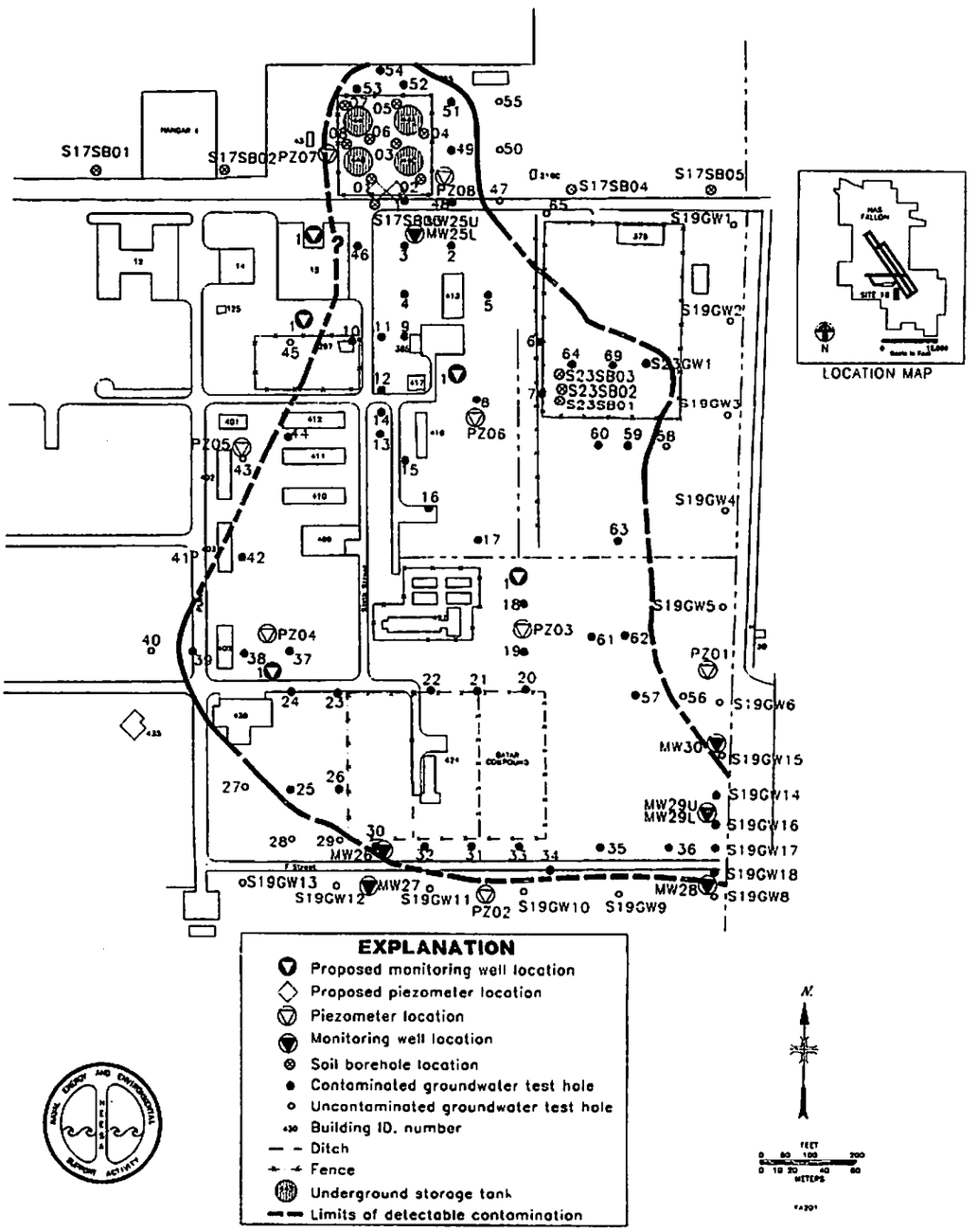

Fig. 3.8.3.i. Site 11: Proposed locations for additional investigations.

be installed depending on the plume configuration and the relation between this plume boundary and the boundary of the gasoline/diesel plume emanating from Site 14 (Fig. 3.8.3.ii).

Site 13, Boiler Plant Tanks

The well proposed for Site 12 above will also serve to further assess this site.

Site 14, Old Vehicle Maintenance Shop

Groundwater test holes will be drilled to define the eastern boundary of the plume in the asphalt-covered parking lot and to define the south boundary of the plume in the vicinity of wells MW19 and MW20 (Fig. 3.8.3.iii). Other test holes will be drilled within the plume to determine optimum locations for additional wells and piezometers. One additional well will be installed within the plume boundaries for contaminant-concentration-gradient determination. Two other wells will be installed along the south boundary of the plume as determined by groundwater test hole drilling. Three piezometers will be installed in the floating-product portion of the plume to assess the thickness and extent of the product lens.

Site 16, Old Fuel Farm

Groundwater test holes will be drilled at all proposed well and piezometer locations prior to installation to ensure optimum placement. If floating product is detected on the groundwater near the underground tanks, then two piezometers will be installed around the area to assess the extent of the floating-product plume. Three additional shallow single completion wells will be installed within the plume downgradient from MW25 (Fig. 3.8.3.i). The purpose of the wells is to define the contaminant concentration gradient between the product plume and the distal plume boundary. One of these wells will also serve to determine the influence on the plume of the preferential flow path created by the former river channel

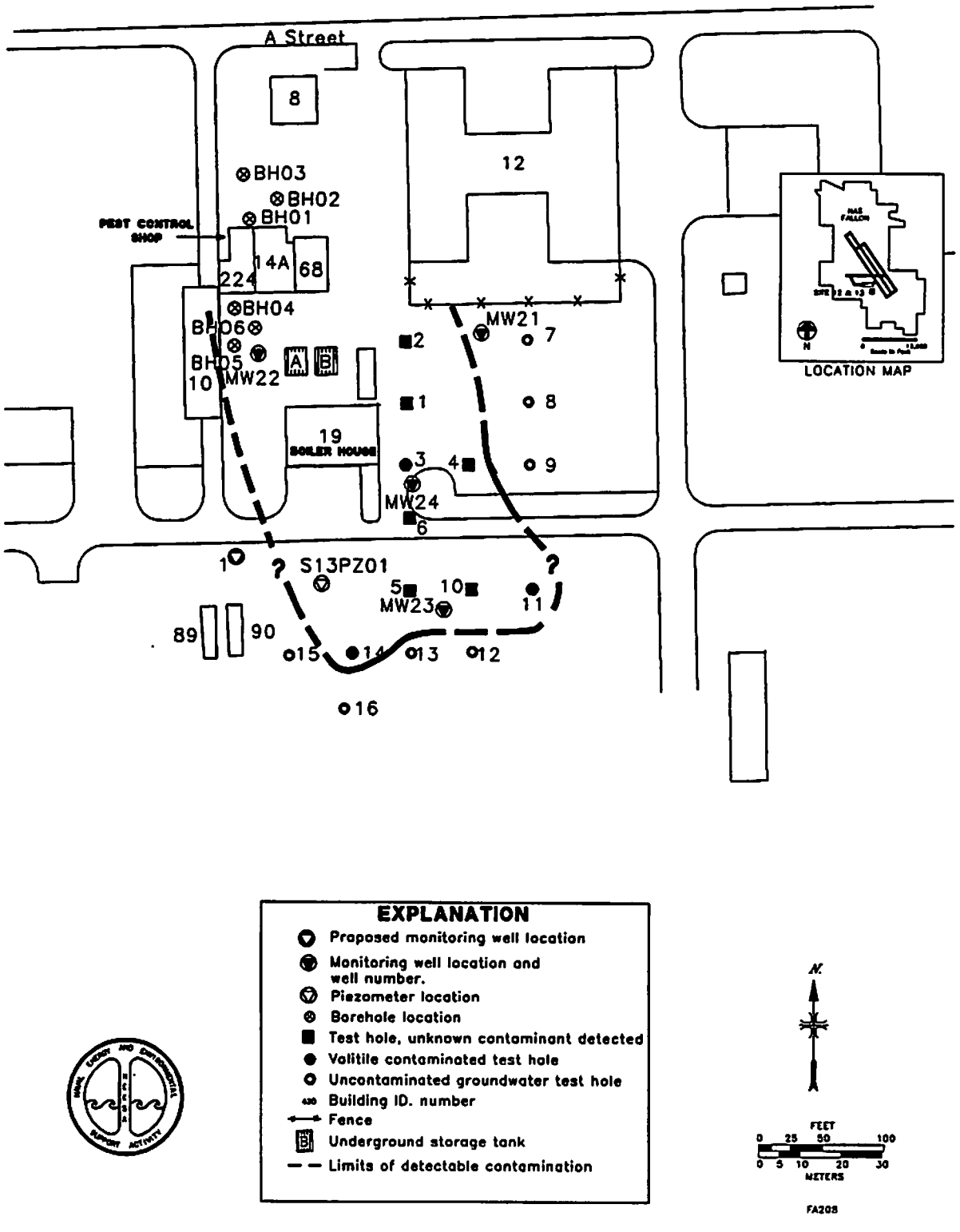

Fig. 3.8.3.ii. Site 12: Proposed locations for additional investigations.

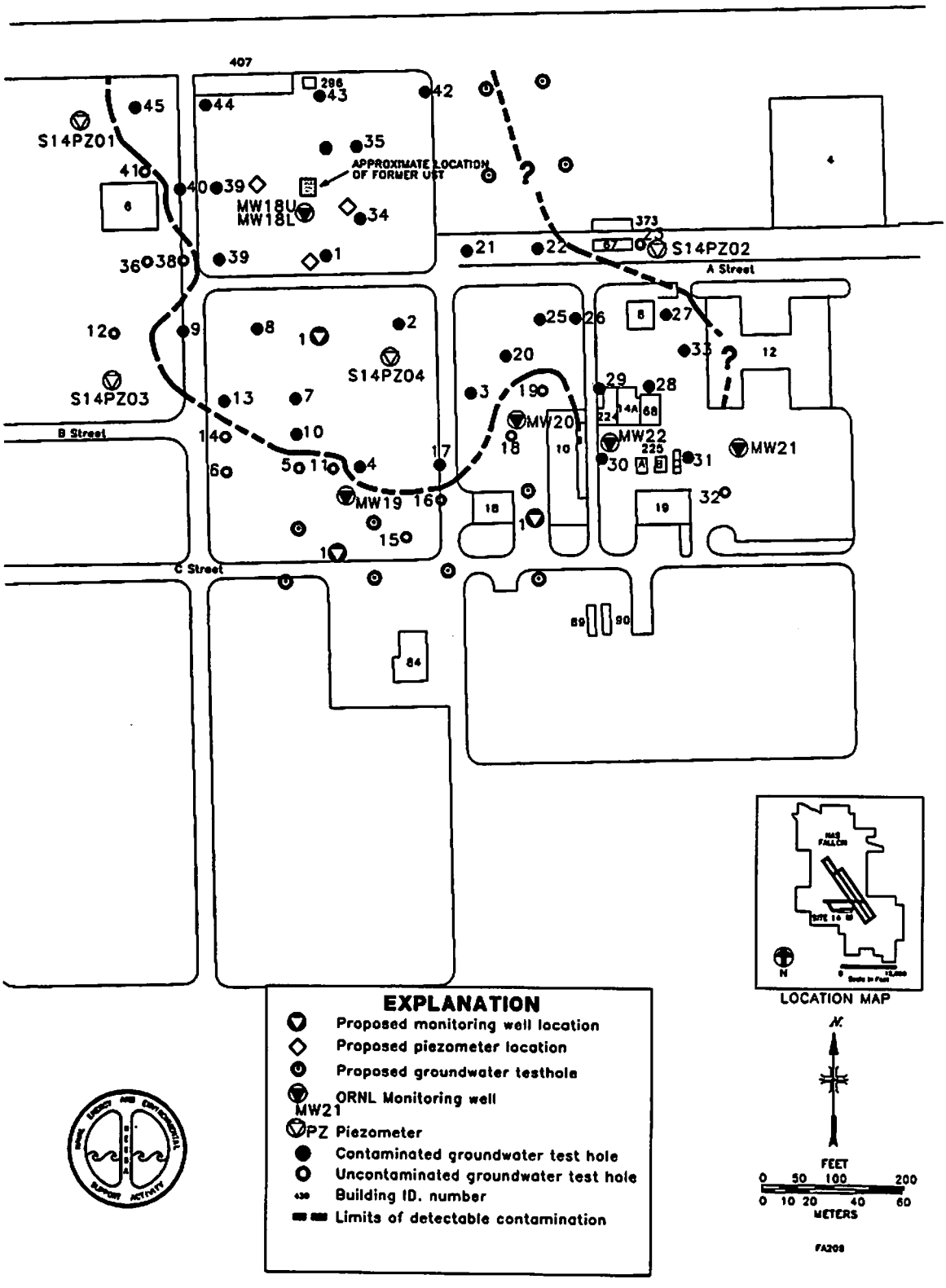

Fig. 3.8.3.iii. Site 14: Proposed locations for additional investigations.

along the southwest edge of the plume. Sediment samples will be collected from four locations in the unnamed ditch along the seepage face where the plume appears to intersect the ditch. These samples will be analyzed for organic contaminants.

Site 17, Hangar 4

No additional field investigations are proposed.

Site 19, Post-World War II Burial Site

No additional field investigations are proposed other than those proposed for Site 16 above.

Site 23, Shipping and Receiving Disposal Site

Another soil boring will be drilled near one of the previous boreholes to obtain a fresh soil sample near the ground surface. This sample will be tested for pesticides and subjected to the TCLP to determine leachable quantities of pesticides. No additional wells are proposed other than those proposed for Site 16 above.

4. SUMMARY OF ENVIRONMENTAL CONTAMINATION AT NAS FALLON

Results from IR Program investigations to date indicate that the vast majority of contaminants of concern at NAS Fallon are petroleum hydrocarbon and solvent related. These contaminants include JP-5, leaded gasoline, diesel fuel, fuel oil, waste oils and lubricants, and solvents. Three locations yielded samples containing detectable pesticides. Although not confirmed, other types of contaminants such as paints, thinners, metals, and

PCBs may also be present in small, localized areas. In addition, methane contamination may be generated as a by-product of bioactivity in the former facility landfills; however, no sampling has been done to confirm the presence of methane.

Introduction of contaminants to the environment has resulted from deliberate disposal activities, both through liquid disposal and landfilling and from accidental spills and leaks associated with normal activities at the facility. Many activities have contributed to environmental contamination since the facility was established in 1943, although practices have improved considerably since the mid-1980s.

Fortunately, characteristics of the native environment such as the semiarid climate, good surrounding air quality, and naturally poor water quality of the upper aquifer have minimized potential contaminant exposure to surrounding receptors. Additionally, institutional restrictions, restricted access, and environmental monitoring further mitigate contaminant exposure on facility property.

The principal exposure pathway of concern associated with NAS Fallon contamination is the surface water in the shallow drainage system to which the facility contributes. Downstream transport of contaminants via surface water may provide an exposure route to receptors. The poor regional quality of surface waters in the surrounding area prevents use as potable water. Thus, receptors are primarily limited to populace exposed to surface water through recreational contact and to flora and fauna indigenous to downstream flows and wetlands.

Phase II screening and sampling activities combined with other environmental assessments (NDEP 1990; ERM-West 1988; Dames and Moore 1988) indicate that areas of contiguous petroleum hydrocarbon and/or solvent contamination can be associated with twelve of the twenty-one IR sites at NAS Fallon. These sites include: Site 1, Crash Crew Training Area; Site 2, New Fuel Farm; Site 3, Hangar 300 Area; Site 4, Transportation Yard; Site 6, Defuel Disposal Area; Site 10, GATAR Compound; Site 12, Pest Control Shop; Site 13, Boiler Plant Tanks; Site 14, Old Vehicle Maintenance Shop; Site 16, Old Fuel Farm; Site 19, Post-World War II Burial Site; and Site 23, Shipping and Receiving Disposal Site. It is surmised that contaminants underlying Sites 4, 10, 19, 23, and perhaps 12 may not have

resulted from past activities at these sites; rather, contamination is the result of subsurface migration from source areas at adjacent sites. Potential contamination from Site 11, Paint Shop, remains to be assessed.

Records of past activities and anomalous responses from screening instruments suggest that minor amounts of other contaminants may also be present in certain areas. These areas and suspected contaminants include: methane gas at Sites 19, 20, 21, and 22, the facility landfills; paint wastes at Site 11, Paint Shop; pesticides at Site 12, Pest Control Shop; and PCBs at Site 10, GATAR Compound. Although reported burials of asbestos have occurred at Site 23 and near Site 10, environmental contamination is not suspected because of proper disposal methods.

Current environmental assessment activities indicate NAS Fallon IR sites are not contributing detectable contamination to surface water emanating from the facility. Contaminants appear to be contained in the shallow subsurface underlying the facility with little or no off-site migration. This finding of no or low risk must be supported with quantifiable data. Additionally the existence and extent of free product at some areas must be assessed in order to satisfy NDEP regulations. Thus, preliminary analysis of the laboratory data, field data, and discussions with HAZWRAP, Navy, and NDEP personnel have led to the conclusion that some additional field work is needed at several of the sites.

5. SUMMARY RECOMMENDATIONS FOR THE SECOND ITERATION OF REMEDIAL INVESTIGATIONS

Based on the results of the first iteration of IR Program field work on 20 sites and the continuing work at Site 2, the following additional investigations are recommended to collect the data required for the risk assessment and feasibility study. See Table 5.i.

Table 5.i. Summary of Second Iteration Remedial Investigations

SITE NUMBER	PROPOSED WELLS	PROPOSED PIEZOMETERS	PROPOSED SOIL BORINGS	GROUNDWATER TEST HOLES
Site 1	5	7	0	~12
Site 3	0	0	0	0
Site 20	0	0	0	0
Site 24	0	0	0	0
Site 2	4	0	12	~8
Site 4	0	0	0	0
Site 6	4	7	0	~15
Site 7	0	0	0	0
Site 21	0	0	0	0
Site 22	0	0	0	0
Site 9	0	0	0	0
Site 18	0	0	0	0
Site 10	0	0	0	~10
Site 11	2	0	0	~6
Site 12	1	0	1	~6
Site 13	0	0	0	0
Site 14	3	3	0	~12
Site 16	3	2	4*	~8
Site 17	0	0	0	0
Site 19	0	0	0	0
Site 23	0	0	1	0
Totals	22	19	18	~77

* Sediment samples from unnamed ditch

Site 1: Crash Crew Training Area

An upgradient well will be installed. The well will be a 5-in.-diameter pumping well for aquifer testing, and four piezometers will be installed around the well for observation points. The 5-in. well will be fully penetrating and fully screened. Two additional monitoring well pairs will be installed within the boundaries of the identified plume. One well pair will be placed within the old burn pit to check for floating product on the groundwater. The other well pair will be placed outside the burn pit but inside the plume in order to identify contaminant concentration gradients within the plume. Each well pair will include one shallow well screened across the water table interface to assess floating contaminants and one well completed at the bottom of the shallow aquifer to check for sinking contaminants.

If floating product is detected on the groundwater under the old burn pit, three piezometers will be installed around the area to assess the extent of the floating-product plume. Groundwater test holes will be drilled at all proposed well and piezometer locations prior to installation to ensure optimum placement. The proposed locations may be modified accordingly.

Site 3: Hangar 300 Area

No additional field investigations are recommended at this time.

Site 20: Checkerboard Landfill

No additional field investigations are recommended at this time.

Site 24: Road Oiling Area

No additional field investigations are recommended at this time.

Group I Sites: Site 2, New Fuel Farm; Site 4, Transportation Yard

Site 2, New Fuel Farm

Two additional shallow single completion wells will be installed within the plume along the edge of the former Carson River channel. The purpose of the wells is to define the contaminant concentration gradient between the product plume and the distal plume boundary and to determine the influence on the plume of the preferential flow path created by the former river channel. Two other wells will be installed near the western plume boundary to characterize that portion of the plume.

Groundwater test holes will be drilled at all proposed well locations prior to installation to ensure optimum placement. Test holes will also be drilled at the proposed location of each of the trench recovery wells recommended in the Site 2 EE/CA.

Site 4, Transportation Yard

No additional field investigations other than those listed under Site 2 above are proposed.

Group II Sites: Site 6, Defuel Disposal Area; Site 7, Napalm Burn Pit; Site 21, Receiver Site Landfill; Site 22, Northeast Runway Landfill

Site 6, Defuel Disposal Area

One upgradient well will be installed. The well will be a 5-in.-diameter pumping well for aquifer testing, and four piezometers will be installed around the well for observation points. The 5-in. well will be fully penetrating and fully screened. Two additional wells will be installed within the boundaries of the identified plume to assess floating-product extent and

contaminant concentration gradients. One additional well will be installed at the distal part of the plume to monitor for potential off-site migration.

If floating product is found within the plume, three piezometers will be installed to assess the extent and thickness of the product lens. Groundwater test holes will be drilled at all proposed well and piezometer locations prior to installation to ensure optimum placement.

Site 7, Napalm Burn Pit

No additional field investigations are proposed.

Site 21, Receiver Site Landfill

No additional field investigations are proposed.

Site 22, Northeast Runway Landfill

No additional field investigations are proposed.

Group III Sites: Site 9, Wastewater Treatment Plant; Site 18, Southeast Runway Landfill

Site 9, Wastewater Treatment Plant

No additional field investigations are proposed.

Site 18, Southeast Runway Landfill

No additional field investigations are proposed.

Group IV Sites: Sites 10, 11, 12, 13, 14, 16, 17, 19, and 23

Site 10, GATAR Compound

A metal-probe survey will be used to test the three target areas delineated by the geophysical survey. The probe will be driven into the ground on a grid pattern to determine if the soil at the site has been disturbed. The assumption is that the probe will penetrate more readily into a disturbed vs a non-disturbed area and that the buried cans containing PCB-laden oil will be found in a disturbed area. In case the probe encounters buried metal, the probe will be withdrawn immediately. The technique will be used to try to narrow the targets for excavation from three to one.

Site 11, Paint Shop

Because contaminants identified in MW-25 included several phenol compounds, two wells are proposed for this site. One well will be installed through the concrete at the former disposal area, and the other well will be installed downgradient. Groundwater test holes will be drilled at all proposed well locations prior to installation to ensure optimum placement.

Site 12, Pest Control Shop

Another soil boring will be drilled near BH02 to obtain a fresh soil sample at the water table. This sample will be tested for pesticides and subjected to the TCLP to determine leachable quantities of pesticides. Additional groundwater test holes will be drilled along the west side of the plume as defined by previous investigations. One additional well may be installed at the site depending on the final plume configuration and the relation between this plume boundary and the boundary of the gasoline/diesel plume emanating from Site 14.

Site 13, Boiler Plant Tanks

The well proposed for Site 12 above will also serve to assess this site.

Site 14, Old Vehicle Maintenance Shop

Groundwater test holes will be drilled to define the eastern boundary of the plume in the asphalt-covered parking lot and to define the southern boundary of the plume in the vicinity of wells MW19 and MW20. Two samples will be collected and analyzed from each testhole to ensure that each location is properly characterized. Other test holes will be drilled within the plume to determine optimum locations for additional wells and piezometers.

One additional well will be installed within the plume boundaries for contaminant-concentration-gradient determination. Two other wells will be installed along the south boundary of the plume as determined by groundwater test hole drilling.

Three piezometers will be installed in the floating-product portion of the plume to assess the thickness and extent of the product lens.

Site 16, Old Fuel Farm

Groundwater test holes will be drilled at all proposed well and piezometer locations prior to installation to ensure optimum placement. If floating product is detected on the groundwater near the underground tanks, two piezometers will be installed around the area to assess the extent of the floating-product plume.

Three additional shallow single completion wells will be installed within the plume downgradient of MW25. The purpose of the wells is to define the contaminant concentration gradient between the product plume and the distal plume boundary. One of these wells will be positioned to determine the influence on the plume of the former river channel.

Sediment samples will be collected from four locations in the unnamed ditch along the seepage face where the plume appears to intersect the ditch. These samples will be analyzed for organic contaminants.

Site 17, Hangar 4

No additional field investigations are proposed.

Site 19, Post-World War II Burial Site

No additional field investigations are proposed other than those proposed for Site 16 above.

Site 23, Shipping and Receiving Disposal Site

Another soil boring will be drilled near one of the previous boreholes to obtain a fresh soil sample near the ground surface. This sample will be tested for pesticides and subjected to the TCLP to determine leachable quantities of pesticides. No additional wells are proposed other than those proposed for Site 16 above.

Because many sites showed no significant contamination detected by PCB/pesticide analysis, metals analysis, and anion analysis, only analytical methods related to contaminants already identified at a site will be requested for samples collected during the next iteration of field work. Analytical parameters will be deleted only for sites where previous investigative results indicate no detection of associated analytes. Samples collected for pesticide analyses from wells at Site 12, Pesticide Control Shop, will be submitted for both EPA method 608 and method 625 analyses in order to cover the entire spectrum of potentially released compounds.

6. DATA VALIDATION

The data validation for the first iteration RI was completed using a computer program designed and written by ORNL. The program follows the EPA Laboratory Data Validation Functional Guidelines for Evaluating Organic and Inorganic Data (USEPA 1988b; USEPA 1988c). Additional guidance for the programming was obtained from DOE/HWP-65/RI entitled *Requirements for Quality Control of Analytical Data* (DOE 1990). This document specifies the checks that must be completed for the "Level C" data validation specified by the Work Plan.

The program queries the analytical results data base containing the appropriate information for each sample. The analytical results can either be entered manually or downloaded electronically from disk. The program provides a logical sequence for the validator to follow, reduces data entry errors, and eliminates omission errors. The validation equations have been incorporated into the program, and all verification calculations are completed and reported by the program. The flagging logic is included in the program and is sent to an edit screen enabling the validator to make judgements on the final quality flags for the summary report of the data. This reduces the tedious, manual cross-comparisons required to produce validation reports. The program greatly increases the efficiency and accuracy of the procedure and substantially decreases the time required for data validation. The details of the data validation will be presented in the final RI report and a brief summary is included below.

In general, the data was good and the problems that were noted had no effect on the usefulness of the data. The most consistent data qualifier resulting from data validation was flagging of data as estimated due to method blank contamination. Some VOC and Semi-VOL analysis were flagged by the 5x/10x rule for method blank contamination. If the method blank contained the same common laboratory contaminants as the sample at concentrations less than 10 times the value in the method blank, the sample results were flagged as estimated due to method blank contamination. The 5 times rule was used for compounds not considered common laboratory contaminants.

Other minor data validation findings resulted in positive results being flagged as estimated values. There were some problems with samples taken early in the RI concerning calibration and percent differences for continuing calibrations. Also, some initial calibrations were performed as much as six weeks prior to sample runs. These problems were cleared up by changing the calibration requirements during renewal of the laboratory subcontract in 1990.

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APPENDIX A

GEOPHYSICAL SURVEY FIELD SCREENING

CONTENTS

APPENDIX A

FIGURES iii

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FIELD SCREENING USING EM-31 GEOPHYSICAL SURVEYS AND USRADS

INTRODUCTION

During August 1989 and again in November 1990, electromagnetic (EM) geophysical surveys were performed at sites at NAS Fallon. These surveys involved the use of a Geonics EM-31 electromagnetometer coupled with an ultrasonic ranging and data collection system (USRADS). Specifically the EM was employed to map differences in the electrical conductivity of the shallow groundwater and soil profile believed to be associated with floating jet fuel (JP-5), varying degrees of groundwater salinity, and/or buried metallic debris. The surveys were performed to help guide the selection of monitoring well locations at Site 1, Site 2, Site 10, Site 19, and Site 23.

HARDWARE

The EM geophysical surveys were conducted using a Geonics EM-31 field-portable instrument coupled with USRADS. The EM-31 data provide a measure of the conduct-ivity of the soil in the surveyed area. Underground conductivity contrasts often yield clues about the soil type, salinity, water content, and the location of buried metal.

USRADS is a patented, computerized data acquisition system developed by Oak Ridge National Laboratory to collect and relate data from field-portable instruments to the precise physical location of the data points. USRADS incorporates three technologies: radio frequency (RF) communications, ultrasonics, and a personal computer (PC) (Dickerson et al. 1989). The system is adaptable to many field-portable instruments, including gamma-ray detectors, electromagnetic geophysical instruments, and x-ray fluorescence instruments. Theoretically, any instrument which is field portable and has a digital signal output can be adapted to the system.

RF is used for system timing, communications, and data transfer. The propagation time of an ultrasonic signal serves as a device to measure the distance travelled while scanning. The PC is used to: 1) calculate the surveyor position; 2) reduce, store, and display data; 3) prepare reports; and 4) transfer data into electronic data bases. The hardware included in USRADS consists of a surveyor's backpack, fifteen stationary receivers, a master receiver, a custom computer interface, and a PC.

FIELD WORK

The field work portion of the surveys required three people for nine days. Each setup with USRADS covered a block area of 200 ft × 200 ft. The data was collected by: one person with the instrument and the backpack who walked over the block, a second person who monitored the PC as the data was transmitted to ensure that the block was adequately covered, and a third person who helped with setup and teardown of the system. The data consisted of many thousands of individual readings taken at one-second intervals over the course of the surveys. This is far more data than acquired during the traditional survey technique of taking manual instrument readings at evenly spaced grid points. Thus, the data coverage is more thorough and the anomaly resolution more accurate.

RESULTS

The raw field data were contoured using the Surfer program produced by Golden Software (Golden Software, Inc. 1989). The program was used to smooth the data and to remove some of the effects of cultural interferences at each site such as underground utilities, fences, above-ground tanks, etc. Smoothing can also be used to remove small-scale anomalies (e.g., man-hole covers) and accent major trends. Contour maps of the data along with track maps of the survey blocks showing data collection points are included in this appendix. The maps are discussed in the individual sections for each site surveyed.

Site 1, Crash Crew Training Area

The data for the site were collected in twenty blocks covering about 200 ft × 200 ft each. Each block contains about 1,000 measurements, while the entire data set consisted of nearly 20,000 records. Each record has an x-y location for the measurement and the quadrature and in-phase readings from the EM-31.

After thorough examination, the data from the twenty blocks were pieced together to show the overall coverage (Fig. A.1). A number of small flaws in the data set became apparent on the plot of the tracking map. The gap in coverage between several blocks is due to a fence which prevented data collection in that area. Other data gaps were the result of brush and aboveground tanks which prevented data collection. The quadrature data collected were rated as "good quality" by the interpreting geophysicist, John Nyquist. However, the in-phase data showed that the threshold was set too high, and readings repeatedly went off scale, causing the data to be clipped. Because the in-phase data are generally used only for detection of buried metal, which was not the objective at this site, the resultant loss of data was not critical. Only the quadrature data are discussed here.

Contouring the quadrature data (Fig. A.2) shows that many small (20- to 30-ft-diameter) highs and lows exist. After buried metal, the strongest influences on terrain conductivity at the site are probably variation of water salinity and degree of soil saturation, most likely far stronger influences than the presence of jet-fuel contamination. The strongest apparent trend is a high-conductivity anomaly running northwest to southeast across the site. Whether this represents high salinity, increased soil-moisture content, shallower depth to groundwater, or a combination of all three is impossible to say without more information. While the anomaly may be attributed to the existence of a buried river channel which trends in the same direction across the southwest corner of the site, it is difficult to say without a better understanding of the precise channel configuration. Geologic cross- sections created from monitoring well logs will assist in additional interpretation. Analysis of the variation in

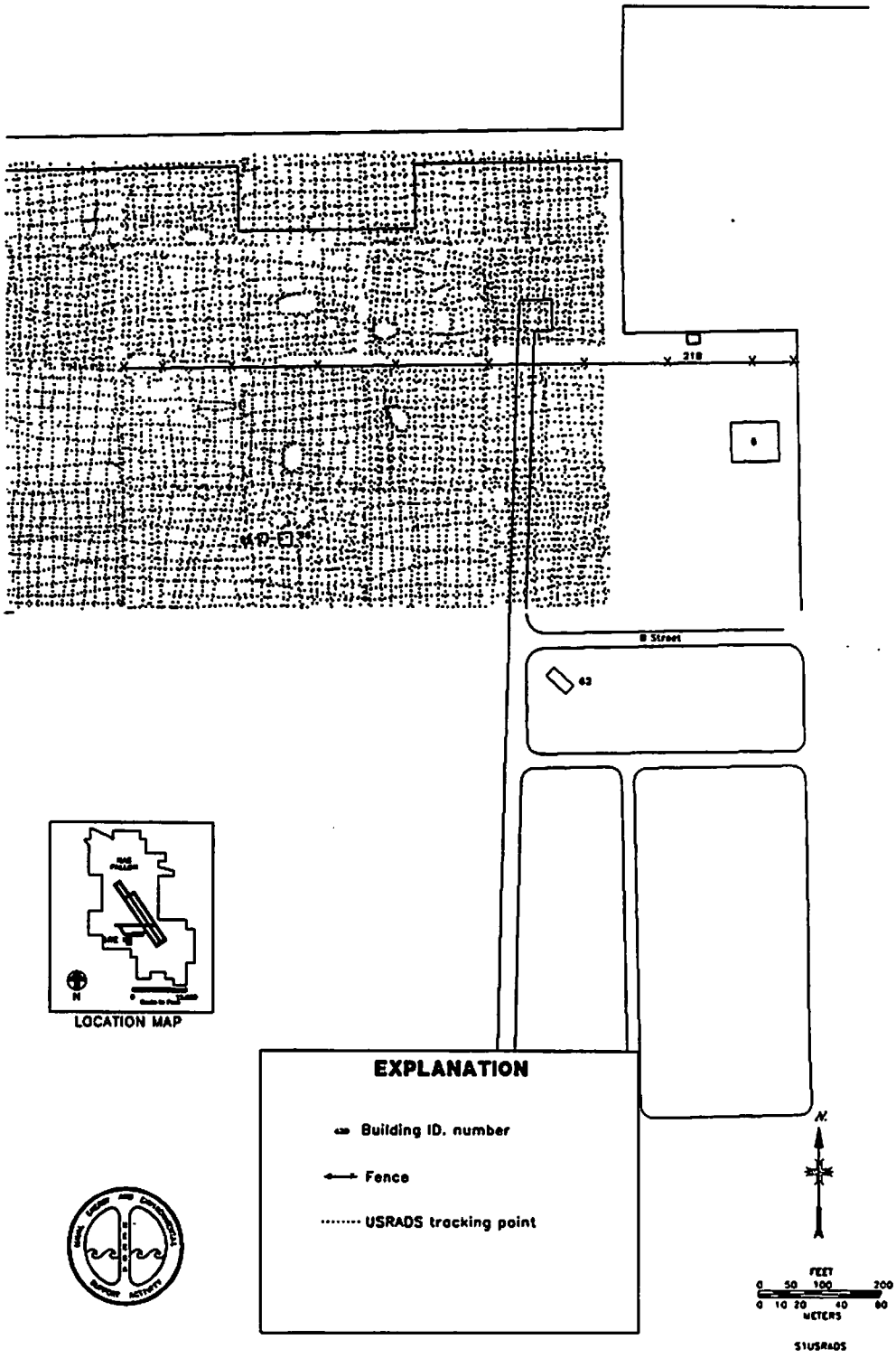

Fig. A.1. Site 1, Crash Crew Training Area. USRADS track map.

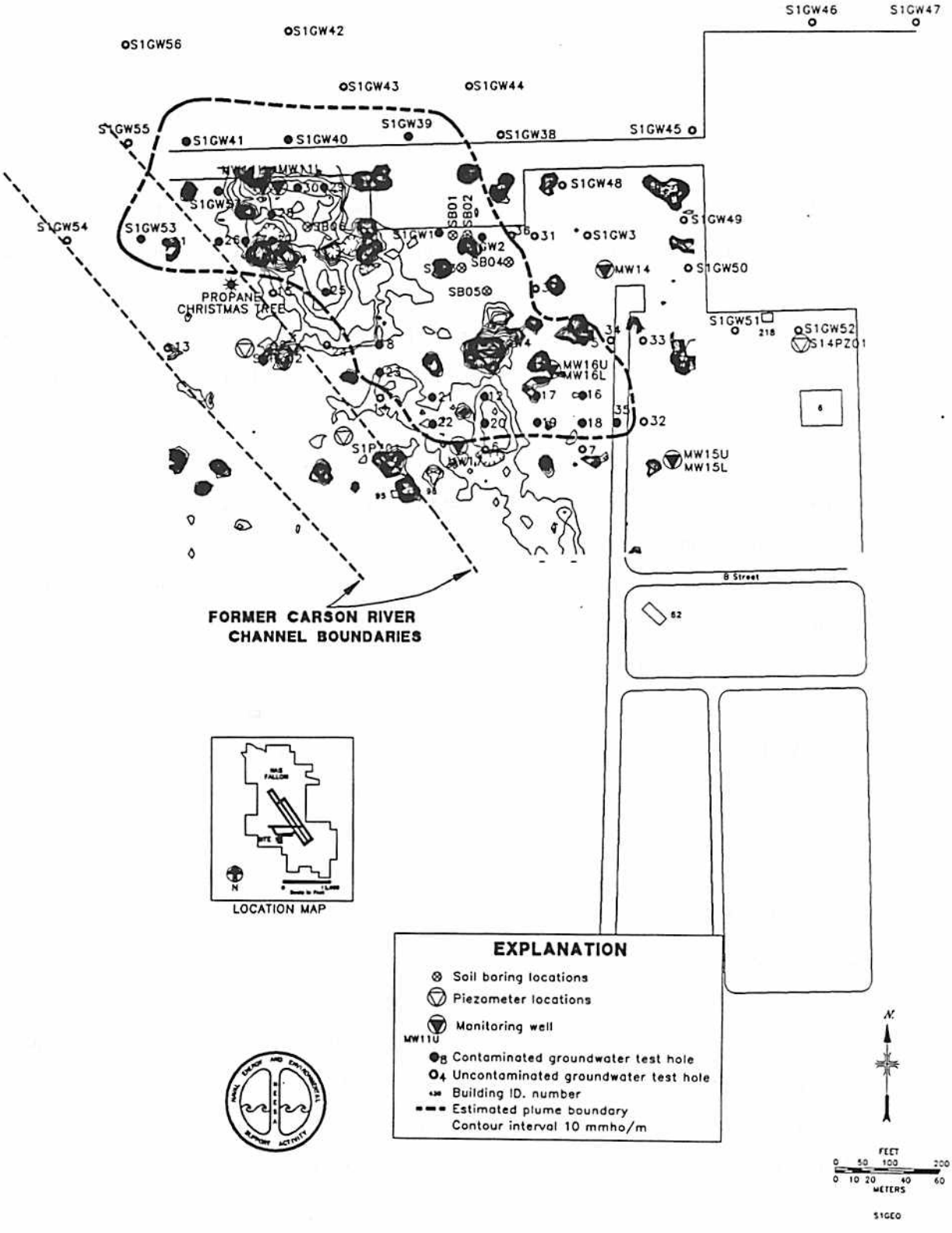

Fig. A.2. Site 1, Crash Crew Training Area. Quadrature geophysical contour map.

the electrical conductivity of the water in the monitoring wells and the creation of groundwater potentiometric maps may also be revealing.

Site 2, New Fuel Farm

The results show anomalously high conductivities related to a chain-link fence across the south side of the fuel farm and to two underground tanks (Fig. A.3). Two trends of low conductivity are also revealed. The two prominent, low-conductivity anomalies trend south 50 degrees east and appear to be associated with changes in the electrical conductivity of the groundwater. The conductivity of the groundwater tested in the ERM-West monitoring wells at the site ranged from less than 1,000 μmhos/cm to greater than 10,000 μmhos/cm, indicating that the water quality ranges from fresh to brackish. The trends of low conductivity mapped by EM geophysical surveys correlate with the wells exhibiting lower-conductivity measurements. The trends do not necessarily correlate to areas with known floating product on the groundwater but do follow the same directional trends as the former Carson River channel mapped across the site. Hence, the EM survey is probably mapping plumes of groundwater and soil with lower salinity and conductivity as opposed to mapping layers of floating hydrocarbons on the water table. Calculations performed by ORNL geophysicist, John Nyquist, support this conclusion. His evaluation concluded that the low-conductivity anomalies were too strong to be accounted for by floating hydrocarbons or by changing depth-to-water due to topography. This is not to say that the low-conductivity anomalies are not related to hydrocarbon plumes. In fact, the soil-gas survey and groundwater test hole data indicate that petroleum hydrocarbons are associated with both plumes of fresh water.

The largest low-conductivity anomaly is associated with the oil/water separator (O/WS) leach field (Fig. A.3). Historical data indicate that the O/WS leach field is the major source of contamination in the area. The function of the O/WS, which was poorly designed and maintained, was to collect fuel spills and wash water from the topoff rack. It collected both fuel and water from routine pavement washing at the topoff rack but did not effectively separate the layer of fuel from the water layer prior to discharge into the leach field.

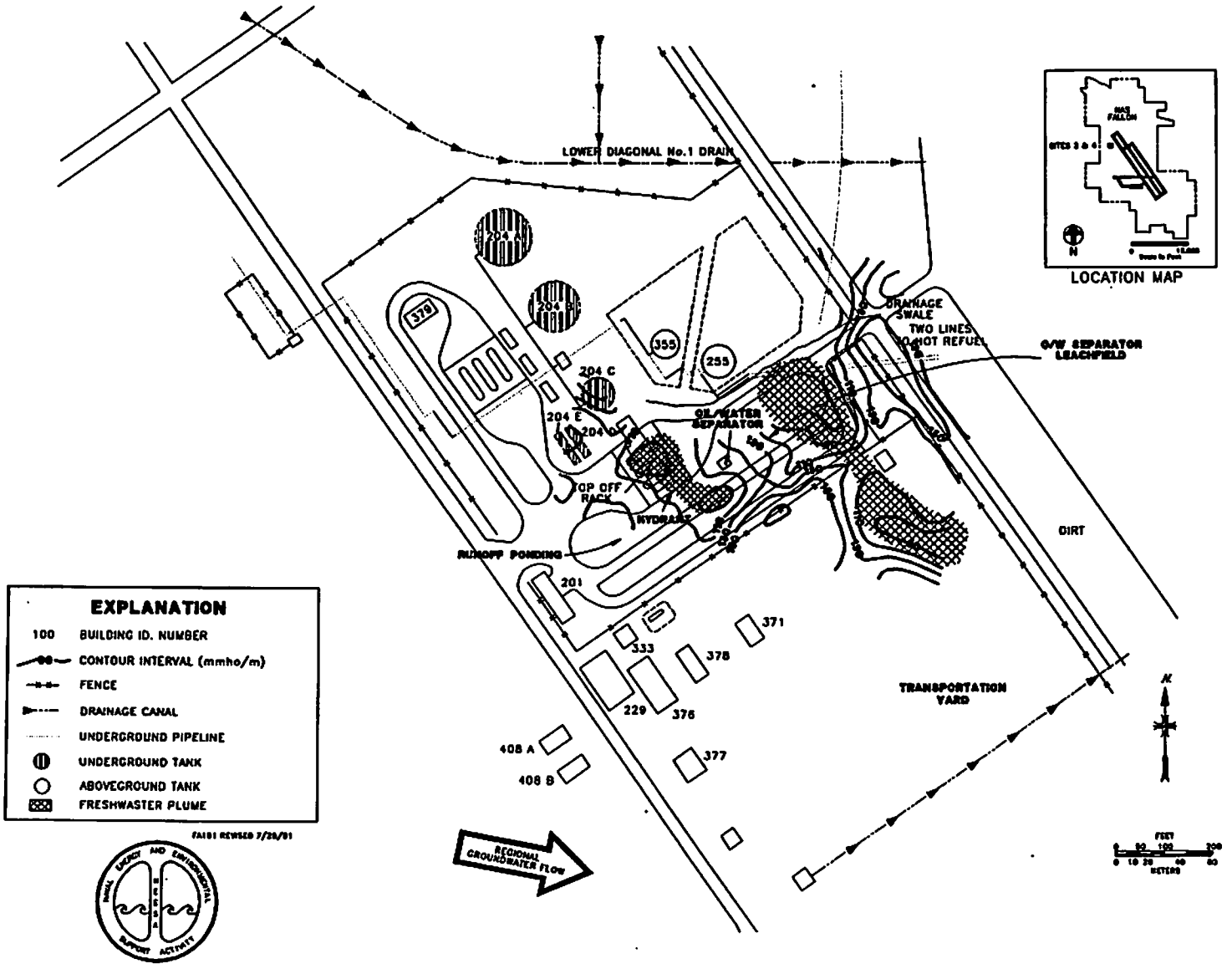

Fig. A.3. Site 2, New Fuel Farm. Geophysical contour map and associated fresh-water plumes.

Large amounts of fresh water and fuel were discharged through the leach field into the shallow groundwater. Furthermore, the leach field is usually inundated with surface runoff from rainfall. This water infiltrates and adds to the fresh-water plume. Interpretation of the monitoring well water-level data indicates that the groundwater flow gradient is approximately south 70 degrees east. Note that this is different by 20 degrees from the trend mapped by the EM geophysical survey. There are two possible explanations for the discrepancy: the fresh-water plume may be following the trend of the buried channel (most likely) or mounding at the leach field is causing errors in the flow determination. (The surface of a mound is curved, and the calculation assumes a planar surface.)

The geophysical contour map indicates that the extent of the fresh-water plume associated with the leach field has not been completely defined. The apparent end of the anomaly along the southeast boundary of the site is a distortion caused by high readings obtained along the chain-link fence separating the fuel farm and the transportation yard. The anomaly resumes on the south side of the fence and appears to extend out of the surveyed area to the southeast.

A smaller, low-conductivity anomaly is located west of the O/WS just south of the topoff rack. A water hydrant located there was leaking fresh water at the time of the survey. It was still leaking several weeks later and probably represents a continuous source of fresh-water recharge. This area also ponds water during rainfall, and facility personnel have noted hydrocarbons on the surface of the ponded water. The conclusion, therefore, is that the small, southeasterly trending, low-conductivity anomaly in the area represents a second plume. The limits of this fresh-water plume appear to be defined by the geophysical data; however, the associated soil-gas and groundwater test hole plume of petroleum hydrocarbon contamination continues to the southeast. This may be an indication that the fresh-water plume is younger than part of the fuel plume.

Site 10, GATAR Compound

The coverage shown on the track map is relatively regular with no gaps in the data (Fig. A.4). The area was covered by two USRADS setups which produced approximately 2,000 data points. The area is enclosed by a chain-link fence, but there were no other visible cultural interferences at the time of the survey. The purpose of the survey at this site was to locate possible cans or drums containing PCB-laden oil which were reportedly buried in the northeast quadrant of the compound. A metal-detector survey revealed several small pieces of shallowly buried metal in the region but no other anomalies.

The quadrature data show several high and low anomalies but no apparent trends (Fig. A.5). The EM-31 quadrature data, however, show a possible concentration of more deeply buried metal about eighty feet south and twenty feet west of the northeast corner of the compound. Other anomalies appear in the region, but the large one would be the most likely place to continue the investigation for the containers of oil. Recommendations include excavating the site to determine if buried drums are present and, if so, removing them for appropriate disposal.

Site 19, Post-World War II Burial Site, and Site 23, Shipping and Receiving Disposal Site

Because these two sites are adjacent and nearly contiguous, the EM-31 survey covered the entire area. Ten USRADS setups were required to fully cover the area of 1,000 ft $\times$ 400 ft, generating approximately 10,000 data points. Site 19 was surveyed for trends possibly related to trenches containing buried scrap metal and engine-cleaning solvent. The primary purpose of surveying Site 23 was to locate the aircraft reportedly buried there in 1984. The track map (Fig. A.6) shows good coverage over the entire area with two exceptions: a rectangular segment in the southwest quarter where the fence for the GATAR compound prevented surveying, and a break in the north-south tracking in the north half of the area related to an east-west trending ditch.

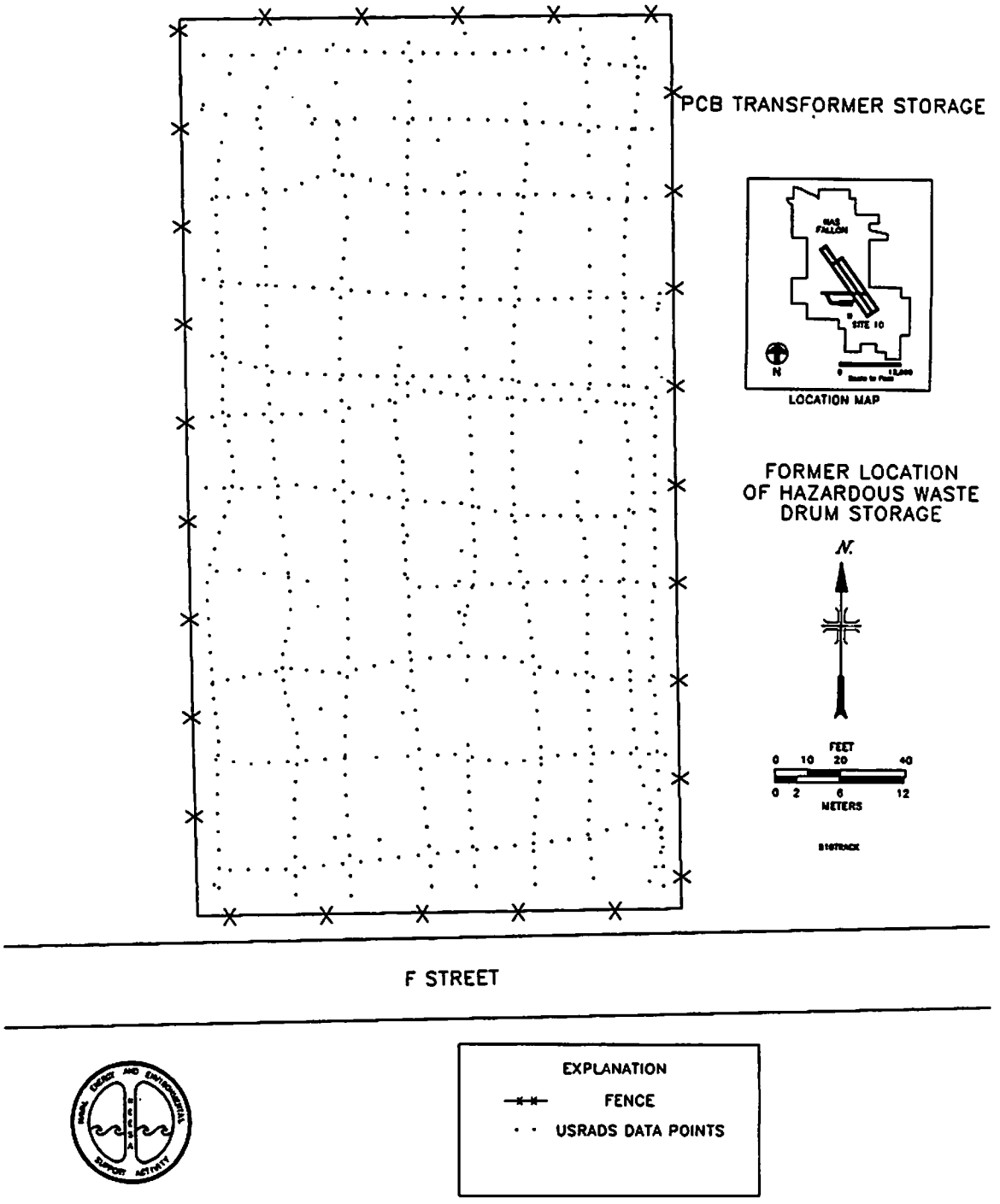

Fig. A.4. Site 10, GATAR compound. USRADS track map.

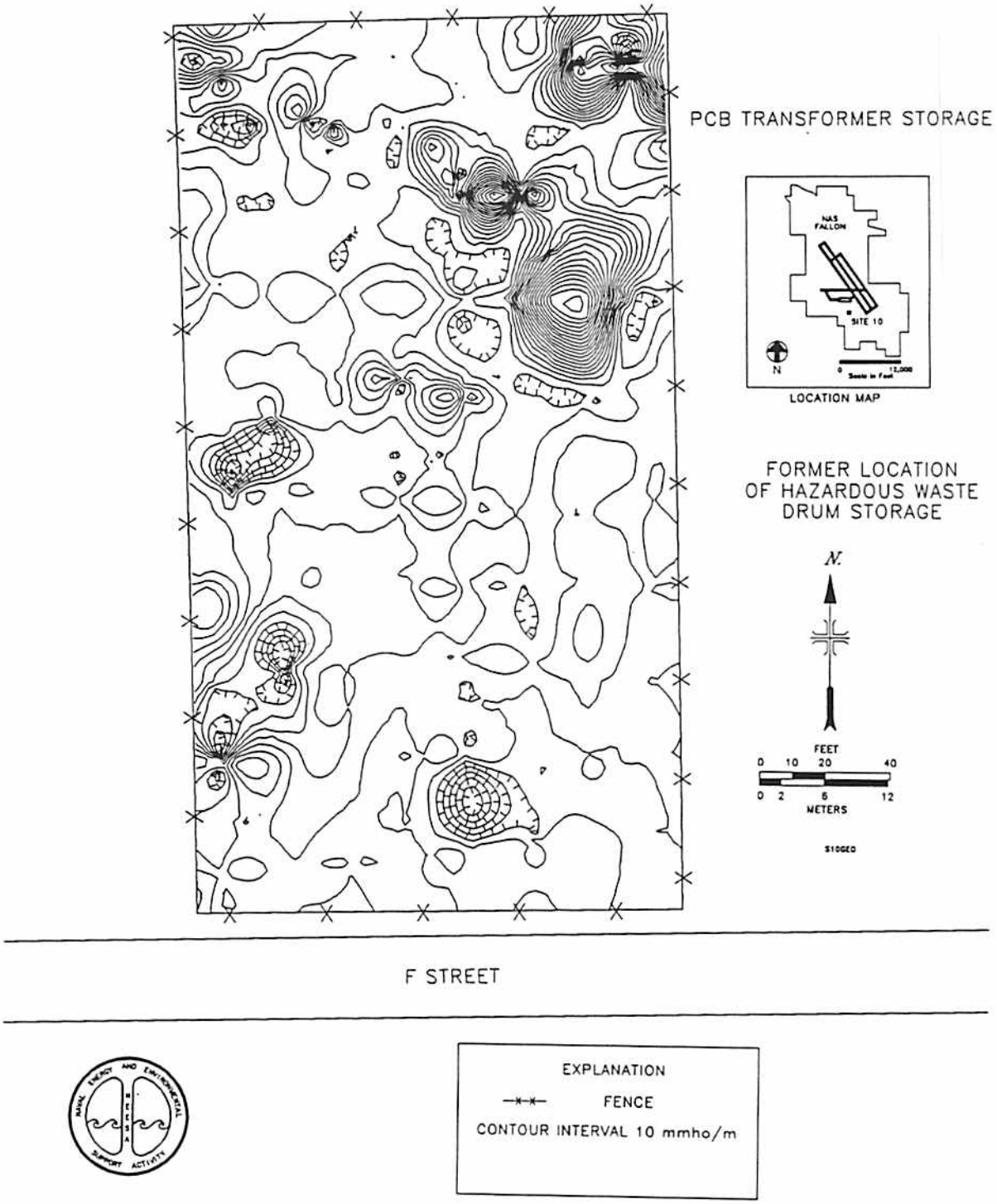

Fig. A.5. Site 10, GATAR compound. Quadrature geophysical contour map.

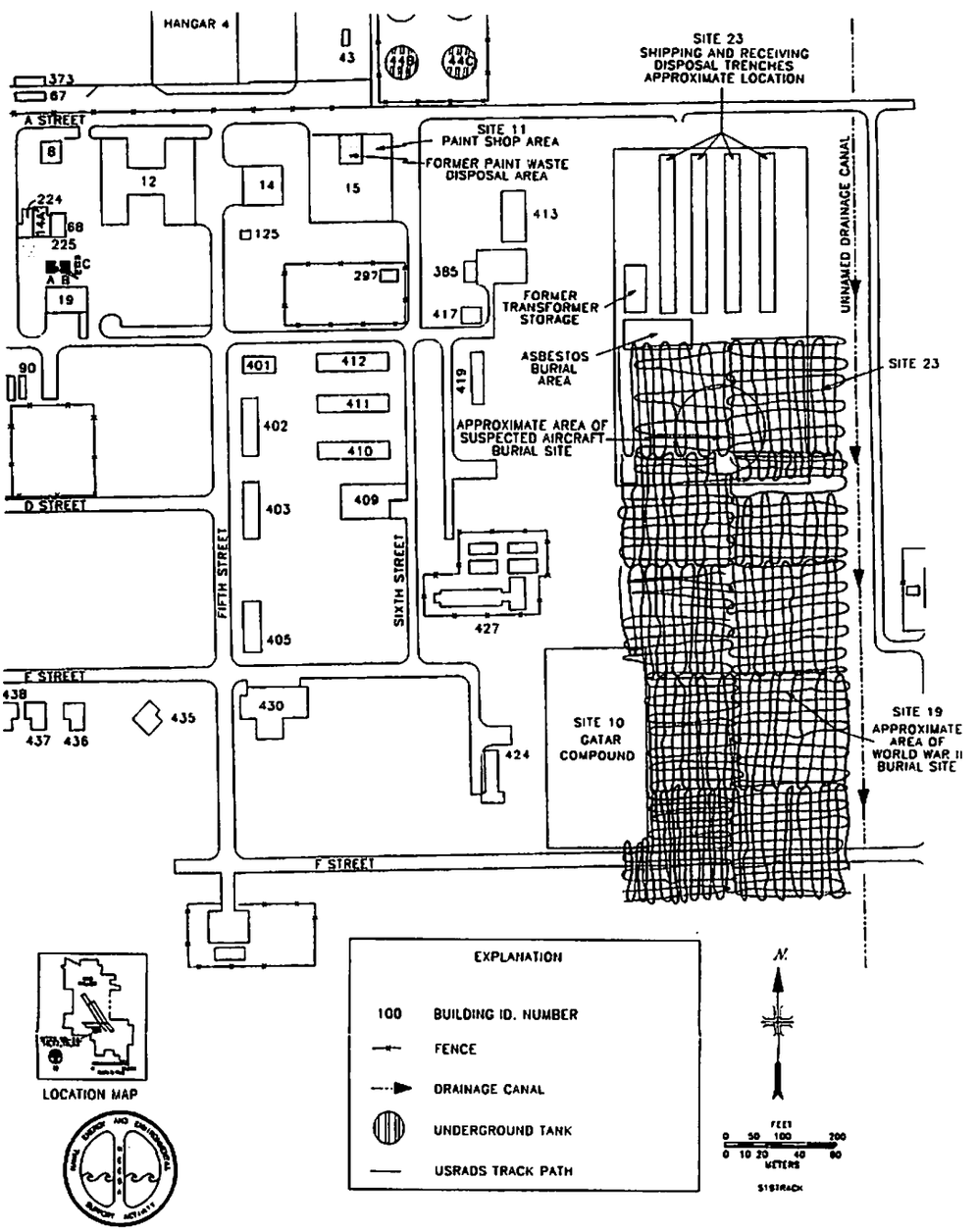

Fig. A.6. Site 19 and Site 23. USRADS track map.

Review of the quadrature data revealed numerous high- and low- conductivity anomalies, many of which can be related to scattered metallic debris on the ground surface. No obvious trends are shown by the contour plot of the quadrature data (Fig. A.7). One slight low-conductivity anomaly appears to trend from northwest to southeast across the south half of the area in the vicinity of the contaminant-plume discharge area delineated by the groundwater test hole mapping. It is difficult to say if this anomaly is related to the contaminant plume.

The in-phase data similarly reflects anomalies, most of which can be related to piles of scrap metal and other debris containing metal such as rebar in concrete (Fig. A.8). The road across the southern end of the area appears to be reflected by a slight low anomaly on the in-phase data. There does not appear to be a buried aircraft in any of the surveyed area unless it is buried underneath one of the surface scrap piles. There may be trenches containing some metallic debris in the southwest quarter of the region, 100 to 300 ft north of the road. Otherwise, the area is devoid of in-phase anomalies.

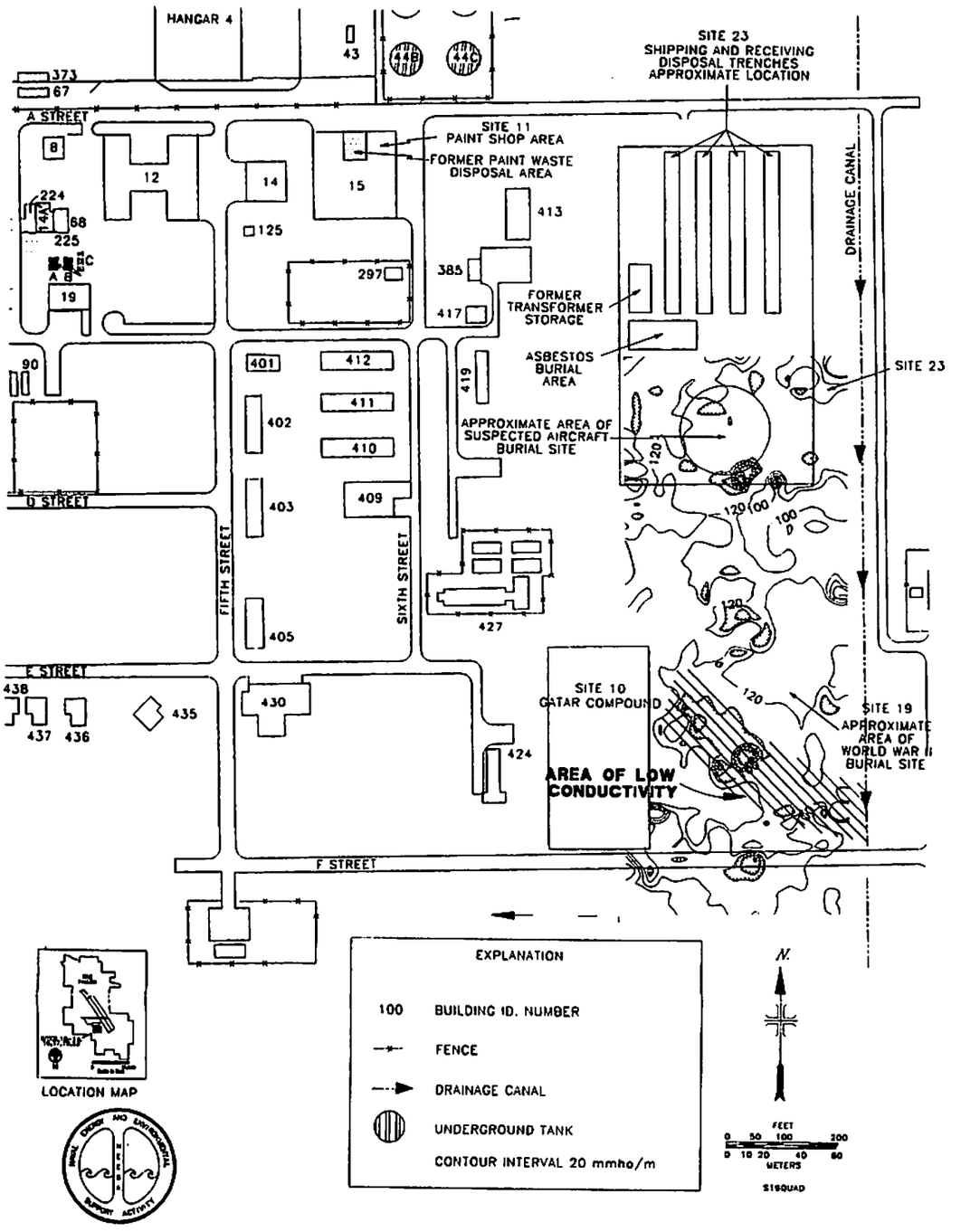

Fig. A.7. Site 19 and Site 23. Quadrature geophysical contour map.

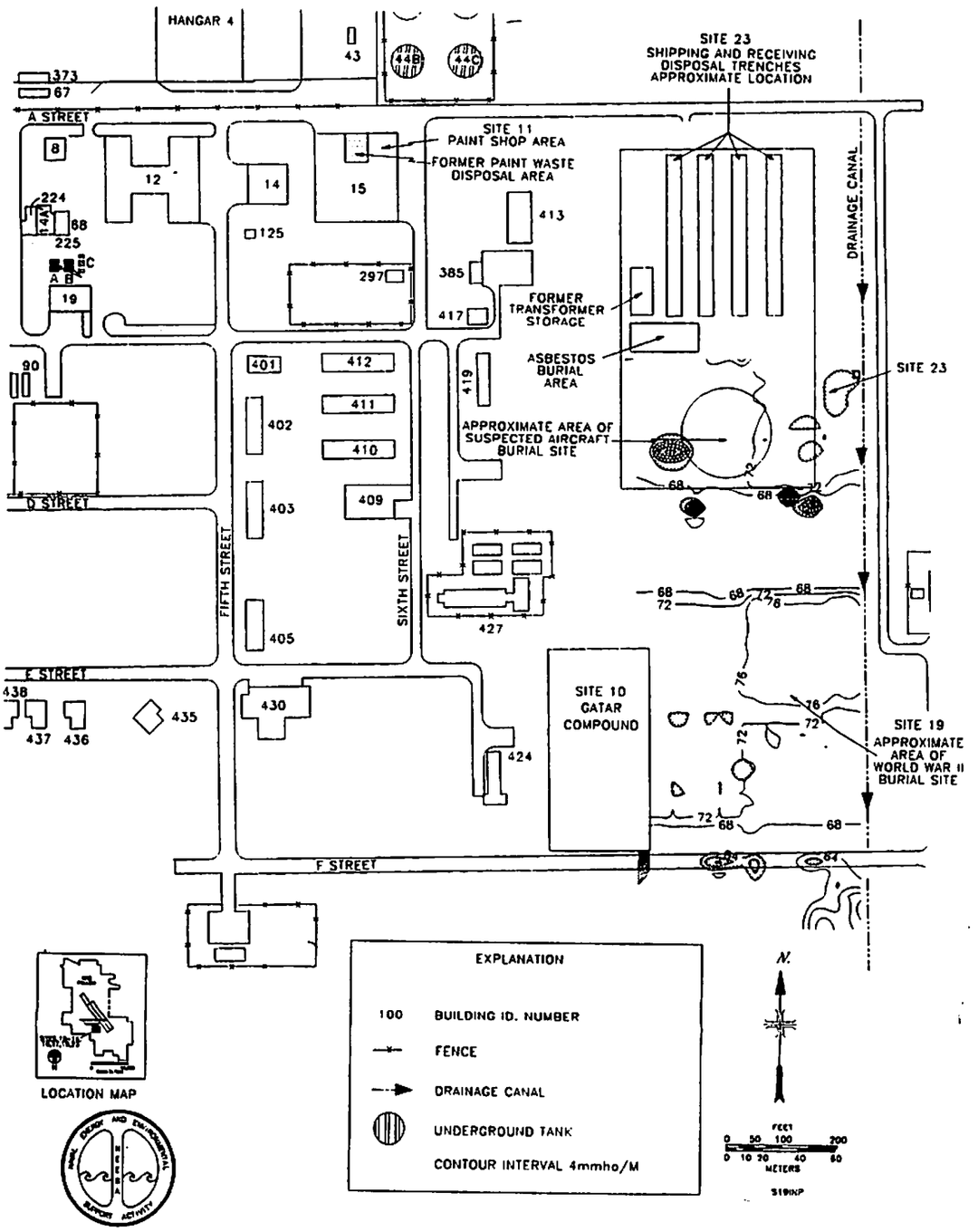

Fig. A.8. Site 19 and Site 23. In-phase geophysical contour map.

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APPENDIX B

GROUNDWATER TEST HOLE FIELD SCREENING

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GROUNDWATER TEST HOLE FIELD SCREENING

METHODOLOGY

This field-screening technique was developed by ORNL/GJ field personnel after other field-screening techniques such as soil-gas and EM-31 geophysical techniques proved inconclusive or inadequate (ORNL 1991a). The technique was an outgrowth of using a hydropunch sampler, the tool of choice at the beginning of the field-screening surveys. This sampler, however, was slow, inconsistent, and subject to damage when used with a hydraulic hammer. The new technique, which proved to be quicker and simpler, involved penetrating the water table by drilling a number of 4-in.-diameter auger holes with a small truck-mounted hydraulically powered auger rig (Fig. B.1). During drilling, each hole was monitored continuously for volatile organic compounds with a PID, HNU model PI-101. The PID was calibrated daily with a known gas standard. Elevated readings during drilling and in the open hole were noted in the field log book. Occasionally the PID would react to exhaust from the rig. However, this problem was eventually minimized by routing the exhaust downwind from the work area with a flexible metal pipe and by checking for repeatable readings with the PID. The color and composition of the drill cuttings were also noted and recorded in the field log book.

Each hole was drilled into the shallow water table, generally 14 to 16 ft deep. A groundwater sample was collected from the open hole with a bailer or screened auger, depending on whether or not the hole would stand open after the augers were removed. Where sandy soil was encountered, the holes tended to cave in up to the top of the water table, and a screened auger had to be drilled into the water-bearing sand to obtain a sample. Otherwise, a bailer was the quickest way to obtain a sample. The water sample was poured from the bailer or screened auger into a 250-mL glass vial equipped with a teflon septum cap and certified precleaned. A new vial was used for each sample. During the sample transfer, about 50 mL of headspace were left in the container. The sample was capped immediately

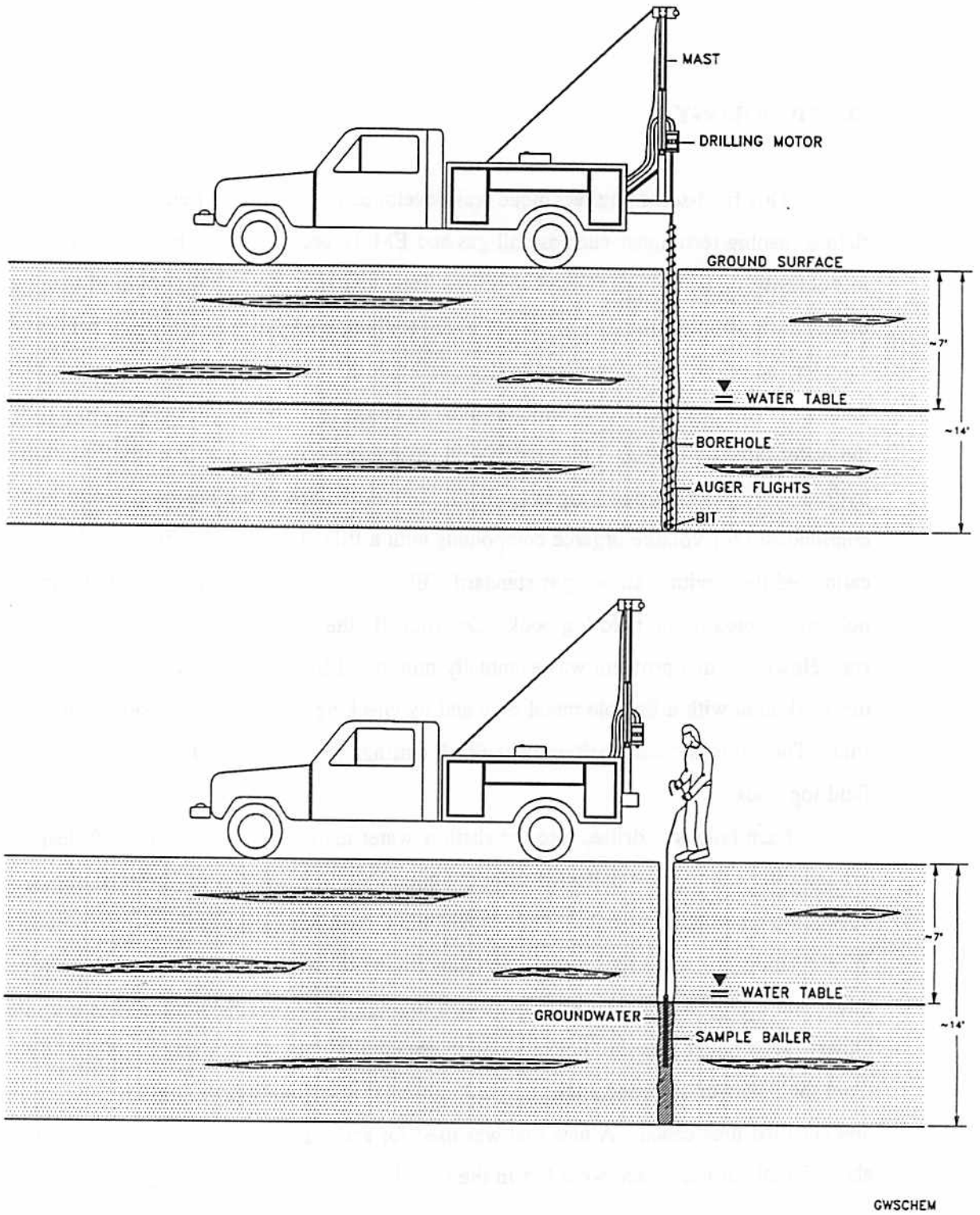

Fig. B.1. Schematic drawing of hydraulic rig and groundwater sampling method using bailer.

and allowed to equilibrate in the container for 30 minutes to ensure that any dissolved volatile organic compounds in the water sample had sufficient time to partition into the headspace air of the vial. All augers, bailers, and other sampling tools were steam-cleaned between holes.

The capped samples were transported to the van containing the field portable gas chromatograph (Photovac Model 10S50) where an aliquot of headspace air was removed from each vial with a syringe (usually 100 μL) and injected into the field GC. Sometimes a smaller sample aliquot was injected if there was evidence that the sample was highly contaminated. This subjective decision was made based on criteria such as: above-ambient PID readings in the open hole; visible product in the sample; noticeable hydrocarbon odor; and a gray, reduced appearance of the drill cuttings. The appearance of visible product was considered ample evidence of contamination, and, generally, no test was run on such samples. If a sample did not contain visible product, a test was performed.

The resultant chromatogram was inspected for anomalous peaks, and a determination of relative concentrations of volatile organic compounds was made. Thus, qualitative designations such as "clean", "slightly contaminated", and "highly contaminated" were assigned to each groundwater test hole. This information was used to guide the selection of additional groundwater test holes. The tables in this appendix designate the holes as "pos" and "neg", indicating that the sample either tested positive or negative for volatile organic contaminants with the PID and the GC. The presence of repeatable anomalous peaks on a chromatogram was considered evidence of contaminated groundwater. In general, the anomalous peaks were confirmed by PID readings in the open drill hole. In 88% of the 450 holes tested at the various sites, the field GC results were consistent with other field observations (Tables B.1 through B.10).

This data, when plotted on site maps, delineated several groundwater plumes by simply separating the test holes which tested positive from those which tested negative by a boundary line (Figures are in the main body of the report under the site-specific-results sections). The boundaries represent the limits of detection of the method and are strictly qualitative; however, in most instances, wells installed outside the limits of the plumes

Table B.1. Screening results for Site 1

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
1	1	X		ND		POS	
1	2	X		ND		POS	
1	3	X			X	POS	GC false negative
1	4	X		X		POS	
1	5		X	X		POS	PID false negative
1	6		X	X		POS	PID false negative
1	7		X		X	NEG	
1	8	X		ND		POS	
1	9		X		X	NEG	
1	10	X		X		POS	
1	11	X		X		POS	
1	12	X		X		POS	
1	13		X		X	NEG	
1	14		X		X	NEG	
1	15		X		X	NEG	
1	16		X	X		POS	PID false negative
1	17		X	X		POS	PID false negative
1	18		X	X		POS	PID false negative
1	19	X		X		POS	
1	20	X		X		POS	
1	21	X		X		POS	
1	22		X	X		POS	PID false negative
1	23	X		X		POS	
1	24		X		X	NEG	
1	25		X	X		POS	PID false negative
1	26		X	X		POS	
1	27	X		X		POS	
1	28		X	X		POS	PID false negative
1	29	X		X		POS	
1	30	X		X		POS	
1	31		X		X	NEG	
1	32		X		X	NEG	
1	33		X		X	NEG	
1	34		X		X	NEG	
1	35		X	X		POS	PID false negative
1	36		X		X	NEG	
1	37		X		X	NEG	
1	38		X		X	NEG	
1	39	X		X		POS	
1	40	X		X		POS	
1	41		X	X		POS	PID false negative
1	42		X		X	NEG	
1	43		X		X	NEG	
1	44		X		X	NEG	
1	45		X		X	NEG	

Table B.1. (continued)

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
1	46		X		X	NEG	
1	47		X		X	NEG	
1	48		X		X	NEG	
1	49		X		X	NEG	
1	50		X		X	NEG	
1	51		X		X	NEG	
1	52		X		X	NEG	
1	53	X		X		POS	
1	54		X		X	NEG	
1	55		X		X	NEG	
1	56		X		X	NEG	
1	57	X		X		POS	

Total = 57

10 hole with negative PID and positive GC
1 hole with positive PID and negative GC
19.3% disagreement between PID and GC
80.7% agreement

ND = Not Done

Table B.2. Screening results for Site 14

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
14	1	X		X		POS	
14	2	X		X		POS	
14	3	X		X		POS	
14	4	X		X		POS	
14	5	X			X	NEG	PID false positive
14	6		X		X	NEG	
14	7	X		X		POS	
14	8	X		X		POS	
14	9	X		X		POS	
14	10	X		X		POS	
14	11		X		X	NEG	
14	12	X			X	NEG	PID false positive
14	13	X		X		POS	
14	14		X		X	NEG	
14	15		X		X	NEG	
14	16		X		X	NEG	
14	17	X		X		POS	
14	18	X			X	NEG	PID false positive
14	19		X		X	NEG	
14	20	X		X		POS	
14	21	X		X		POS	
14	22	X		X		POS	
14	23		X		X	NEG	
14	24		hit water line				
14	25	X		X		POS	
14	26	X		X		POS	
14	27	X		X		POS	
14	28	X		X		POS	
14	29	X		X		POS	
14	30	X		X		POS	
14	31	X		X		POS	
14	32		X		X	NEG	
14	33	X		X		POS	
14	34	X		X		POS	
14	35	X		X		POS	
14	36	X			X	NEG	PID false positive
14	37	X		X		POS	
14	38		X		X	NEG	
14	39	X		X		POS	
14	40	X		X		POS	
14	41		X		X	NEG	
14	42	X		X		POS	
14	43	X		X		POS	
14	44	X		X		POS	
14	45	X		X		POS	

Table B.2. (continued)

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
14	PZ01		X		X	NEG	
14	PZ02		X		X	NEG	
14	PZ03	X		ND		POS	
14	PZ04	X		ND		POS	

Total = 49

4 holes with negative GC and positive PID
8% disagreement between PID and GC
92% agreement

ND = Not Done

Table B.3. Screening results for Site 13

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
13	1	X		X		POS	Slow PID response
13	2	X		X		POS	Slow PID response
13	3	X		X		POS	Slow PID response
13	4	X		X		POS	Slow PID response
13	5	X		X		POS	Slow PID response
13	6	X		X		POS	Slow PID response
13	7		X		X	NEG	
13	8		X		X	NEG	
13	9		X		X	NEG	
13	10	X			X	POS	False NEG GC
13	11	X			ND	POS	
13	12		X		X	NEG	
13	13		X		X	NEG	
13	14	X			X	POS	Petroleum odor
13	15		X		X	NEG	
13	16		X		X	NEG	
13	PZ01		ND	X		POS	

Total = 17

2 hole with negative GC and positive PID

Several holes had very weak GC and slow PID response

12% disagreement between PID and GC

88% agreement

ND = Not Done

Table B.4. Screening results for Sites 16, 19, and 23

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
16	1	X		X		POS	
16	2	X		X		POS	
16	3	X		X		POS	
16	4	X		X		POS	
16	5	X		X		POS	
16	6	X		X		POS	
16	7	X		X		POS	
16	8	X		X		POS	
16	9	X		X		POS	
16	10	X		X		POS	
16	11	X		X		POS	
16	12	X		X		POS	
16	13		X		X	NEG	
16	14	X		X		POS	
16	15	X		X		POS	
16	16	X		X		POS	
16	17	X		X		POS	
16	18	X		X		POS	
16	19	X		X		POS	
16	20	ND		X		POS	
16	21	X		X		POS	
16	22	X		X		POS	
16	23	X		X		POS	
16	24	X		X		POS	
16	25	X		X		POS	
16	26	X		X		POS	
16	27		X		X	NEG	
16	28		X		X	NEG	
16	29		X		X	NEG	
16	30		X		X	NEG	
16	31	X		X		POS	
16	32	X		X		POS	
16	33	X		X		POS	
16	34	X		X		POS	
16	35	ND		X		POS	
16	36	X		X		POS	
16	37	X		X		POS	
16	38	X		X		POS	
16	39	X		X		POS	
16	40	X		X		POS	
16	41		ND		X	NEG	
16	42	X		X		POS	
16	43	X		X		POS	
16	44	X		X		POS	
16	45		X		X	NEG	

Table B.4. (continued)

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
16	46	X		ND		POS	
16	47		X		X	NEG	
16	48	X		X		POS	
16	49	X		X		POS	
16	50		X		X	NEG	
16	51		X	X		POS	PID false negative
16	52		X	X		POS	PID false negative
16	53	X		X		POS	
16	54		X	X		POS	PID false negative
16	55		X		X	NEG	
16	56		X		X	NEG	
16	57	X		X		POS	
16	58		X		X	NEG	
16	59		X		X	NEG	
16	60		X		X	NEG	
16	61	X		ND		POS	
16	62		X	X		POS	
16	63	X		X		POS	
16	64		X	X		POS	PID false negative
16	PZ01		X		ND	NEG	
16	PZ02		X		ND	NEG	
16	PZ03	X		ND		POS	
16	PZ04	X		ND		POS	
16	PZ05		X		ND	NEG	
16	PZ06	X		ND		POS	
16	PZ07	X		ND		POS	
16	PZ08	X		ND		POS	
19	1		X		X	NEG	
19	2		X		X	NEG	
19	3		X		X	NEG	
19	4		X		X	NEG	
19	5		X		X	NEG	
19	6		X		X	NEG	
19	7	X		X		POS	
19	8		X		X	NEG	
19	9		X		X	NEG	
19	10	X		X		POS	
19	11		X		X	NEG	
19	12		X		X	NEG	
19	13		X		X	NEG	
19	14	X		X		POS	
19	15		X		X	NEG	
19	16	X		X		POS	
19	17		X		X	NEG	
19	18		X		X	NEG	

Table B.4. (continued)

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
23	1		X		X	NEG	
23	2		X		X	NEG	
23	3		X		X	NEG	
23	4	X			X	NEG	PID false positive
23	5		X		X	NEG	
23	6		X		ND	NEG	

Total = 96

5 holes with negative PID and positive GC
1 hole with positive PID and negative GC
6% disagreement between PID and GC
94% agreement

ND = Not Done

Table B.5. Screening results for Site 20

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
20	1	X			X	NEG	PID = 300 slow
20	2	X			X	NEG	PID = 60 slow
20	3		ND		X	NEG	
20	4		X		X	NEG	
20	5		X		X	NEG	
20	6		X		X	NEG	
20	7		X		X	NEG	
20	8		X		X	NEG	
20	9		X		X	NEG	
20	10		X		X	NEG	
20	11		X		X	NEG	
20	12		X		X	NEG	
20	13		X		X	NEG	
20	14		X		X	NEG	
20	15		X		X	NEG	
20	16		X		X	NEG	
20	17		X		X	NEG	
20	18		X		X	NEG	
20	19	X			X	NEG	PID = 28PPM slow
20	20	X				NEG	PID = 62PPM slow
20	21	X			X	NEG	PID = 52PPM slow
20	22	X			X	NEG	PID = 26PPM slow
20	23		X		X	NEG	
20	24		X		X	NEG	
20	25		X		X	NEG	
20	26		X		X	NEG	
20	27		X		X	NEG	
20	28		X		X	NEG	
20	29		X		X	NEG	
20	30		X		X	NEG	
20	31		X		X	NEG	
20	32		X		X	NEG	
20	33		X		X	NEG	
20	34		X		X	NEG	
20	35		X		X	NEG	
20	36		X		X	NEG	

Total = 36

0 holes with negative PID and positive GC
6 holes with positive PID and negative GC
16.6% disagreement between PID and GC
83.4% agreement

ND = Not Done

Table B.6. Screening results for Sites 9 and 18

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
9 & 18	1		X		X	NEG	
9 & 18	2		X		X	NEG	
9 & 18	3		X		X	NEG	
9 & 18	4		X		X	NEG	
9 & 18	5		X		X	NEG	
9 & 18	6		X		X	NEG	
9 & 18	7		X		X	NEG	
9 & 18	8		X		X	NEG	
9 & 18	9		X		X	NEG	
9 & 18	10		X		X	NEG	

Total = 10

0 holes with negative PID and positive GC

0 holes with positive PID and negative GC

0% disagreement between PID and GC

100% agreement

Table B.7. Screening results for Site 3

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
3	1		X	X		NEG	TCE?
3	2	X			X	NEG	Asphalt
3	3		X		X	NEG	
3	4		X	X		POS	TCE?
3	5		X	X		POS	TCE?
3	6		X	X		POS	TCE?
3	7	X		X		POS	TEC?
3	8		X		X	NEG	
3	9		X		X	NEG	
3	10		X		X	NEG	
3	11		X		X	NEG	
3	12		X		X	NEG	

Total = 12

4 holes with negative PID and positive GC

1 hole with positive PID and negative GC

42% disagreement between PID and GC

58% agreement

Note: TCE not detectable on PID at low concentrations

Table B.8. Screening results for Sites 6, 7, 21, and 22

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
6*	1		X		X	NEG	
6*	2		X		X	NEG	
6*	3		X		X	NEG	
6*	4		X		X	NEG	
6*	5		X		X	NEG	
6*	6		X		X	NEG	
6*	7		X		X	NEG	
6*	8		X		X	NEG	
6*	9		X		X	NEG	
6*	10		X		X	NEG	
6*	11	X			X	NEG	PID slow response
6*	12	X			X	NEG	PID slow response
6*	13	X			X	NEG	PID slow response
6*	14		X		X	NEG	
6*	15	X		X		POS	PID slow response
6*	16	X		X		POS	PID slow response
6*	17	X			X	NEG	
6*	18	X			X	NEG	
6*	19		X		X	NEG	
6*	20	X			X	NEG	PID slow response
6*	21	X			X	NEG	PID slow response
6*	22	X			X	NEG	PID slow response
6*	23	X		X		POS	
6*	24	X		X		POS	
6*	25	X		X		POS	
6*	26	X		X		POS	
6*	27	X		X		POS	
6*	28		X		X	NEG	
6*	29	X			X	NEG	PID slow response
6*	30		X		X	NEG	
6*	31	X		X		POS	
6*	32	X		X		POS	
6*	33	X		X		POS	
6*	34	X		X		POS	
6*	35	X		X		POS	
6*	36	X		X		POS	
6*	37	X		X		POS	
6*	38		X		X	NEG	
6*	39		X		X	NEG	
6*	40		X		X	NEG	
6*	41		X		X	NEG	
6*	42		X		X	NEG	
6*	43		X		X	NEG	
6*	44		X		X	NEG	
6*	45		X		X	NEG	

Table B.8. (continued)

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
6*	46		X		X	NEG	
6*	47		X		X	NEG	
6*	48		X		X	NEG	
6*	49		X		X	NEG	
6*	50		X		X	NEG	
6*	51		X		X	NEG	
6*	52		X		X	NEG	
6*	53	X		X		NEG	
6*	54		X		X	POS	
6*	55		X		X	NEG	
6*	56		X		X	NEG	
6*	57		X		X	NEG	
6*	58		X		X	NEG	
6*	59		X		X	NEG	
6*	60		X		X	NEG	
6*	61		X		X	NEG	
6*	62		X		X	NEG	
6*	63		X		X	NEG	
6*	64		X		X	NEG	
6*	65		X		X	NEG	
6*	66		X		X	NEG	
6*	67	X		X		POS	
6*	68		X		X	NEG	
6*	69		X		X	NEG	
6*	70		X		X	NEG	
6*	71		X		X	NEG	
6*	72		X		X	NEG	
6*	73		X	X		POS	PID false negative
6*	74	X			X	NEG	PID slow response
6*	75	X		ND		POS	Product
6*	76		X		X	NEG	
6*	PZ01	X		X		POS	
6*	PZ02		X		X	NEG	
6*	PZ03		X		X	NEG	

* Indicates could be sites 6, 7, 21, or 22

Total = 79

1 hole with negative PID and positive GC
10 holes with positive PID and negative GC
14% disagreement between PID and GC
86% agreement

ND = Not Done

Table B.9. Screening results for Site 4

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
4	1		X		X	NEG	Within plume
4	2		X		X	NEG	Within plume
4	3		X		X	NEG	Within plume
4	4		X		X	NEG	Within plume
4	5		X		X	NEG	Within plume

Total = 5

0 holes with negative PID and positive GC

0 holes with positive PID and negative GC

0% disagreement between PID and GC

100% agreement

Table B.10. Screening results for Site 2

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
2	1	X		X		POS	Next to ERM15
2	2	X		X		POS	
2	3	X		X		POS	
2	4	X		X		POS	
2	5	X		X		POS	
2	6	X		X		POS	
2	7	X		X		POS	
2	8	X		X		POS	
2	9	X		X		POS	
2	10	X		X		POS	
2	11		X		X	NEG	
2	12		X		X	NEG	
2	13	X		X		POS	
2	14		X		X	NEG	
2	15		X		X	NEG	
2	16	X			X	NEG	PID reading exhaust
2	17		X		X	NEG	
2	18		X		X	NEG	
2	19	X		X		POS	
2	20	X		ND		POS	Product
2	21		X		X	NEG	
2	22		X		X	NEG	
2	23	X		ND		POS	Product
2	24		X	X		POS	Slight GC response, Neg deflection on PID
2	25		X	X		POS	Slight GC response
2	26		X	X		POS	Slight GC response
2	27	X		X		POS	
2	28		X		X	NEG	
2	29	X		X		POS	
2	30		X		X	NEG	
2	31	X		X		POS	Product
2	32	X		X		POS	Product
2	33		X		X	NEG	
2	34		X		X	NEG	
2	35	X			X	NEG	PID reading exhaust
2	36		X		X	NEG	
2	37		X		X	NEG	
2	38	X		X		POS	Product
2	39	X		X		POS	Product
2	40	X		X		POS	Slight GC response
2	41		X		X	NEG	
2	42	X		X		POS	
2	43		X		X	NEG	PID reading exhaust
2	44		X		X	NEG	PID reading exhaust
2	45	X			X	NEG	PID reading exhaust

Table B.10. (continued)

Site #	Hole #	PID Pos.	PID Neg.	Field GC Pos.	Field GC Neg.	Final Decision	Comments
2	46	X			X	NEG	PID reading exhaust
2	47		X		X	NEG	
2	48		X		X	NEG	
2	49		X		X	NEG	
2	50						NO DATA
2	51		X		X	NEG	
2	52		X		X	NEG	
2	53		X		X	NEG	
2	54	X		ND		POS	Product
2	55	X		ND		POS	Product
2	56	X		ND		POS	Product
2	57	X		X		POS	
2	58	X		ND		POS	Product
2	59	X		ND		POS	Product
2	60	X			X	NEG	PID reading exhaust
2	61	X		ND		POS	Product
2	62	X		ND		POS	Product
2	63	X		ND		POS	Product
2	64	X			X	NEG	PID reading exhaust
2	65	X		ND		POS	Product
2	66		X		X	NEG	
2	67		X		X	NEG	
2	68		X		X	NEG	
2	69	X		X		POS	Product
2	70		X	X		POS	PID false negative
2	71		X		ND	NEG	Site 1
2	72		X		ND	NEG	Site 6
2	73	X		ND		POS	
2	74	X		ND		POS	Product
2	75	X		ND		POS	Product
2	76		X		ND	NEG	
2	77	X		ND		POS	Product
2	78		X		ND	NEG	
2	79	X		ND		NEG	
2	80	X		ND		POS	
2	81		X		ND	NEG	
2	82	X		ND		POS	Product
2	83		X		ND	NEG	
2	84		X		ND	NEG	
2	85	X		ND		POS	
2	86		X		ND	NEG	
2	87		X		ND	NEG	
2	88		X		ND	NEG	
2	89		X		ND	NEG	
2	90	X		ND		POS	Product

Total = 89

4 holes with negative PID and positive GC
6 holes with positive PID and negative GC
11% disagreement between PID and GC
89% agreement

ND = Not done

were "clean" when compared to National Drinking Water Standards (NDWS) for contaminants known to be contained in the various plumes. The only exceptions were MW19 and MW20 at the Site 14 gasoline/diesel contaminant plume, where both wells exceeded NDWS for some compounds.

The field GC was regularly calibrated with benzene, toluene, ethylbenzene, and xylene standards. Syringe blank samples were injected at frequent intervals as quality control (QC) samples. A continuous stream of carrier gas was run through the GC to purge the system between samples. The syringes were cleaned and baked between sample injections. If the chromatogram for the sample resembled the blank run and there were no elevated PID readings, the sample was considered "clean". Occasionally samples were tested twice to check repeatability of the results. Ten split samples were sent to a fixed-based laboratory in Reno, Nevada, for overnight analysis of volatile organic compounds by EPA Method 624. The results confirmed the field designation of "clean" for all ten samples. This field-screening method has proven very effective for detecting and delineating petroleum-hydrocarbon-contaminated groundwater plumes at NAS Fallon.

RATIONALE

The approach to field screening at different sites varied depending on what was known about contamination at each site. Some sites such as Site 1, Crash Crew Fire Training Area, and Site 2, New Fuel Farm, were known or strongly suspected to be contaminated. In these cases, the field screening started in areas of known contamination or surface staining and proceeded on a grid away from the area and downgradient in the direction of regional groundwater flow until the detectable limits of contamination were reached. The plume boundaries were then traced around the perimeter to the upgradient limits of detectable contamination. At other sites such as Site 6, Defuel Disposal Area, and Site 20, Checkerboard Landfill, where there was doubt about the potential for or location of contamination, the screening was initially conducted by drilling fence patterns

of groundwater test holes across the regional groundwater flow lines downgradient from the suspected site. If contamination was detected, as at Site 6, the survey proceeded as above. However, if no contamination was detected, as at Site 20, the survey was completed around all sides of the site where it was reasonable to expect contaminants to migrate.

RESULTS SUMMARY

Maps showing the results of the groundwater screening are included in the text of the report. Tables of the results by site and by hole number are included in this appendix. A narrative summary of the results is presented below.

Site 1, Crash Crew Training Area:

Potential contaminants: jet fuel (JP-5), waste oil and other fuels, and solvents.

Screening: consisted of an EM-31 survey and fifty-seven groundwater test holes (Table B.1). A plume containing JP-5 and solvents was delineated. A former river channel was also located and partially mapped. The channel appears to trend southeast across the southwest part of the site.

Group I: Sites 2 and 4:

Potential contaminants Site 2: include JP-5, JP-4, avgas, gasoline, and diesel fuel.

Potential contaminants Site 4: could include waste oil, hydraulic fluid, radiator coolant, paint waste, and mixed fuels.

Screening: results and investigation results have been presented in the *Preliminary Site Characterization Summary and Engineering Evaluation/Cost Analysis for Site 2* (ORNL 1991a). The groundwater test hole screening results are tabulated in Table B.10. The initial screening consisted of two types of soil-gas surveys and an electromagnetic geophysical survey. Three additional piezometers were installed in April 1991 just south of the Transportation Yard, Site 4. Five groundwater test holes were drilled around Building 378 (Table B.9), and three soil borings were drilled near Building 378 (Site 4).

Site 3, Hangar 300 (renamed Hangar 1):

Potential Contaminants: include JP-5, hydraulic fluid, lube oil, and solvents.

Screening: consisted of drilling twelve groundwater test holes (Table B.7). A solvent plume was detected in the southern part of the site (GSE area and south disposal area). However, the plume appeared to go under the apron, and no boundaries were delineated due to the difficulty of drilling through the thick concrete. No contamination was detected in the north disposal area or the bowser disposal area.

Group II Sites: Site 6, Site 7, Site 21, and Site 22:

Potential contaminants Site 6: JP-4 and JP-5

Potential contaminants Site 7: napalm M-2 and napalm A&B

Potential contaminants Sites 21 and 22: JP-5, gasoline, diesel fuel, waste oils, hydraulic fluid, and wet-garbage leachate.

Screening: consisted of drilling ninety-five groundwater test holes around the sites and includes the Lower Diagonal No. 1 Drain investigation (Table B.8). One large fuel plume was located and delineated emanating from Site 6. No other significant contamination was detected from any other sites except along the road between Sites 21 and 22 next to the intersection of the road leading to the receiver site where slightly anomalous GC results were obtained. Attempts to trace this contamination south yielded no other contaminated test holes. Thus, the contamination appeared to be localized and inconsistent. Attempts to locate the napalm burn pit, Site 7, by drilling groundwater test holes failed due to extensive landfill material buried in the area which prevented the drill from reaching the water table. Later testimony during a public meeting, Sept. 4, 1991, by the former NAS Fallon Fire Chief verified that the napalm burnpit never existed. Lower Diagonal No. 1 Drainage Ditch: Site of a recent JP-5 cleanup, this is not an IR Program site but was investigated to determine the possibility of contaminant migration from the Group II sites to the ditch. Part of this work was associated with the investigation of a fuel spill in the Lower Diagonal No. 1 Drain. No evidence of contribution to contamination in the ditch from any of the sites was found (Table B.11). The nineteen groundwater test holes, five piezometers, and two staff gauges were all considered part of the Group II investigation.

Group III Sites: Site 9 and Site 18:

Potential contaminants Site 9: oils, paint wastes, metals, and diesel fuel.

Potential contaminants Site 18: paints, metals, solvents, and hydrocarbons.

Screening: consisted of drilling ten groundwater test holes between the sites and the Lower Diagonal Drain (Table B.6). No contamination was detected.

Table B.11. Screening results for LD#1

Site #	Hole #	PID		Field GC		Final Decision	Comments
		Pos.	Neg.	Pos.	Neg.		
LD#1	1		X		X	NEG	
LD#1	2		X		X	NEG	
LD#1	3		X		X	NEG	
LD#1	4		X		X	NEG	
LD#1	5		X		X	NEG	
LD#1	6		X		X	NEG	
LD#1	7		X		X	NEG	
LD#1	8		X		X	NEG	
LD#1	9		X		X	NEG	
LD#1	10		X		X	NEG	
LD#1	11		X		X	NEG	
LD#1	12		X		X	NEG	
LD#1	13		X		X	NEG	
LD#1	14		X		X	NEG	
LD#1	15		X		X	NEG	
LD#1	16		X		X	NEG	
LD#1	17		X		X	NEG	
LD#1	18		X		X	NEG	
LD#1	19		X		X	NEG	

Total = 19

0 holes with negative PID and positive GC

0 holes with positive PID and negative GC

0% disagreement between PID and GC

100% agreement

Group IV Sites: Site 10, Site 11, Site 12, Site 13, Site 14, Site 16, Site 17, Site 19, and Site 23:

Potential contaminants: lists can be found in the PA/SI.

Screening: consisted of drilling 162 groundwater test holes around the area and performing an EM-31 survey over Sites 19, 23, and 10 (Tables B.2, B.3, B.4). A large fuel plume was located that appeared to be emanating from the Old Fuel Farm, Site 16, and flowing toward the unnamed lateral drain north of the Lower Diagonal Drain (Table B.4). Another gasoline/diesel plume was delineated emanating from the old vehicle maintenance shop area where two leaking tanks were removed (Table B.2). This plume appears to merge with a plume near the pesticide shop and boiler plant, Sites 12 and 13 (Table B.3).

Site 20, Checkerboard Landfill:

Potential contaminants: JP-5, gasoline, diesel fuel, waste oils, hydraulic fluid, and wet-garbage leachate.

Screening: consisted of drilling thirty-six groundwater test holes around the site (Table B.5). No contamination was detected with the field GC.

Site 24, Road Oiling Area:

Potential contaminants: include waste oil, fuels, and solvents.

Screening: deemed unnecessary for this site because many of the groundwater test holes for the Group II sites were drilled in the road. No significant contamination was detected except that associated with the Site 6 plume.

Appendix B
References

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APPENDIX C

GENERAL CONTAMINANT TRANSPORT CONSIDERATIONS AND DOWNGRADIENT GROUNDWATER USAGE

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GENERAL CONTAMINANT TRANSPORT CONSIDERATIONS

One of the objectives of the Phase II IR Program remedial investigation is to define the potential migration pathways and exposure rates of contaminants with respect to potential receptors. Preliminary site-characterization results indicate the vast majority of contaminants at NAS Fallon are petroleum hydrocarbon or solvent related. Exposure by ingestion, dermal contact, or inhalation from all sites is minimal to both humans and biota because the wastes are either inaccessible (i.e., buried) or have been exposed long enough for significant near-surface volatilization to have occurred. Restricted access and institutional controls further mitigate any environmental exposure to both humans and biota from contaminants on NAS Fallon property.

Conceptual site models developed for the preliminary risk assessment performed during development of the Phase II RI Work Plan indicate that the main environmental concern is exposure resulting from contaminated groundwater or surface-water transport to off-site receptors (Fig. C.1). The groundwater system in the Fallon area is composed of three aquifer flow systems: 1) a shallow alluvial aquifer extending from the surface to a depth of 15.2 m (50 ft), 2) an intermediate-to-deep alluvial aquifer extending from 15.2 m (50 ft) to 667 m (2200 ft) below ground surface, and 3) a basalt aquifer sandwiched in the alluvium at a depth of approximately 182 m
(600 ft). The basalt aquifer serves as a domestic drinking water source for much of the surrounding area.

Due to the shallow water table, 1.1 to 3 m (4 to 10 ft) below ground surface, contaminants released to the soils have a high potential for migration to the shallow groundwater. The Phase I PA/SI Report (Dames and Moore 1988) postulated that an upward flow gradient existed between the intermediate-to-deep alluvial aquifer and the shallow aquifer. Thus, the natural flow of groundwater in the area would prevent shallow contaminants from reaching the basalt aquifer at depth. Additional aquifer-characterization studies (ERM-West 1988) suggest that, at least in some portions of the facility, there is a 4.5+ m (15+ ft) thick clay confining layer separating the shallow aquifer Fig. C.1

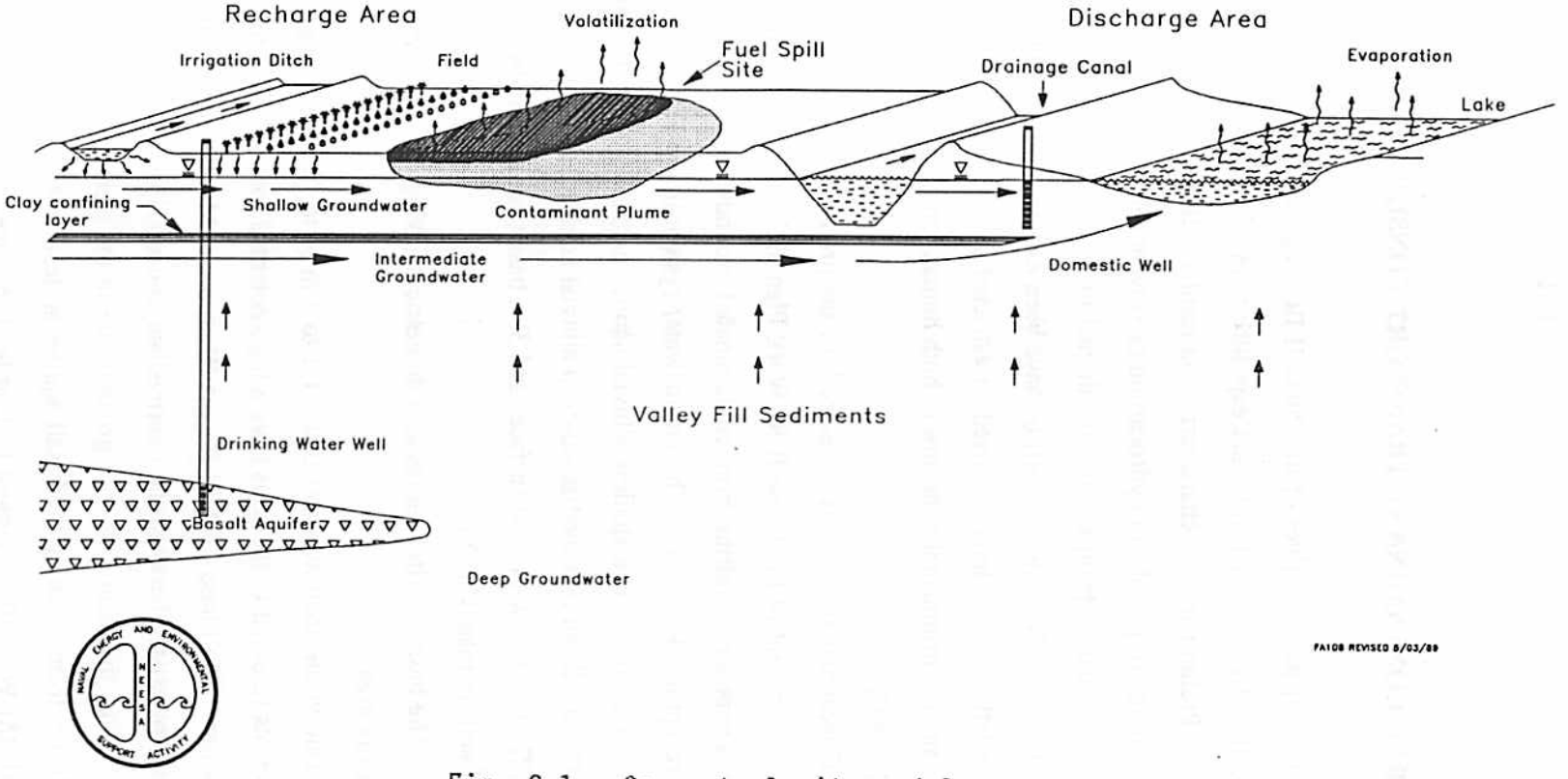

Fig. C.1. Conceptual site model.

and the intermediate-to-deep aquifer. Investigations conducted during the first iteration of RI field work verified the upward flow gradient between the intermediate aquifers and the existence of a 20-ft-thick impermeable clay layer separating the two aquifers over the entire facility. These natural containment properties should preclude downward migration of contaminants.

DOWNGRADIENT GROUNDWATER USAGE

Phase II investigations have determined that contamination of the shallow aquifer exists at several IR Program Sites; however, the RI must also identify potentially affected receptors. Regionally, groundwater associated with the shallow aquifer is high in dissolved salt content and generally unfit for domestic use (Glancy 1986). In order to determine the exact usage of the groundwater downgradient from the facility, a complete canvassing of downgradient residents was conducted in August 1991. The results are summarized in Table C.1. The associated map (Fig. C.2) shows the locations of the downgradient residents with respect to the facility boundary and areas of known groundwater contamination. Only two of the twelve wells completed in the shallow aquifer are used for drinking water, and they are both upgradient from any known contaminated groundwater (Table C.1 and Fig. C.2). Of the remaining ten shallow wells, nine are used for other domestic purposes such as bathing and washing dishes, watering livestock, and some irrigation such as yard watering. None of the ten wells completed in the intermediate aquifer are used for drinking water, and only three are used for other domestic purposes. There are also three of the deeper wells that are not used at all. This lack of use greatly minimizes potential environmental exposure to groundwater contaminants.

Table C.1. Summary of downgradient groundwater uses

HOUSEHOLD REFERENCE NUMBER AND WELL NUMBER	COMPLETED IN AQUIFER		USES OF WELL WATER			
	0-20 FEET	DEEP	DRINKING WATER	DOMESTIC	LIVESTOCK	IRR
1. RISI- WELL #1	Yes		Yes	Yes	Yes	Yes
2. LANDIS- #1	Yes		No	Yes	Yes	Yes
3. HEAL- #1	Yes		No	Yes	Yes	No
4. DIFFIN- #1	Yes		Yes	Yes	Yes	Yes
4. DIFFIN- #2		Yes	No	No	No	No
5. CARD- #1	Yes		No	Yes	Yes	Yes
5. CARD- #2		Yes	No	No	Yes	Yes
6. SNOW- #1	Yes		No	Yes	Yes	Yes
6. SNOW- #2		Yes	No	No	No	No
7. SNOW- #1		Yes	No	Yes	Yes	Yes
8. MAY RANCH- #1		Yes	No	No	Yes	No
8. MAY RANCH- #2		Yes	No	No	Yes	Yes
9. AQUIAR- #1		Yes	No	Yes	Yes	Yes
10.DEGIACOMO- #1	Yes		No	Yes	Yes	Yes
11.SNODGRASS- #1		Yes	No	Yes	Yes	Yes
11.SNODGRASS- #2		Yes	No	No	Yes	No
12. BUSBOOM- #1	Yes		No	Yes	Yes	Yes
13. DALTON- #1	Yes		No	Yes	Yes	Yes
14. MERBS- #1	Yes		No	No	No	No
14. MERBS- #2		Yes	No	No	No	No
15. ANDRAE- #1	Yes		No	Yes	Yes	Yes
16. ANDRAE- #1	Yes		No	Yes	Yes	Yes
TOTALS	12	10	2	14	18	15

IRR: irrigation

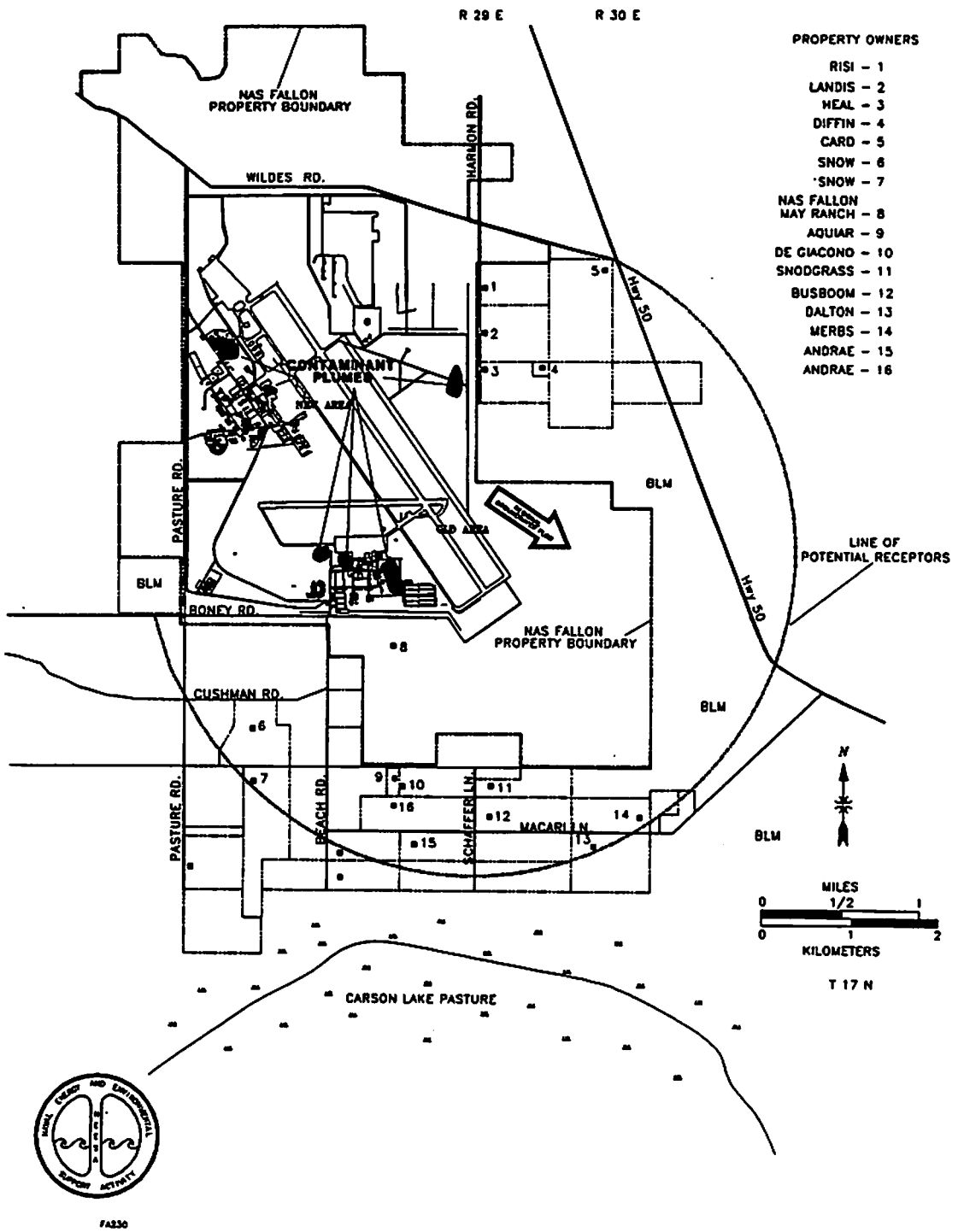

Fig. C.2. Location map of downgradient groundwater users.

POTENTIAL PATHWAYS

Exposures could occur primarily through natural groundwater seepage to surface water. The potential pathways of contaminant migration from the sites at NAS Fallon, in order of importance, are: (1) subsurface flow in the shallow alluvial aquifer to the drainage canals, (2) surface flow in drainage canals to the Stillwater Point Reservoir and Stillwater Wildlife Refuge, and (3) surface flow in irrigation ditches. These mechanisms are depicted in Fig. C.1. This figure represents a combination of the important aspects of the site-specific conceptual models developed in the Phase II Work Plan (ORNL 1989, Appendix A). Note that a clear distinction is drawn between irrigation ditches and drainage canals. The irrigation ditches were constructed as a shallow system to deliver water to fields. The drainage canals were excavated deeper in order to drain excess surface runoff and shallow groundwater. The drainage canals intersect the shallow alluvial aquifer and the irrigation ditches do not; therefore, the irrigation ditches represent only a minor potential contaminant migration pathway when compared to the drainage canals.

Migration characteristics for known contaminants of concern are determined by individual contaminant characteristics such as density, viscosity, and solubility. Most of the fuels and oils would float on the water table, but small quantities will dissolve and migrate in the groundwater. Solvents, such as trichloroethene (TCE), behave differently based on the quantities available and the presence of other wastes. Some of the solvent might dissolve, some might sink as immiscible liquid, and some might float on the water table if the quantity is not sufficient to break the surface tension of the water. The PA/SI report postulates that any sinking solvents would remain in the shallow aquifer due to the upward flow gradient across the boundary with the intermediate alluvial aquifer (Dames and Moore 1988). The results of the site specific investigations confirm this and support the conclusion that no sinking contaminant plumes are present at the sites. This combined with the fact that the basalt drinking water aquifer is located upgradient of any contaminant plumes on the facility removes human consumption of water as a potential pathway to receptors.

Contaminants in the shallow aquifer may ultimately discharge into the area drainage canals. All drainage canals which cross the facility flow east toward Stillwater Point Reservoir. The regional groundwater flow direction is inferred to be east-southeastward toward Grimes Point. It is suspected that a groundwater divide splits the flow somewhere downgradient of the facility and part of the groundwater flows toward discharge at Carson Lake Pasture, about 3 miles south of the facility, and the other part flows toward Stillwater Point Reservoir, approximately 10 miles to the northeast (Fig. C.3). It is estimated that contaminants in groundwater could migrate approximately 35 ft per year (Glancy 1986), although variability in the shallow aquifer indicates that some preferential groundwater flowpaths may have much greater transmissivity. Furthermore, if contaminated groundwater discharges into a drainage canal, the rate of migration could be several miles a day.

The drainage canals that could be affected include the Lower Diagonal Drain, the Lower Diagonal No. 1 Drain, and their tributaries on facility (Fig C.4). These drainage canals discharge to the Stillwater Point Reservoir. Irrigation ditches on the facility are not located in proximity to the sites under investigation and do not intersect the shallow groundwater; thus, it is unlikely that they represent contaminant migration pathways for any of the sites under investigation.

Contamination of surface water could also occur during a rare rainfall or by human induced runoff if the runoff is sufficient to carry the contaminants directly to drainage canals or irrigation ditches. It is estimated that contaminants in irrigation ditches could migrate on the order of 15 to 50 miles a day, while migration in the drainage canals would be considerably slower.

EXPOSURE POINTS AND AFFECTED BIOTA

Potential receptors include flora and fauna which inhabit and use downstream surface water and persons using water from wells completed in the

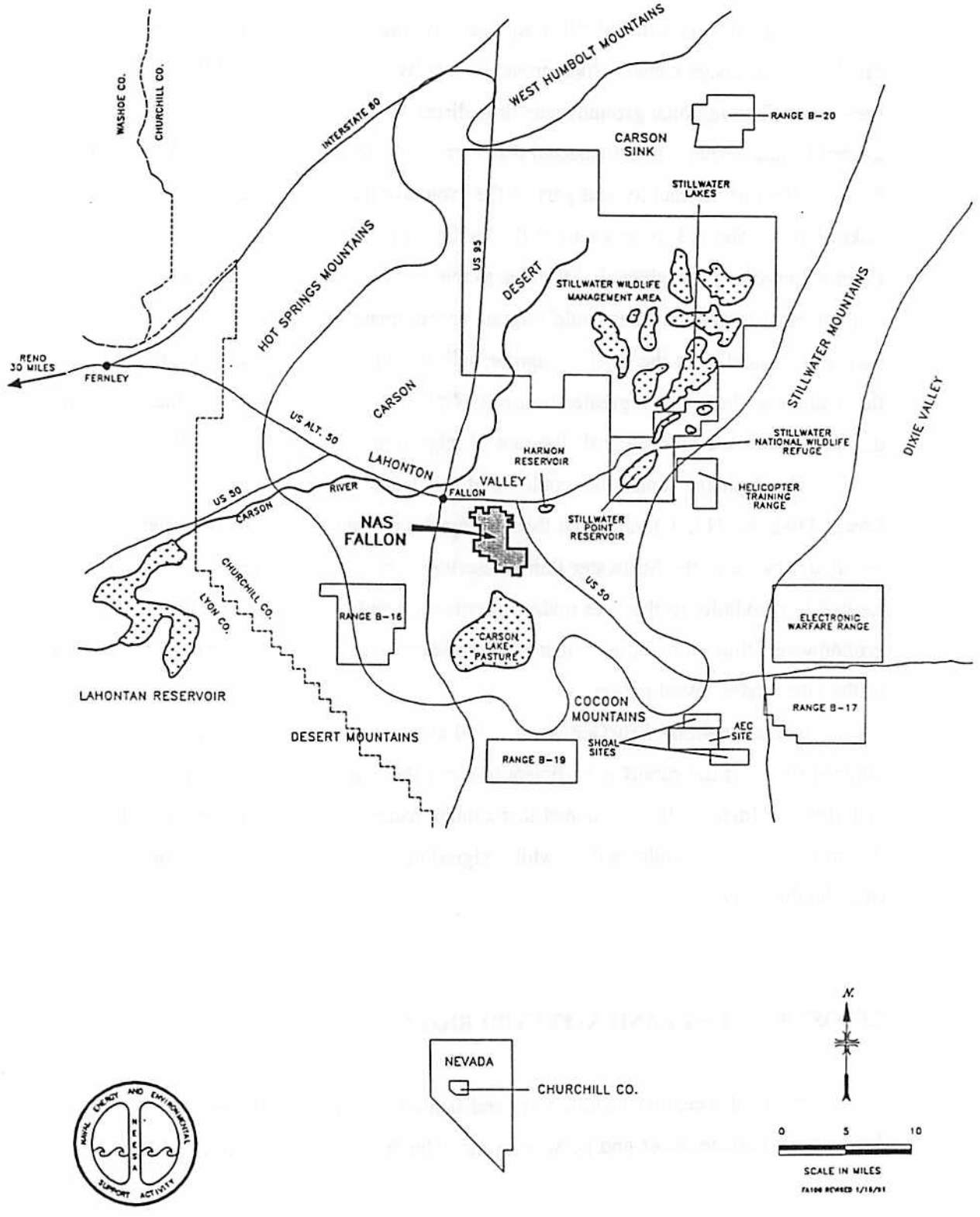

Fig. C.3. NAS Fallon. Regional location map.

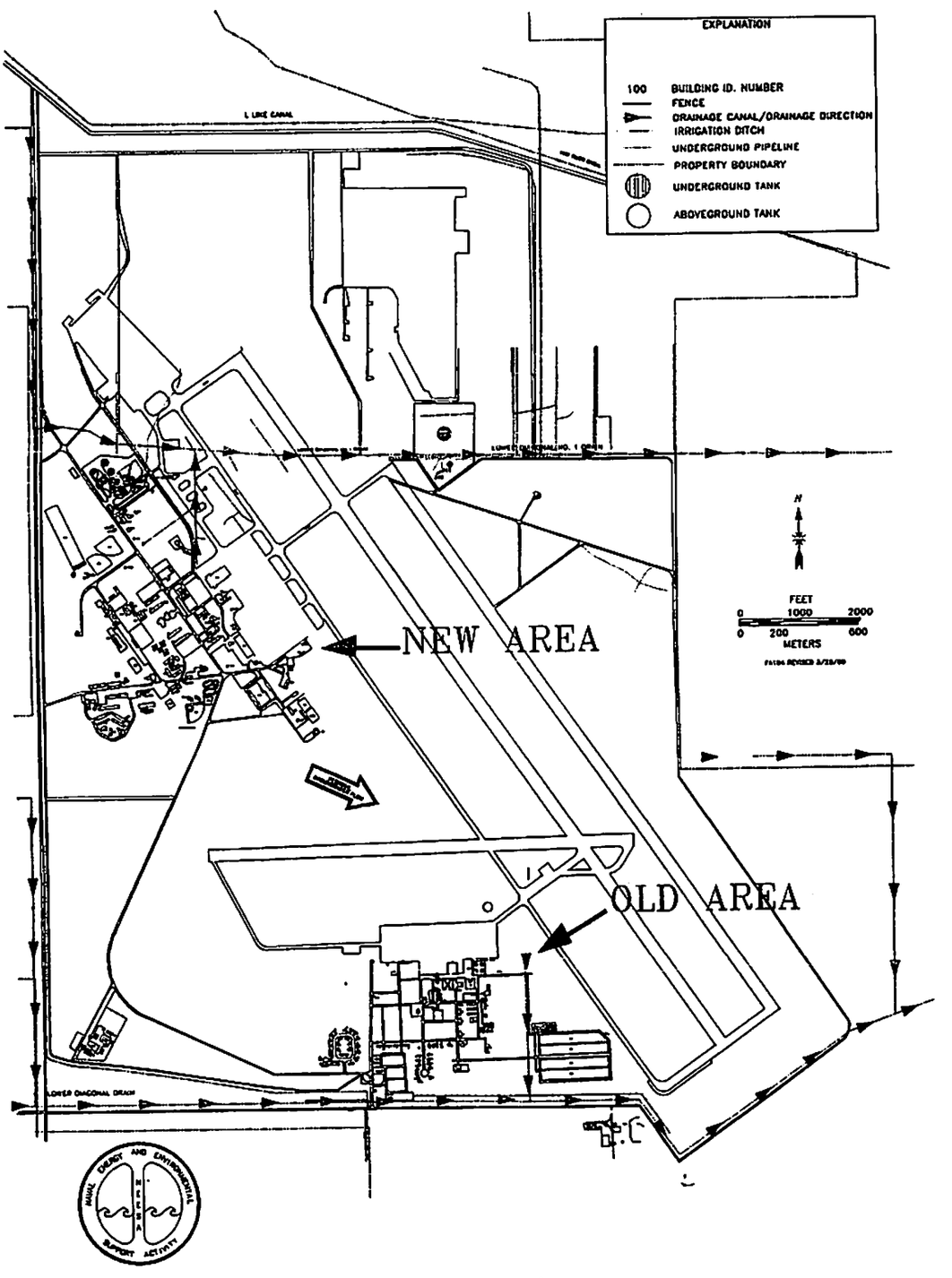

Fig. C.4. NAS Fallon drainage canals.

downgradient shallow alluvial aquifer or consuming contaminated flora or fauna. Users of the deeper groundwater are not considered likely receptors because of: 1) the significant depth to the deeper aquifer, and 2) the underlying clay layer and upward flow gradient which effectively contain contaminants in the uppermost aquifer.

Contaminants carried downstream by surface water or discharged from the shallow alluvial aquifer into drainage canals could threaten wetlands and aquatic habitat. Water from the Lower Diagonal Drain and the Lower Diagonal No. 1 Drain flows into the Stillwater Point Reservoir which is part of the Stillwater Refuge (Fig. C.3). This area is inhabited by two federally-listed endangered species: the bald eagle and the peregrine falcon. Although not federally listed, other species of concern include the Lahontan tui chub, American white pelican, white-faced ibis, osprey, western snowy plover and long-billed curlew.

Contaminant migration in surface water could also threaten already beleaguered habitats in the Stillwater National Wildlife Management Area which includes the Stillwater National Wildlife Refuge. In recent years the refuge has been the focus of national attention due to reports of massive fish and bird die-offs. Studies are underway to identify the cause of these die-offs. The normal fluctuation of precipitation along with increased demand for available water resources have combined to create severe drought conditions in the refuge, and many marshes have dried up. This in turn has reduced the wildlife habitat in the refuge which is considered by the Federal Fish and Wildlife agency to be critical to the migratory bird populations of the Pacific Flyway. There is also potential for exposure of humans to contaminants migrating off site in surface water. For instance, the Lower Diagonal Drain receives minor use by area citizens for game fishing; these fish, in which contaminants may have concentrated, may be consumed by humans. This usage has declined dramatically in recent years due to the disappearance of most game fish from the ditch.

Several wells tapping the shallow aquifer exist downgradient from NAS Fallon. In general, the shallow groundwater in the surrounding area is of poor quality and unfit for domestic use (Glancy 1986). However, as discussed in the downgradient groundwater usage section, some wells are used for domestic purposes. Present use of the wells has been documented, and it appears that only livestock are directly consuming the water downgradient from any known contaminant plumes. Livestock, therefore, are potential receptors by

ingestion, but humans are only receptors by dermal contact. This potential for transport is believed to be mitigated at least in part by the fact that all contaminated groundwater would have to flow under the Lower Diagonal Drain in order to reach downgradient wells. This is considered unlikely, because the ditch intersects the top of the shallow groundwater flow where most of the contamination has been detected.

In summary, off-site transport of contaminants of concern via surface water appears to be a major concern at NAS Fallon, and off-site transport of contaminants to potential receptors via groundwater is only of minor concern. The poor quality of the shallow groundwater and the limited recreational use of surface flow in the immediate vicinity mitigate direct exposure to human receptors. Affected receptors appear to be primarily flora and fauna which inhabit the neighboring surface streams and wetlands. Human consumption of these receptors also affords a secondary exposure pathway to the local populace.

APPENDIX C

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ERM-West. 1988. *Site Investigation Fuel Farms - Fallon Naval Air Station, Fallon, Nevada*, Final Draft, Earth Resources Management, West California, Walnut Creek, Calif.

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APPENDIX D

HYDROLOGIC CHARACTERIZATION OF THE SHALLOW ALLUVIAL AQUIFER

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INTRODUCTION

A series of aquifer tests were performed at NAS Fallon to gather information needed for modeling groundwater flow and contaminant transport. Work performed at the facility included soil-gas surveys, groundwater contaminant screening, geophysical surveys, soil borings, monitoring well installations, soil sampling, groundwater sampling, and well testing. As a result of this investigation, the subsurface geology and hydrogeology were described, and contaminant (petroleum hydrocarbons) plume boundaries were identified. This report relates the methods used and results obtained in defining the hydrologic parameters for the shallow alluvial aquifer at Site 2. Background information on the regional hydrologic and geologic setting is contained in Section 2 of the main report.

HYDROLOGY AND LOCAL SETTING

The facility lies on a broad, flat alluvial plain in the southern Carson Desert referred to as the Lahontan Valley. The area is part of the Basin and Range geological province. It is a sink for surface runoff from surrounding mountains and the Carson River. The Carson Lake Pasture, a region of drainage ditches and marshes, is a few miles south of the facility. The lakes and marshes of the Stillwater Wildlife Refuge are a few miles northeast of the facility.

The valley fill sediments contain four aquifers designated as the shallow alluvial aquifer, the intermediate aquifer, the deep alluvial aquifer, and the basalt aquifer.

Wells penetrating the intermediate aquifer on the facility indicate a head difference of about 5 to 9 ft between the shallow (unconfined) and the intermediate (confined) aquifers. The head is higher in the deeper aquifer, indicating artesian conditions and precluding any downward migration of groundwater at the facility. Thus, the investigation involved only the shallow water table aquifer. No tests were performed on the deep wells.

FIELD METHODS AND RESULTS

Pump tests were performed in two parts of the plume, and several bail tests were performed to determine the aquifer parameters at Site 2 (Driscoll 1987). Pump tests were performed by ERM West near the source of the contaminant plume where the geology varied from medium sand to silty sand (Fig. D.1). Another test was performed by ORNL on a well at the extreme downgradient edge of the plume in a coarse channel sand deposit. Bail tests were performed by ORNL on the remaining wells that had no floating contaminant present. The degree of variation in the test results indicate that the varying geology across the site could be an important control on plume migration. Slug tests have been performed on most of the wells installed in March 1991; however, tabulation of the data was not necessary for this preliminary report.

Mid-plume Aquifer Tests (ERM West)

The first tests were performed on W-20 using two nearby wells as observation wells, Ext-A and W-9. The drilling log for W-20 indicates a sandy aquifer about 15-ft thick with silty sand and fine sand predominating. The water level in W-20 is about 8 ft bgs, at an elevation of 3928 ft above sea level (asl). The hydraulic gradient is very flat, and the water flows to the southeast. A shallow-well jet pump was used to perform a step drawdown and two aquifer pumping tests. The pumping rate was 10 gallons per minute (gpm) as measured by a roto-meter-type flow gauge calibrated to $\pm 1\%$ for a range of 1 to 20 gpm.

Data was collected with a Geokon Micro-10 datalogger equipped with 0-10 psi transducers for monitoring water levels in the pumping and observation wells. Water levels were recorded every 30 seconds to the nearest 0.01 ft. The tests were conducted in three parts: an initial rest period, a series of pumping increments, and a subsequent recovery period. During the rest period, water levels were observed during an equilibrium, static condition. Water and product levels taken prior to the tests are presented in Table D.1. Fig. D.1.

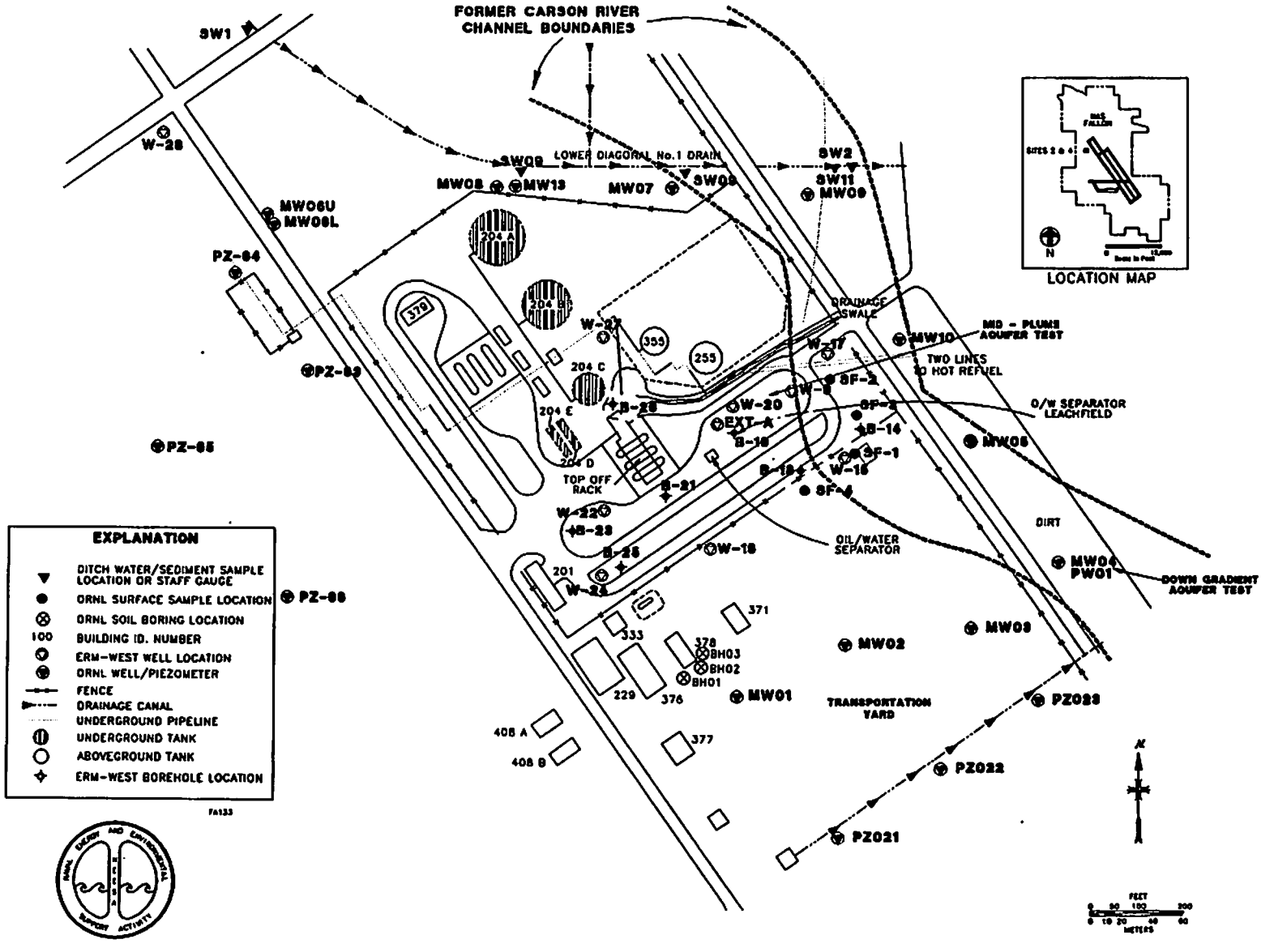


Fig. D.1. Site 2, New Fuel Farm. ORNL surface-water sampling points, borehole, piezometer, and monitoring well locations. ERM-West borehole and monitoring well locations.

Table D.1. Pre-test water and product levels

WELL #	WATER LEVEL bgs, ft	PRODUCT LEVEL bgs, ft	ELEVATION TOC asl, ft	WATER ELEVATION asl, ft	COMMENTS
EXT-A	10.09	7.4	3938.35	3928.26	No density correction
W-9	8.82	7.54	3936.64	3927.82	No density correction
W-20	14.2	10.66	3939.14	3924.94	No density correction
MW-01	6.93	----	3935.18	3928.25	
MW02	5.78	----	3933.76	3927.98	
MW-03U	5.31	----	3933.13	3927.82	
MW-03L	5.30	----	3933.13	3927.83	
MW-04	6.46	----	3934.02	3927.56	
MW-05U	6.80	----	3934.41	3927.61	
MW-05L	6.87	----	3934.49	3927.62	
MW-06U	5.48	----	3935.75	3930.27	
MW-07	6.20	----	3935.91	3929.71	
MW-08	8.47	----	3937.72	3929.25	
MW-09	8.02	----	3935.91	3927.89	
MW-10	7.12	----	3934.84	3927.72	

TOC: top of casing.

Step Drawdown Test

A step drawdown pumping test was performed by ERM West prior to the traditional pumping tests. It consisted of operating the pump for short time increments at gradually increasing pumping rates. During each period, water level measurements were recorded and the pump discharge rate was monitored and kept constant. Following a series of pumping steps, the pump was shut off and measurements were made of the recovering water levels in each well. This information was used to determine the constant rate to use for the pumping tests.

The step drawdown test was conducted on W-20. An initial flow rate of 2 gpm for 3 minutes was increased to 5 gpm for 17 minutes and then to 9 gpm for 10 minutes. When pump failure brought an unexpected halt to the step drawdown test after 30 minutes, well recovery was recorded. Results of the step drawdown are shown on Graph 1 (Fig. D.2). Based on information obtained from the step drawdown test, a pumping rate of 10 gpm was chosen for the mid-plume aquifer tests.

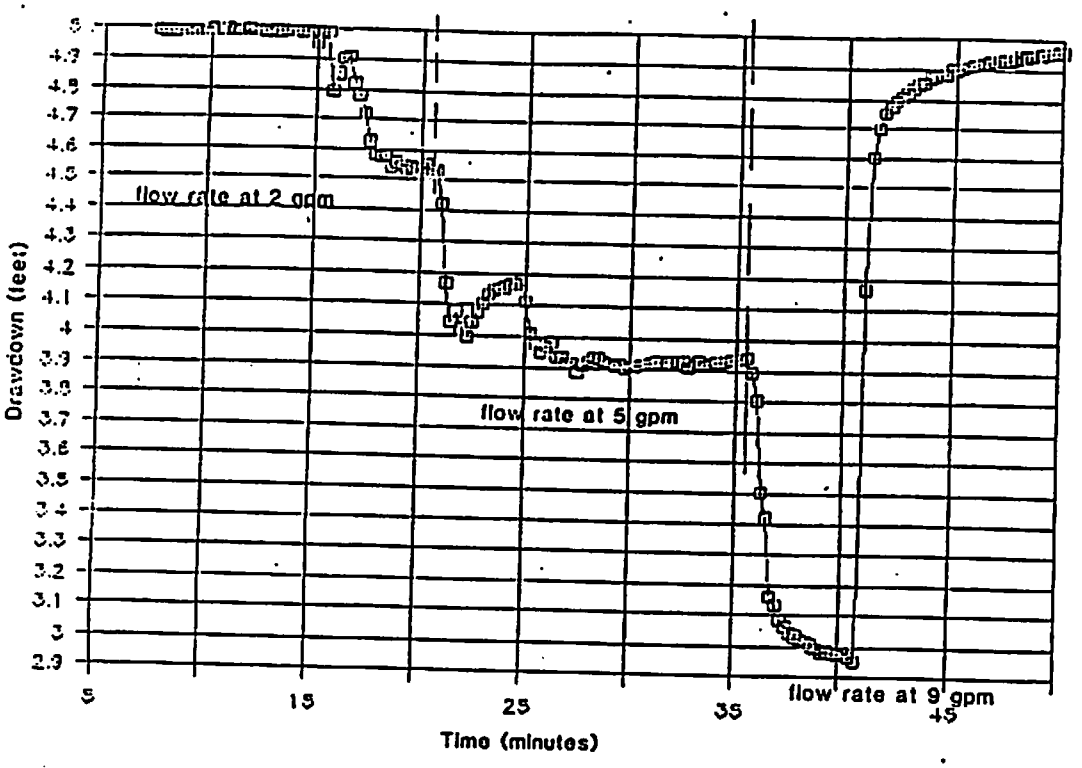
Pumping Tests

A pumping rate of 10 gpm was maintained for 127 minutes while pumping W-20 and observing drawdown in Ext-A and W-9. Field data was entered into the Pump Test Computer Program. Graph 2 presents this data for W-20 (Fig. D.2). The recovery levels of the three wells were also recorded, and Graph 3 (Fig. D.3) show the pump test recovery curve for W-20.

A second mid-plume aquifer test was completed by ERM West on W-9, with W-20 and Ext-A as observation wells. W-9 was pumped dry in 10 minutes at a rate of 10 gpm, and the recovery time was approximately 3 hours. The water level recovery rate in W-9 was only 0.03 gpm compared to 5 gpm in W-20. Only the recovery data was used on this test because a 10 minute drawdown test was not considered adequate for curve matching.

GRAPH 1

STEP TEST



GRAPH 2

WELL W-20 PUMPING TEST

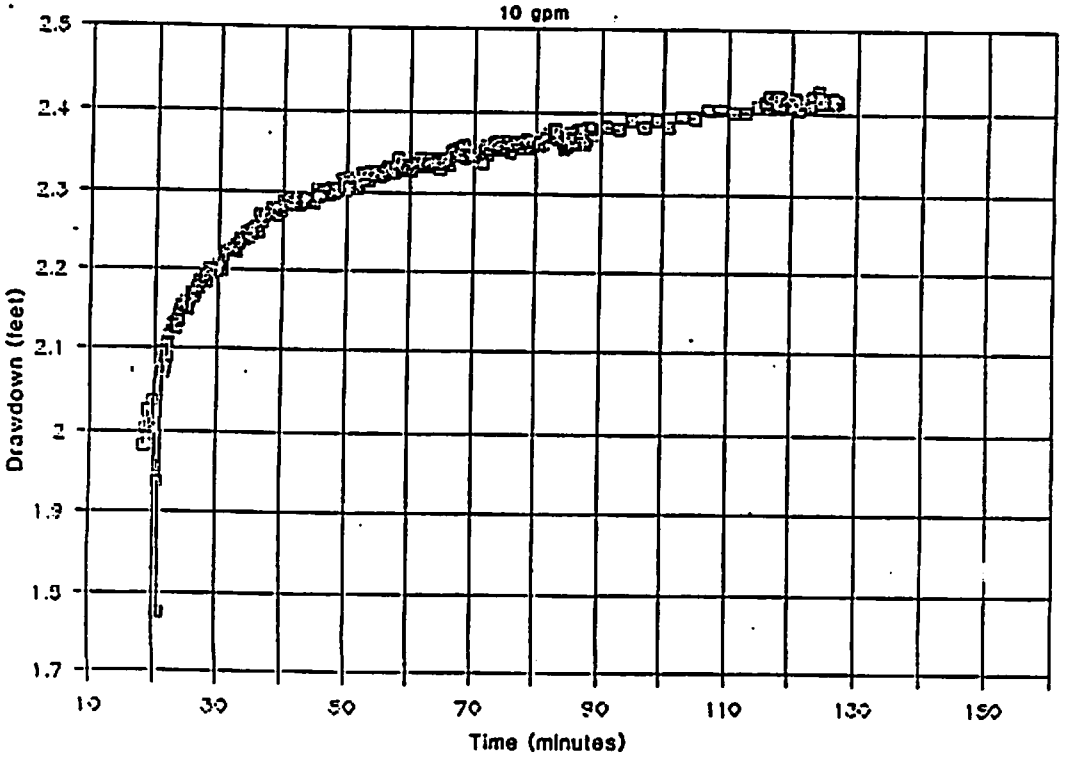
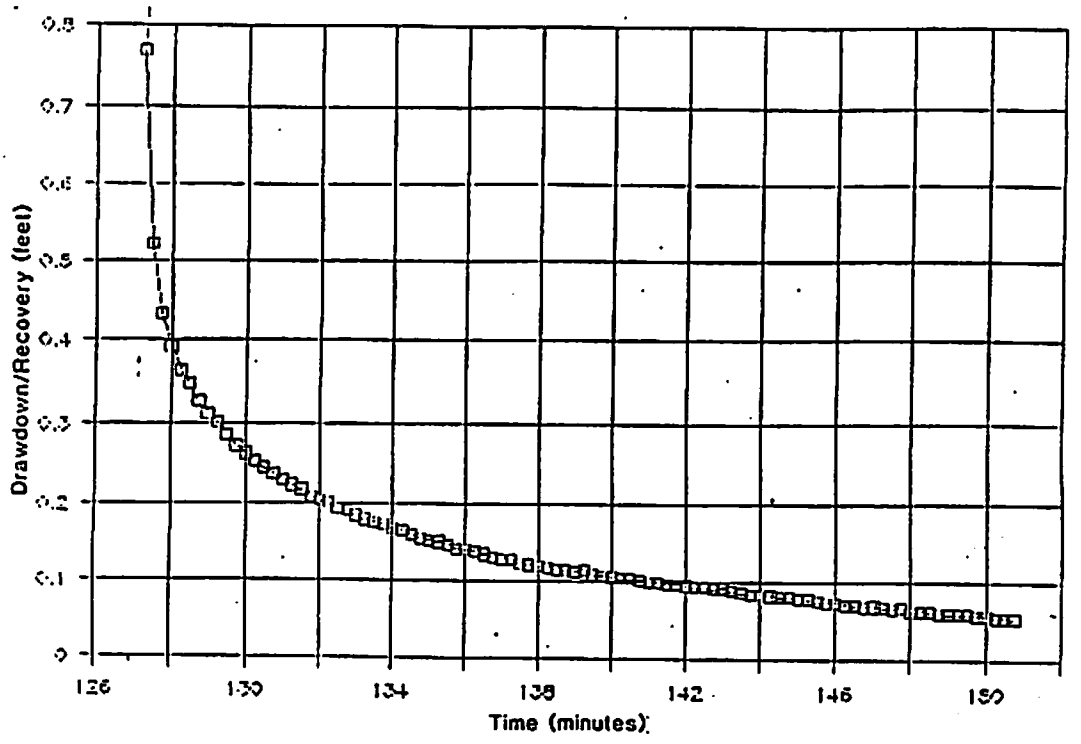


Fig. D.2. Step test and well W-20 pumping test results.

GRAPH 3

W 20 recovery



GRAPH 4

WELL PW-01 PUMPING TEST (50gpm)

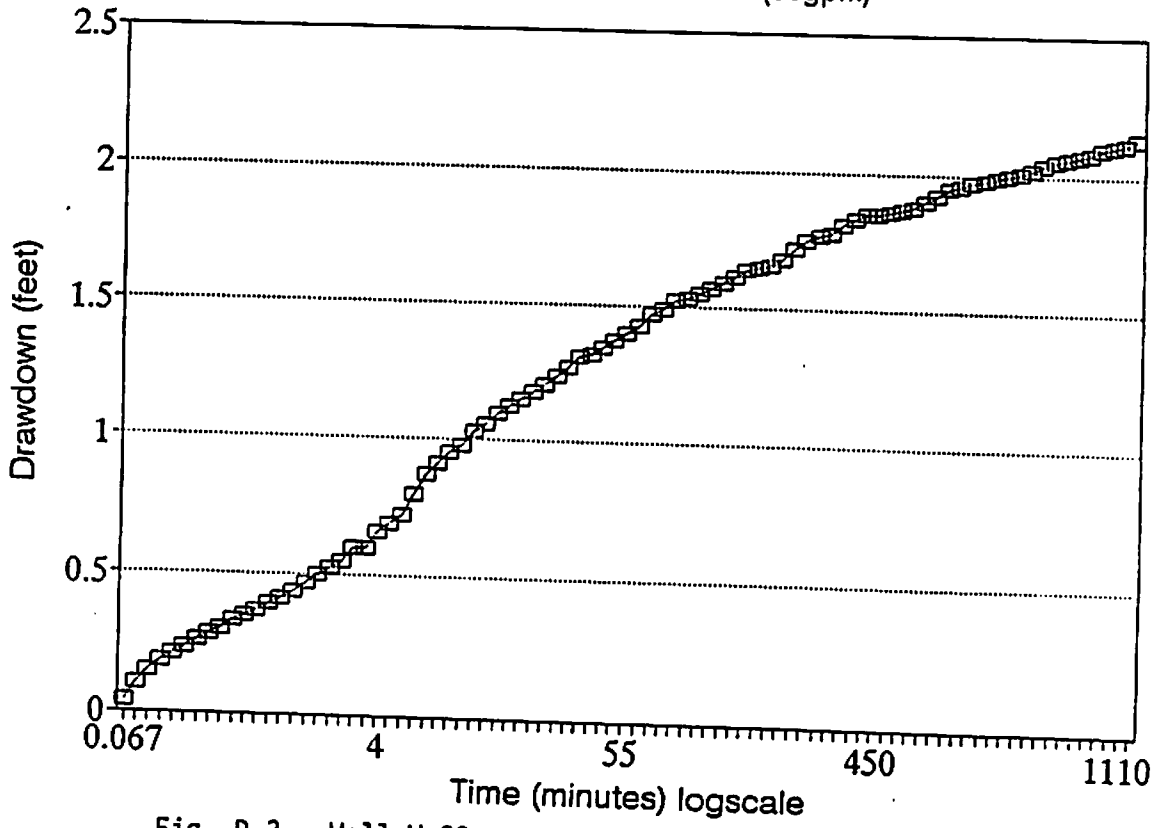


Fig. D.3. Well W-20 pump test recovery curve and well PW-01 pumping test results.

Field data was entered into the Graphic Well Analysis Program for IBM computers. The data was plotted as graphs (Fig. D.2 and D.3). Type curves were superimposed on the plots (Freeze and Cherry 1979). After an appropriate type curve was matched and selected, transmissivity and storage properties were automatically calculated from the program (Table D.2). The calculated results yielded an average transmissivity of 5840 gal/ft/day (780 ft^2/day), with a storativity of 0.014 for an unconfined aquifer. The resulting hydraulic conductivity and groundwater velocity values using a gradient of 0.0014 and an effective porosity of 0.20 were 390 gal/day/ft^2 and 0.42 ft/day (150 ft/year) respectively.

Downgradient Pumping Test

A pumping test was performed by ORNL on PW-01 that lasted about 27 hours. A location in the former Carson River channel with a coarse-grained sandy unit was selected for the 5-in.-diameter pumping well. The well was fully screened over the 14-ft-thick water table aquifer. Drawdown was observed in a nearby 2-in.-diameter monitoring well (MW-04). Water samples were collected and analyzed prior to the test to ensure that the well was free of contaminants, thus simplifying disposal of the water recovered during the test. A pre-test was run for 160 minutes to determine the pumping rate for the extended test. A rate of 50 gpm was selected for the test. The flow rate was monitored during the test and kept constant.

A 4-in.-diameter Grundfos submersible pump was used for the pumping well, and water levels were monitored in the observation well with a Solinst water level meter calibrated to 0.01 ft. Once pumping commenced, water levels were recorded every 5 seconds for the first minute, every 10 seconds for the second minute, every 20 seconds for the third minute, and so on, until eventually at 210 minutes, water levels were recorded every 30 minutes for the remainder of the test. Generator failure at 27 hours into the test forced the end of the test. At this point the water level was dropping only 0.01 ft every 30 minutes, and a total drawdown of 2.13 ft had been obtained in the observation well. Graph 4 shows the time-drawdown plot of the data (Fig. D.3).

Table D.2. Pumping test results

Well Number	Hydraulic Conductivity (K), gal/day/ft²	Specific Yield	Linear Groundwater Velocity, ft/year	Aquifer Thickness, ft	Transmissivity, gal/day/ft
W-20	290	0.0034	110	15	4360
Ext-A	420	0.0031	160	15	6300
Ext-A	460	0.0038	174	15	6900
PW-01	1640	0.022	560	14	22,900

The pump test data was entered into Walton's pumping test analysis program and values of 22,900 gal/day/ft (3060 ft²/day) and 0.022 were obtained for transmissivity and storativity respectively (Walton 1988). The resulting hydraulic conductivity was approximately 1640 gal/day/ft². In order to calculate the groundwater velocity rate, the hydraulic gradient was determined. Site-specific data from contouring water levels compare well with Glancy's regional potentiometric map (Glancy 1986) and yield a gradient of 0.0014 (Fig. D.1). Assuming an effective porosity of 0.20, a resulting linear groundwater velocity of 1.5 ft/day or 560 ft/year was obtained. This estimate of groundwater velocity is restricted to the coarse-grained sandy unit. The extent and continuity of this unit are considered a controlling influence on the migration of groundwater contamination at the site. No boundaries were encountered during the pump test, yet it is obvious from nearby wells that the unit is not present over the entire site. Cross sections constructed from well logs will be used to evaluate the extent of the former Carson River channel prior to performing transport calculations.

Bail Tests

Bail tests were performed on 12 wells around the site. The tests were accomplished by instantaneously unloading the water from the well using a high pressure jetting tool and compressed nitrogen gas. A pre-test water level was recorded for each well. The jetting tool was then lowered to the bottom of the well, and the compressed nitrogen was turned on. This geysered the standing water out of the well, and well recovery was measured every few seconds until recovery was complete. Water levels were measured with a Solinst water-level meter calibrated to the nearest 0.01 ft. The resulting recovery data was entered into a bail test evaluation program and evaluated by computer. The results are shown in Table D.3.

Table D.3. Results of Site 2 bail tests

Well Number	K gal/day/ft² Trial 1	K gal/day/ft² Trial 2
MW01	1050[a]	120[b]
MW02	64	61
MW03U	63	56
MWO3L	46	66
MW04	***	***
MW05U	60	No test
MWO5L	53	59
MW06U	32	40
MW07	***	***
MW08	15	17
MW09	19	13
MW10	19	17

[a] This number is based on only three measurements and is probably erroneous.

[b] There was no early time data for this test, and it is questionable.

*** Indicates that the well recovered too rapidly for a reliable test.

Note: The downgradient pumping test was performed adjacent to MW04.

The bail test data indicate that the shallow alluvial aquifer is heterogeneous and comprised of several lithologic units of varying permeability. The hydraulic conductivities calculated from bail tests generally vary less than an order of magnitude across the site except for MW07 and MW04 which are in the coarse-grained sand channel and have much higher hydraulic conductivities.

The results of the pumping tests indicate K values 5 to 125 times higher than the bail test values. The bail test data is considered strictly qualitative and yields a relative number for each location. The pumping test results are considered a more reliable quantitative measure of aquifer parameters; however, relating the bail test data to the pumping test data is useful for determining the variability of the hydraulic conductivity as it relates to changes in the subsurface geology.

Another unique new technology was utilized to obtain data for aquifer characterization. It involved the use of a borehole colloidal microscope which is lowered into the well and used to observe the movement of colloidal particles through the well during steady-state flow. By timing the movement of several particles across a known distance at various depths in a well, a reasonable groundwater velocity and flow direction can be estimated. The tool is still in the development stages and is being used in research at several other sites around the country. The results of the borescope tests for several wells on the facility have not yet been tabulated; however, they will be included in the final RI Report.

SUMMARY

The results of the aquifer testing are inconclusive with respect to contaminant transport at Site 2. Considering the time period available for groundwater transport of dissolved petroleum hydrocarbons (20+ years), the highly permeable zones in the aquifer, and the present downgradient contaminant-plume limits as defined by site characterization, there must be other mechanisms at work retarding contaminant transport. Otherwise the dissolved portion of the contaminant plume should have spread several thousand feet downgradient instead of a few hundred feet. The roles of dispersion, adsorption,

biodegradation, and the former Carson River channel need to be further assessed in order to understand the dynamics of the groundwater regime at the site. It is interesting that the floating-product portion of the plume does not appear to be moving although the thickness of product is decreasing gradually. Monitoring well ERM-20 installed in 1987 had about 3.6 ft of product immediately after completion and only about 2.3 ft three years later. The low density, high viscosity, and relative insolubility of the product seem to inhibit subsurface transport by groundwater. These factors will have to be accounted for if contaminant-transport modeling is to be accomplished for any of the sites.

Considering the geologic heterogeneity of the aquifer over the entire facility and the lack of information on the concentration gradients within the distal portion of the Site 2 plume where it meets the former Carson River channel, two recommendations are made: (1) two additional pumping test wells should be installed, one upgradient from Site 1 and one upgradient from Site 6 for the purpose of obtaining reliable data for the two other major areas of concern on the facility; and (2) two additional monitoring wells should be installed in the Site 2 plume downgradient between ERM-15 and MW03 along the west edge of the former Carson River channel to further evaluate the interaction between the plume and the channel.

POTENTIOMETRIC MAPPING

A comprehensive program of measuring water levels in all wells and piezometers and at all drainage ditch staff gauges was initiated in July 1990. Water levels are measured monthly and data stored in a computer data base. Evaluation of the data has resulted in the characterization of the potentiometric surfaces at all of the IR Program sites (Figs. D.4 - D.9). Potentiometric maps are being produced for each site or group of sites on a monthly basis; however, it is not necessary for the purposes of this report to include more than one set of maps from one set of measurements. Additionally, the head measurements in the three widely spaced wells completed in the intermediate aquifer have Fig. D.4.

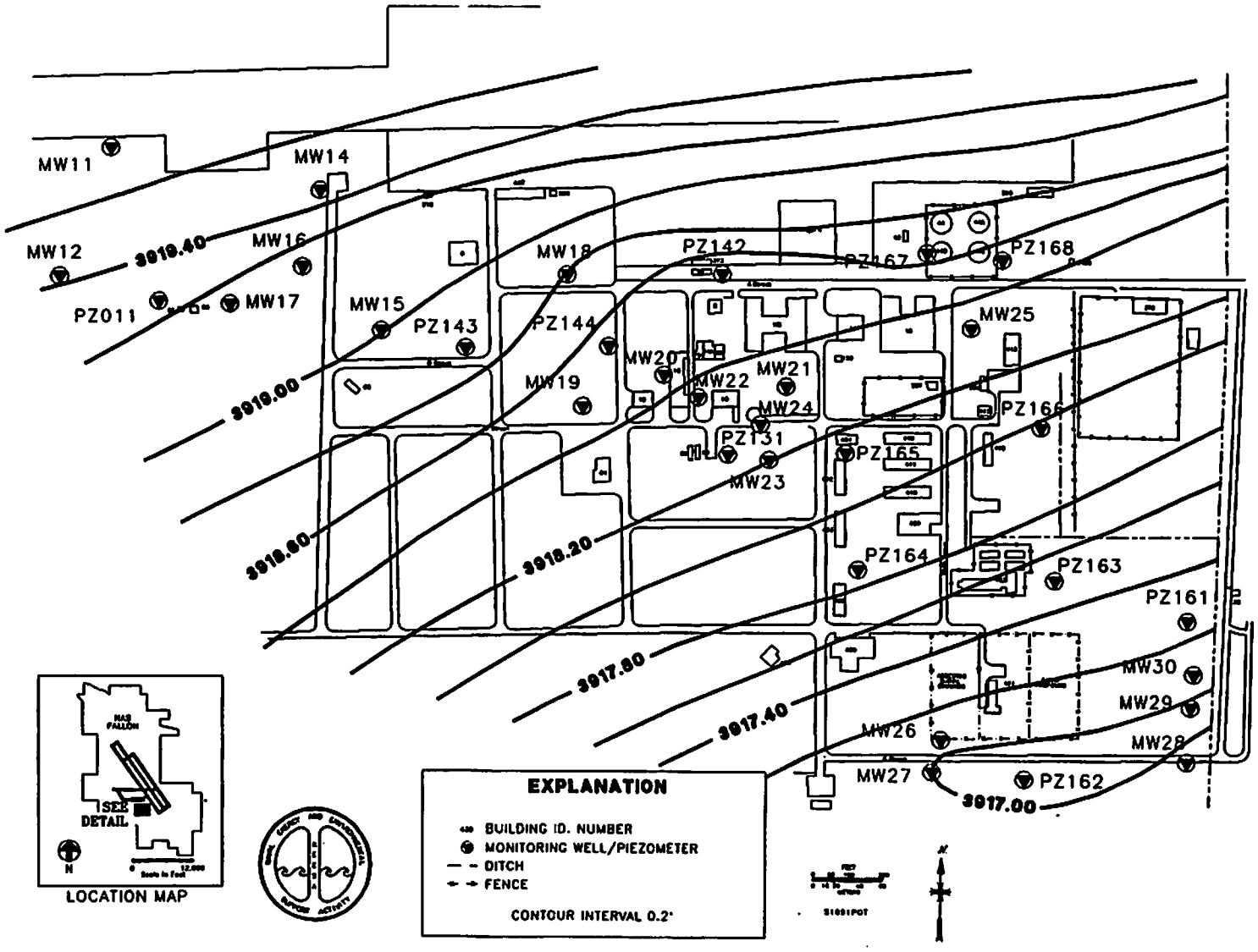


Fig. D.4. Sites 1, 10, 11, 12, 13, 16, 23 potentiometric surface contour map.

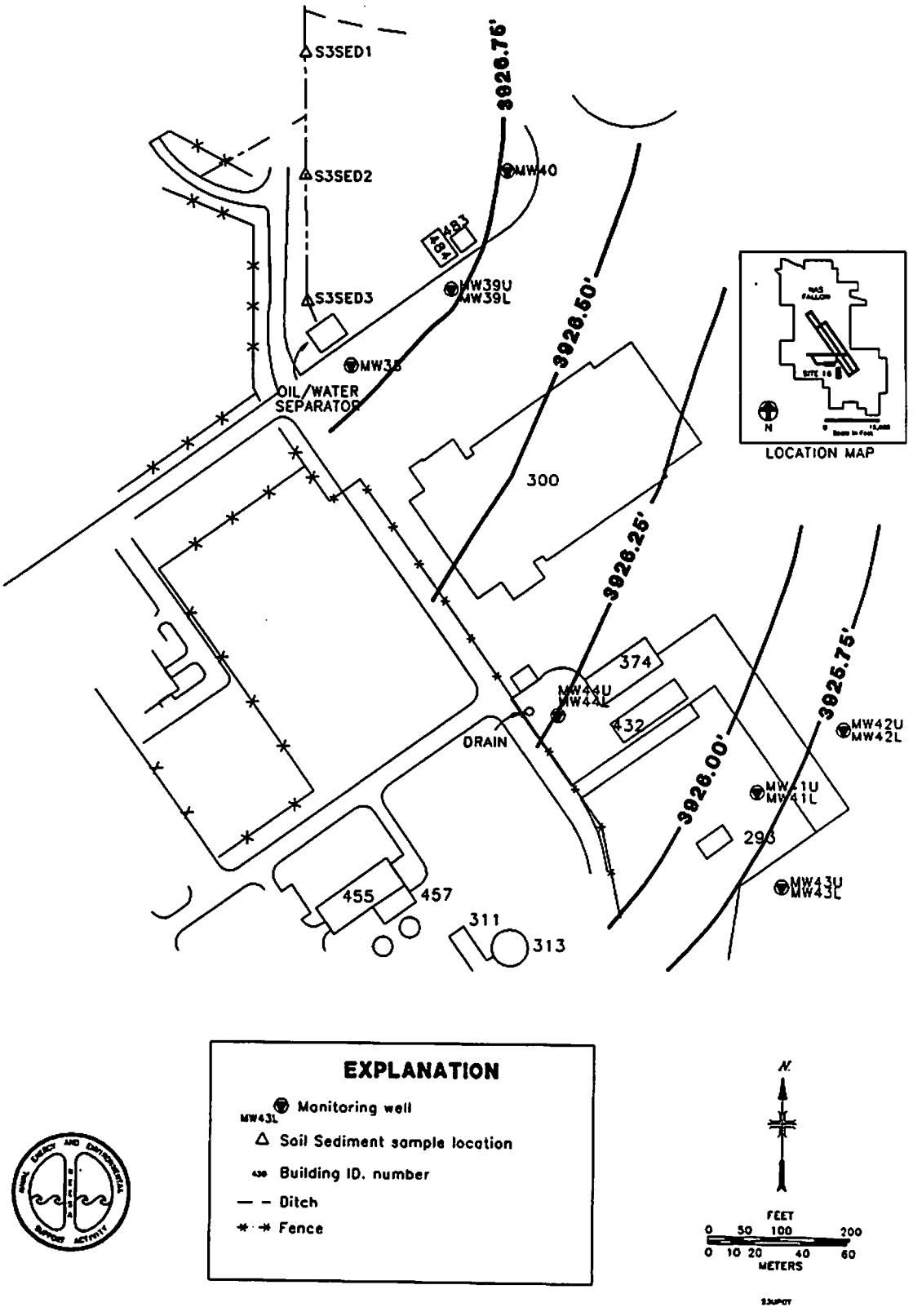


Fig. D.5. Site 3, Hangar 300 area. Potentiometric surface contour map.

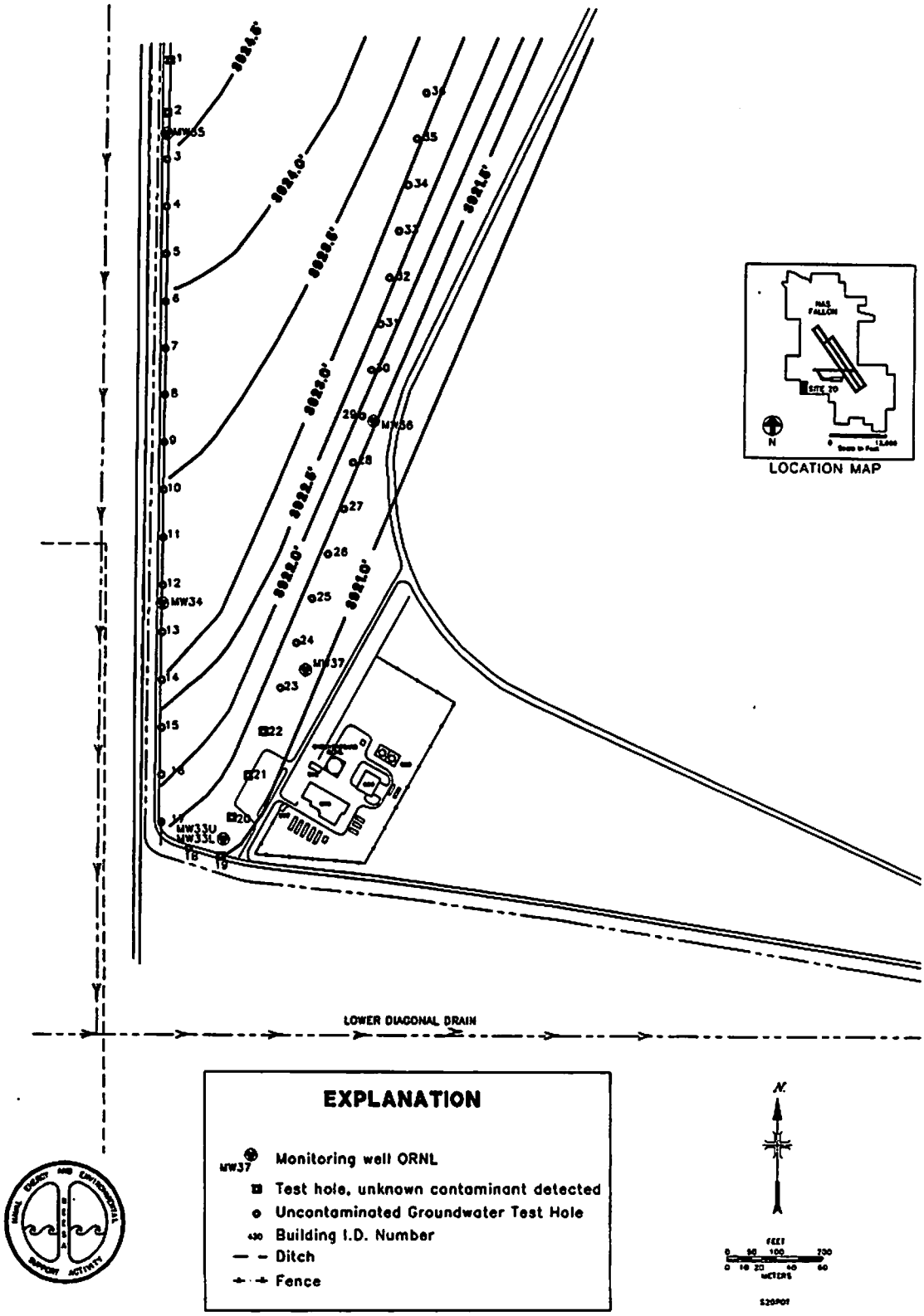


Fig. D.6. Site 20, Checkerboard Landfill. Potentiometric surface contour map.

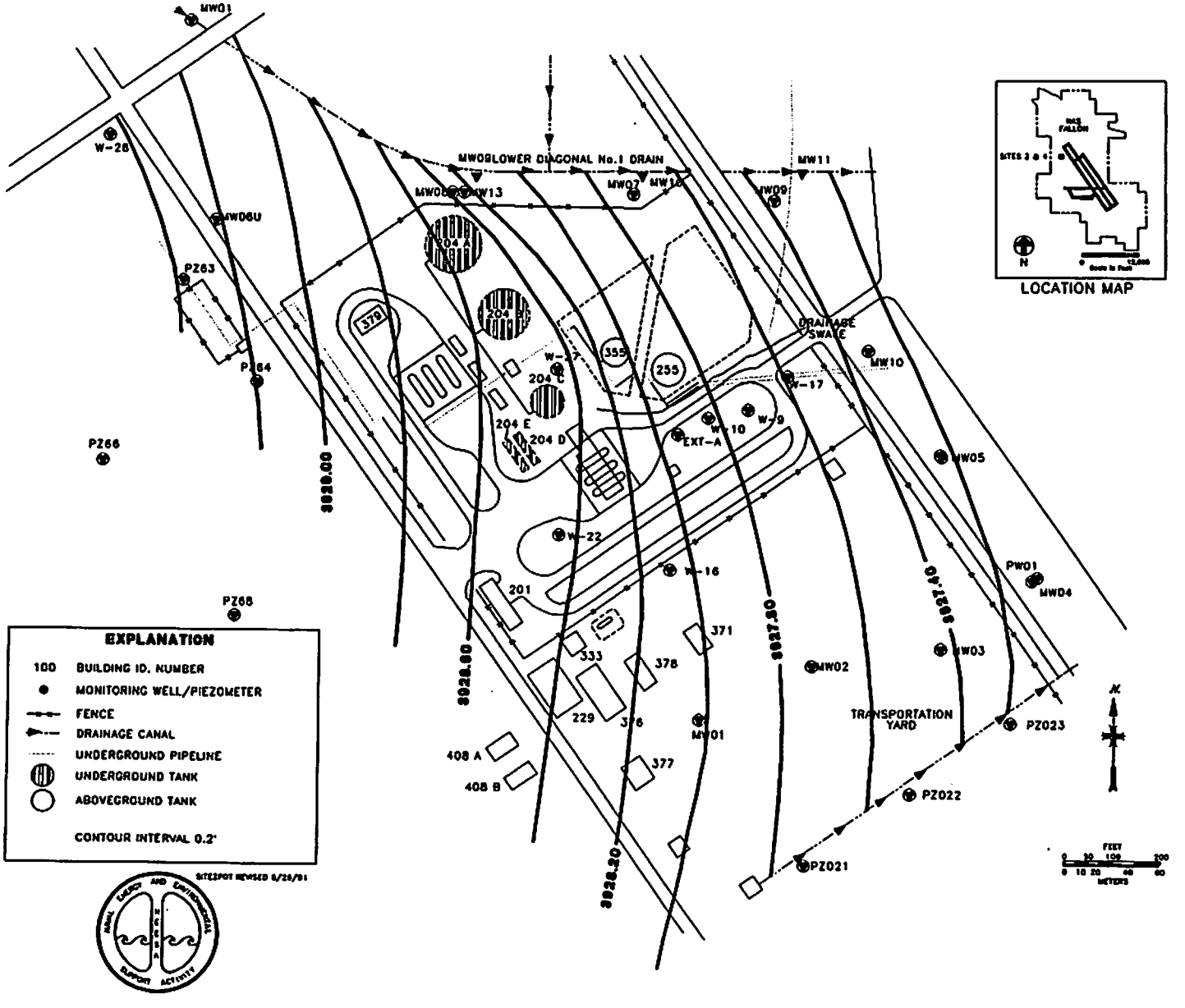


Fig. D.7. Site 2, New Fuel Farm. Potentiometric surface contour map.

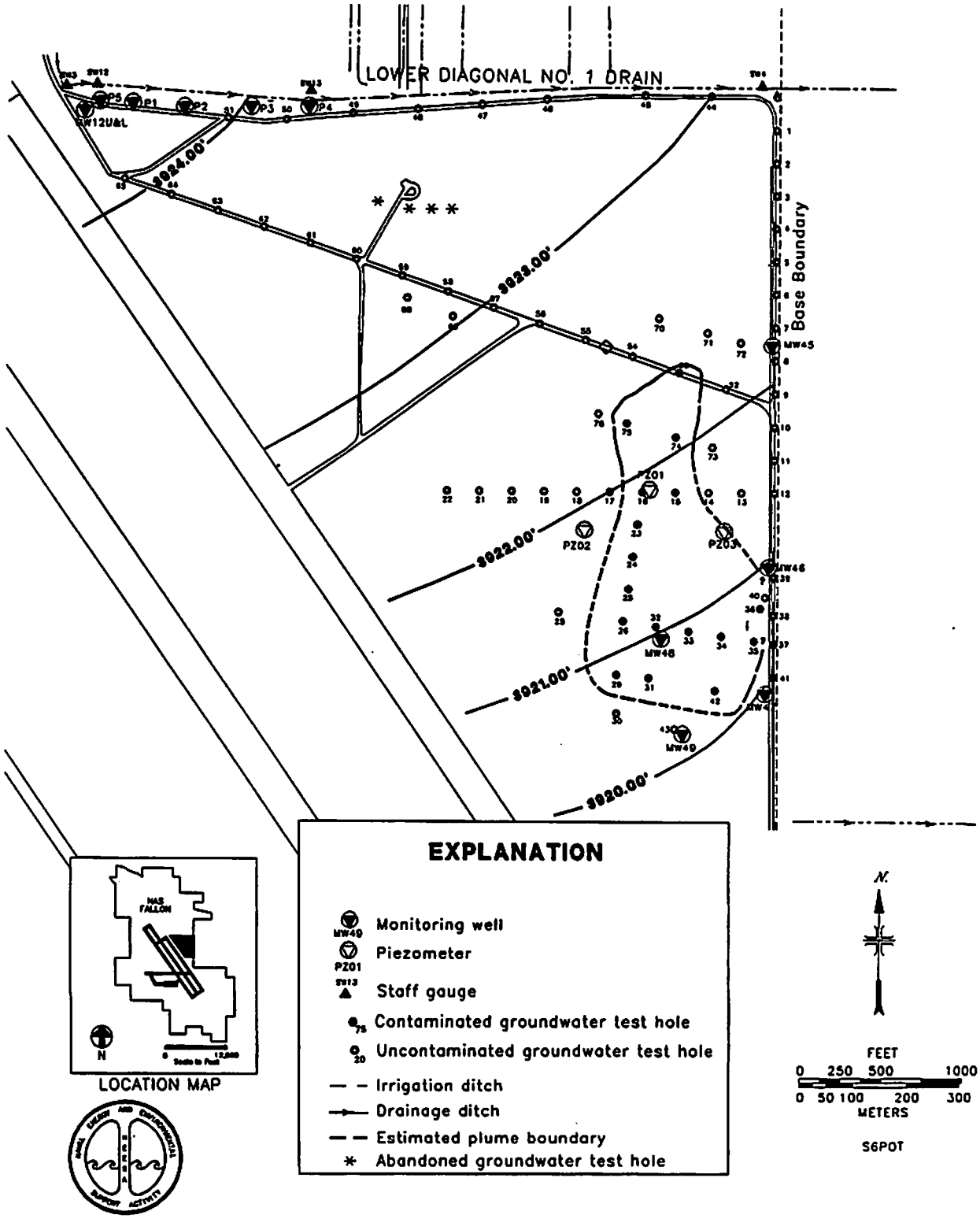


Fig. D.8. Sites 6, 7, 21, and 22. Potentiometric surface contour map.

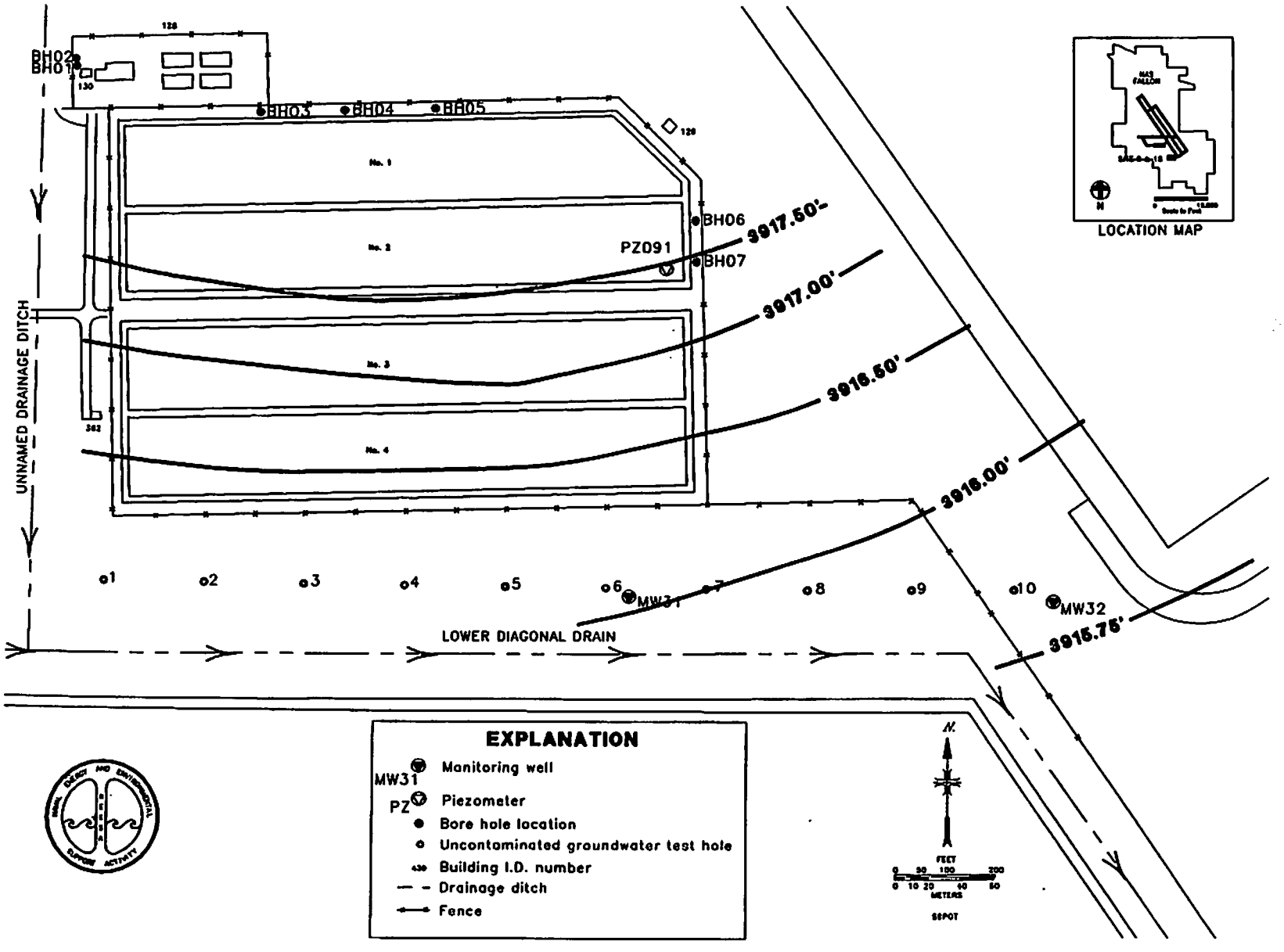


Fig. D.9. Sites 9 and 18. Potentiometric surface contour map.

been utilized to produce a potentiometric map of the intermediate aquifer on the facility. The head measurements have confirmed a year-round artesian head in the intermediate aquifer which precludes downward migration of groundwater from the shallow aquifer to the intermediate aquifer.

Generally speaking, when determining groundwater flow direction from potentiometric maps, the flow is assumed to be perpendicular to the gradient contours. This is only true, however, in a homogeneous, isotropic aquifer. The shallow alluvial aquifer is anything but homogeneous and isotropic; thus, there are likely to be considerable variations in the actual groundwater flow direction depending on preferential flow paths such as the former Carson River channels. The general gradients in the shallow aquifer all appear to be east-southeast which is consistent with Glancy's regional evaluation (Glancy 1986).

The annual fluctuation in water levels at Site 2 is demonstrated by the graph in Fig. D.10. This graph shows the water-level fluctuation over the period from August 1990 to May 1991 in several wells at Site 2. The slopes of the fluctuations for each well are typical of other wells in the shallow aquifer. Water levels varied approximately 0.4 to 0.7 ft over the period. Some wells closer to the Lower Diagonal Drain (Fig. D.11) showed more fluctuation over the same period, ranging from 1.1 to 1.5 ft due to the influence of fluctuating water levels in the drainage ditch. Water levels in the intermediate aquifer were almost constant, fluctuating only about 0.3 ft over the same period. Figure D.12 is a potentiometric map of the intermediate aquifer of the facility. Comparing Fig. D.12 with the other potentiometric maps, Figs. D.4 through D.9, confirms the upward flow gradient between the intermediate and shallow aquifers.

Monthly monitoring of all water levels will continue throughout the remainder of the RI. This data will be assimilated into the final RI Report.

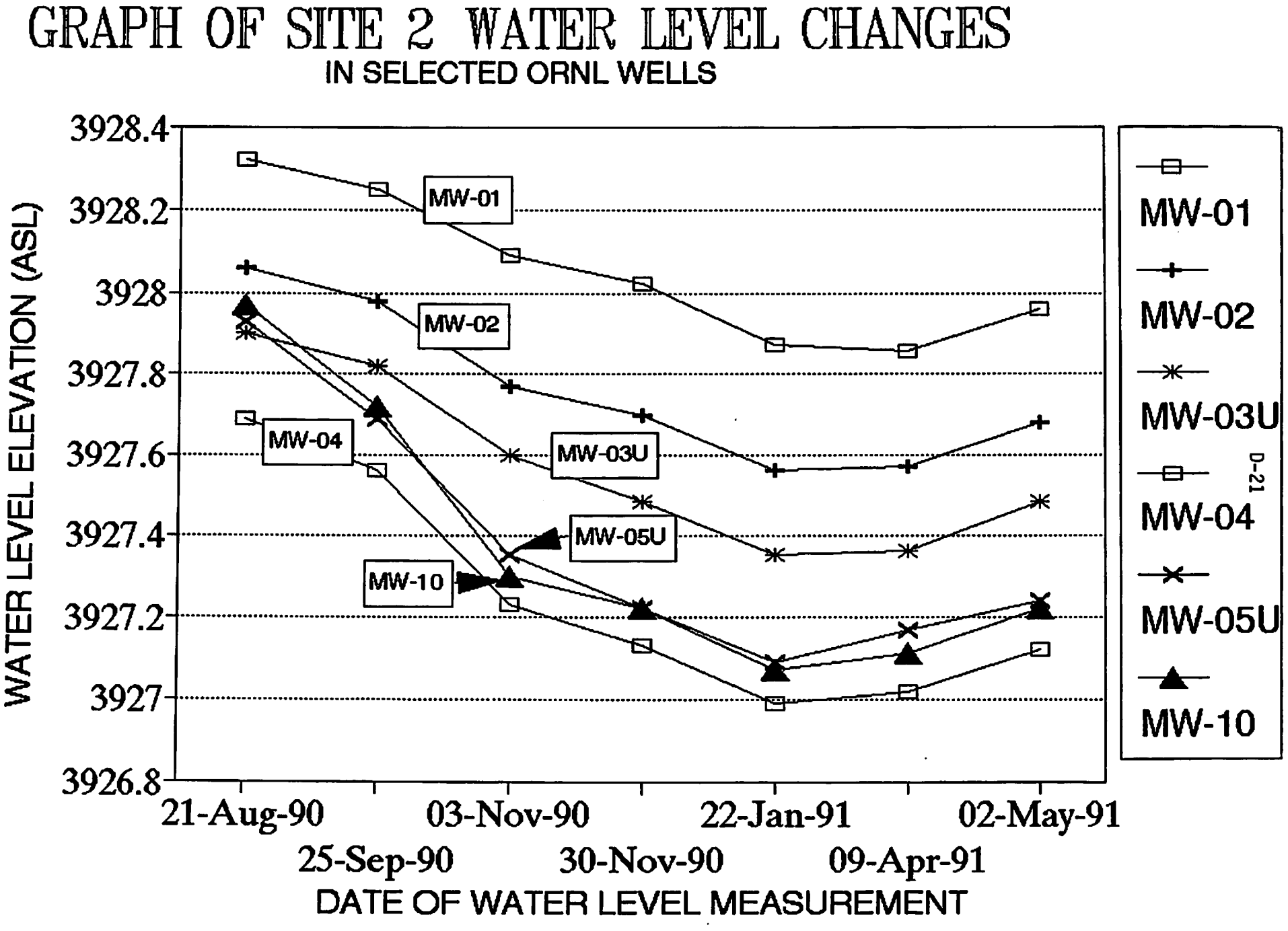


Fig. D.10. Site 2 water level changes for MW-01, MW-02, MW-03U, MW-04, MW-05U, and MW-10.

GRAPH OF SITE 2 WATER LEVEL CHANGES
IN SELECTED ORNL WELLS

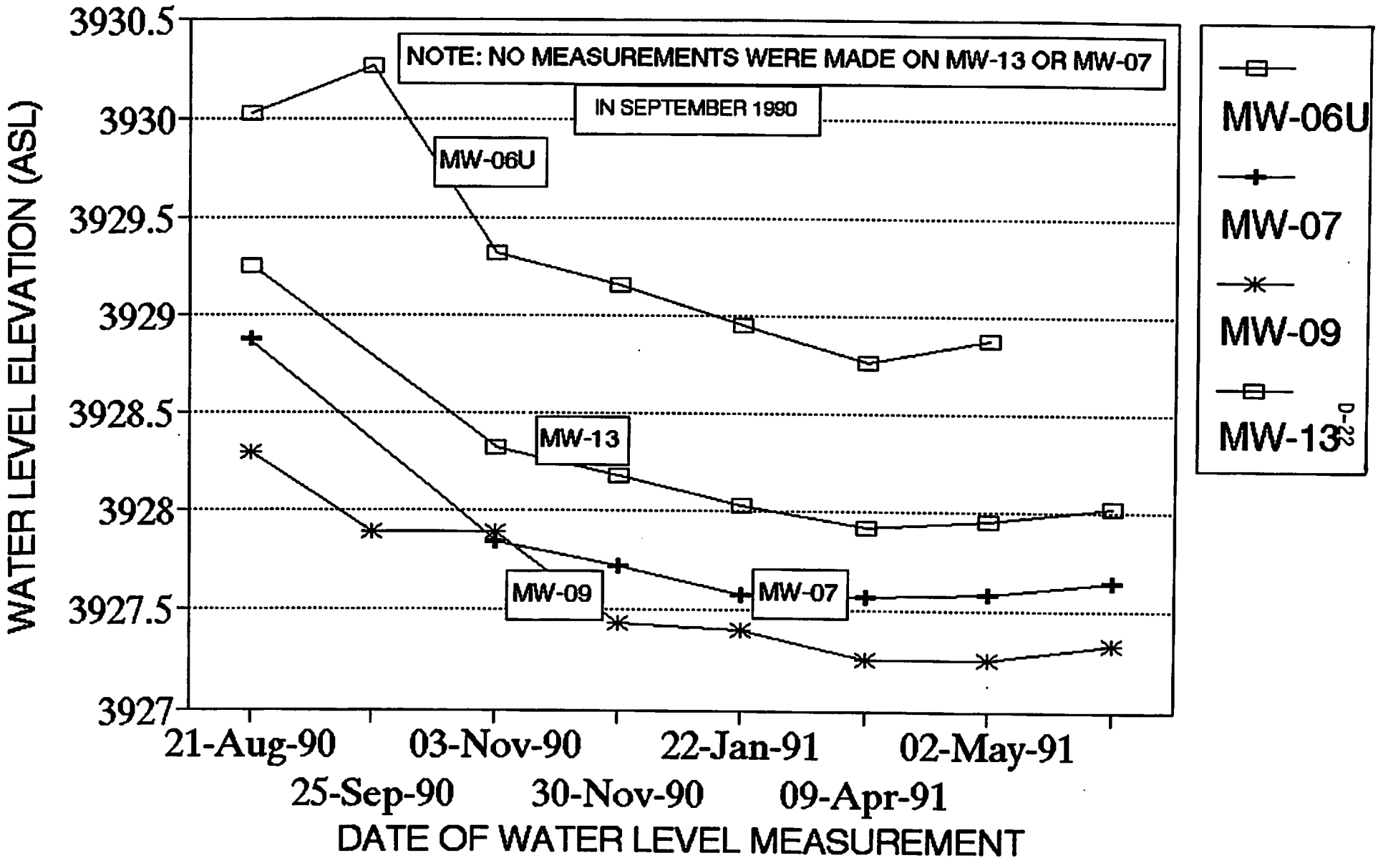


Fig. D.11. Site 2 water level changes for MW-06U, MW-07, MW-09, and MW-13.

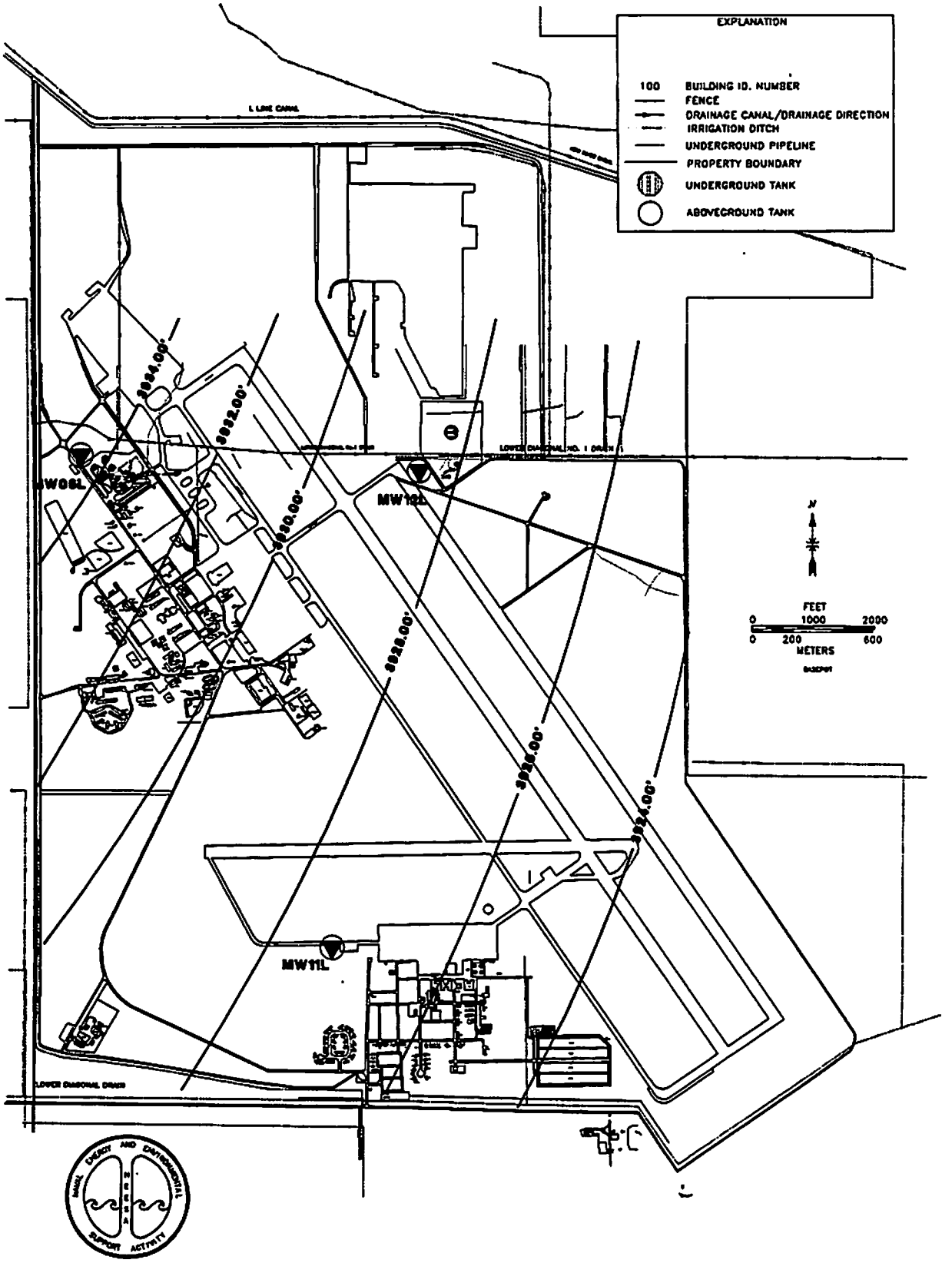


Fig. D.12. NAS Fallon. Potentiometric map of the intermediate aquifer.

APPENDIX D

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APPENDIX E

CHARACTERIZATION OF FLOW AND WATER QUALITY IN THE LOWER DIAGONAL AND LOWER DIAGONAL #1 DRAINAGE DITCHES

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INTRODUCTION

A series of current-meter measurements were performed in two ditches at NAS Fallon to gather information needed for characterizing potential contaminant transport by surface water from former waste disposal sites. Water samples and stream-sediment samples were collected for establishing background water quality and assessing surface-water contaminant transport. Other work performed at the facility included soil-gas surveys, groundwater contaminant screening, geophysical surveys, soil borings, monitoring well installations, soil sampling, groundwater sampling, and well testing. As a result of this investigation, the subsurface geology and hydrogeology were described, and contaminant (mainly petroleum hydrocarbons) plume boundaries were identified. Since two of the plumes are very close to surface-water drainage ditches, the surface-water investigation was performed to assist with risk assessment. This report details the methods used and results obtained defining the quality and quantity of the potentially affected surface water.

HYDROLOGY AND LOCAL SETTING

The facility lies on a broad, flat alluvial plain in the southern Carson Desert referred to as the Lahontan Valley. The area is part of the Basin and Range geological province. It is a sink for surface runoff from the surrounding mountains and the Carson River. Carson Lake is a few miles south of the facility, and the Stillwater National Wildlife Refuge is a few miles northeast of the facility. Surface water from the facility flows to Stillwater while the shallow groundwater generally flows toward Carson Lake.

The Carson Desert is a hydrologically closed depression. The entire area is in the rain shadow of the Sierra Nevada Mountains; consequently, precipitation is about 5 inches a year. About 80% of the Carson Desert surface is the Carson River floodplain, and the

rest is composed of playas and alluvial fans (Wilden and Speed 1974). The Carson River, augmented by the Truckee River via the Truckee Canal (part of the Newlands Irrigation Project), provides more than 95% of all surface runoff received by the Carson Desert. Much of the area around the facility is irrigated, and there are several irrigation ditches to deliver water and two drainage canals to remove excess water. The drainage canals generally intersect the shallow water table aquifer and drain excess water from the farmland. Flow rates in the drainage canals fluctuate with the irrigation season, although many of them flow year-round and constitute wetland habitats for fish, water fowl and other fauna.

A shallow water table aquifer occupies the alluvium from near the surface to about 25 ft below the surface. It is composed of many interconnected zones of varying permeability ranging from highly transmissive channel sands to less-transmissive silty clay floodplain deposits. The water quality is generally poor because of abundant dissolved salts and metals. The regional groundwater flow direction is to the southeast toward Carson Lake. The regional groundwater flow velocity estimated by Glancy is 35 ft per year (Glancy 1986); however, the groundwater flow velocity varies locally from 50 to 550 ft per year as indicated by pumping-test and bail-test data from the facility (Appendix D).

Wells penetrating the intermediate aquifer on the facility indicate a head difference of about 5 to 9 ft between the shallow (unconfined) and intermediate (confined) aquifers. The head is higher in the deeper aquifer, indicating artesian conditions and precluding any downward migration of shallow groundwater at the facility. Thus, there is little interaction, if any, between the shallow groundwater and the deeper, confined aquifers. In contrast, however, the shallow alluvial aquifer is alternately recharged by or discharges to the surface water in the drainage canals, depending on the seasonal fluctuations in irrigation return flows to the drainage canals.

FIELD METHODS AND RESULTS

Flow Measurements

There are two main drainage ditches running through the facility and several small, unnamed lateral ditches (Fig. E.1). The ditch on the north side of the facility is the Lower Diagonal No. 1 (LD #1) Drain, and the one on the south side is the Lower Diagonal (LD) Drain. The LD Drain is about 25-ft wide and averages about 2 ft of water during low flow in the winter months. Measured discharge rates ranged from 26 to 82 cfs (cubic feet per second). On the other hand, LD #1 is about 12-feet deep and averages about 1 ft of water during the winter. The flow in LD #1 is relatively slow, and discharges rarely exceed 2 cfs. Both ditches represent potential pathways for migration of contaminated groundwater into the surface water. Thus, selection of a series of water sample locations, SW-1 through SW-8, and installation of seven staff gauges allowed the characterization of the flow and contaminant transport for a 2-month period in the ditches. The staff gauges were also useful in relating the local groundwater potentiometric surface to the level of the water in the ditches. A total of eight water- and sediment-sample locations (four in each ditch) were chosen based on proximity to the upstream and downstream intersections of the ditches with known or suspected contaminated groundwater in the shallow aquifer. Two staff gauges, SW-1 and SW-8, were installed at gauging-station locations, and staff gauges SW-9 through SW-13 were placed near suspected contaminant-plume discharge areas (Fig. E.1). Installation of the other staff gauges provided data for evaluating the groundwater/surface-water flow interactions. The following criteria from USGS Water Supply Paper 2175 (Rantz et al. 1982) were considered during selection of gauging stations SW-1 and SW-8:

1. The general course of the stream should be straight for a considerable distance upstream from the gauging station.
2. The total flow should be confined to one channel at all stages, and no flow should bypass the station as subsurface flow.

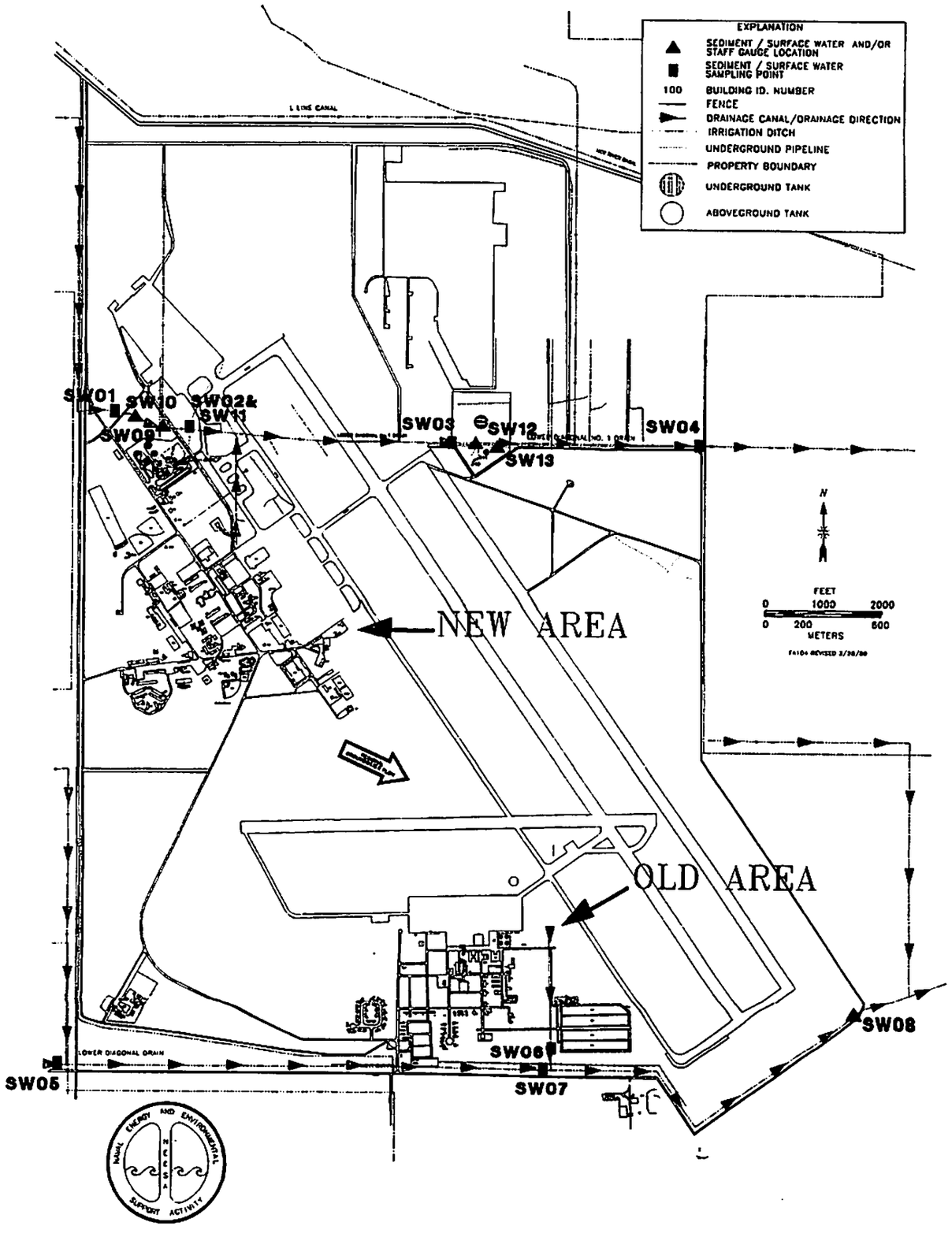

Fig. E.1. NAS Fillon. Surface water and staff gauge location map.

3. The streambed should not be subject to scour and fill and should be free of aquatic growth.
4. Banks should be permanent, high enough to contain floods, and free of obstructions.
5. Unchanging natural controls (such as bedrock outcrop) should be present to provide riffles for low flow and channel constriction for high flow.
6. A pool should be present upstream from the control to ensure a recording of stage at extremely low flow and to present high velocities at the streamward end of gauging-station intakes during periods of high flow.
7. The gauge station should be far enough upstream from the confluence with another stream or from tidal effects to avoid any variable influence from other sources on the stage at the gauge station.
8. A satisfactory reach for measuring discharge at all stages should be available within a reasonable distance from the gauge station.
9. The location should be readily accessible for ease of installation and operation of the gauging station.

Ultimately, two man-made structures in the ditches where the channels were straight and forced to flow through a confined reach were selected as gauge-station locations. The locations fit all of the criteria above with the exception of the one in LD #1 Drain which had a considerable growth of cattails that needed cutting back frequently. A 3-ft-diameter flat-bottomed culvert with concrete wing walls was selected as the gauge location in LD #1, and a 10-ft-wide concrete bridge/culvert was selected as the gauge location in LD Drain. These locations also served as water-and sediment-sampling locations.

Stream-gauging measurements were made with a Price type AA current meter mounted on a standard top-setting wading rod. Measurements were taken on 0.5-ft increments in LD #1 and on 1.0-ft increments in the LD Drain. Since flows were relatively shallow, the six-tenths method was incorporated. This method involves measuring the

velocity at 0.6 of the depth from the water surface at each increment across the stream. The velocity of water flowing across the cross-sectional area of the stream is the discharge. This relationship is represented by the formula $Q = \sum(av)$ where Q is the total discharge in cubic feet per second (cfs), a is an individual subsection area in ft^2, and v is the corresponding mean velocity of the flow normal to the subsection in ft/sec (Rantz et al. 1982). Calculations were done by the midsection method, and the results are presented in Table E.1. The resultant values were related to the staff gauge readings by constructing rating curves for the two gauging stations (Figs. E.2, E.3, E.4, and E.5).

Two graphs were constructed for each gauging station, one with gauge height vs discharge on an arithmetic scale and the other with gauge height vs discharge on a log scale. Even though a limited data set was obtained for the LD Drain, the resultant graphs display linear plots. Both sets of rating curves approximate straight lines when plotted with discharge on a log scale, indicating that there is a valid relationship between gauge height and discharge for the range of flows likely to be encountered in the two ditches. The resultant curves are now being used to estimate discharge rates based on staff gauge readings.

Chemical Sampling

Water and sediment samples were collected from eight locations, four in each ditch (Fig. E.1). Water samples were collected every two weeks for two months (four times). Sediment samples were collected only once, at the beginning of the study. All samples were collected in sample containers which were pre-cleaned by the supplier to meet EPA requirements for level III quality assurance/quality control (QA/QC) (USEPA 1987). Sample containers were selected based on the requirements for the specific analytes and methods for detection as presented in the Analytical Laboratory Guidebook (NUS Corp. 1987). The appropriate preservatives were placed into the sample containers prior to sample collection. Upon collection of samples, the sealed containers were immediately placed on ice in coolers

Table E.1. Stream discharge rating curve data

LD #1 DRAIN

GAUGE HEIGHT, ft	DISCHARGE, cfs
0.15	0.45
0.16	0.54
0.41	0.68
0.62	0.75
0.83	0.90
0.99	1.01
1.19	1.40
1.20	1.45
1.40	1.80
1.62	2.54
1.81	3.40
2.02	4.18

LD DRAIN

GAUGE HEIGHT, ft	DISCHARGE, cfs
0.0	26.64
0.25	37.97
0.56	48.36
0.63	54.62
0.73	59.83
1.03	82.36

Note: This data was collected during August, September, and October of 1989, which covers part of the irrigation season and the period after irrigation ceased in the fall.

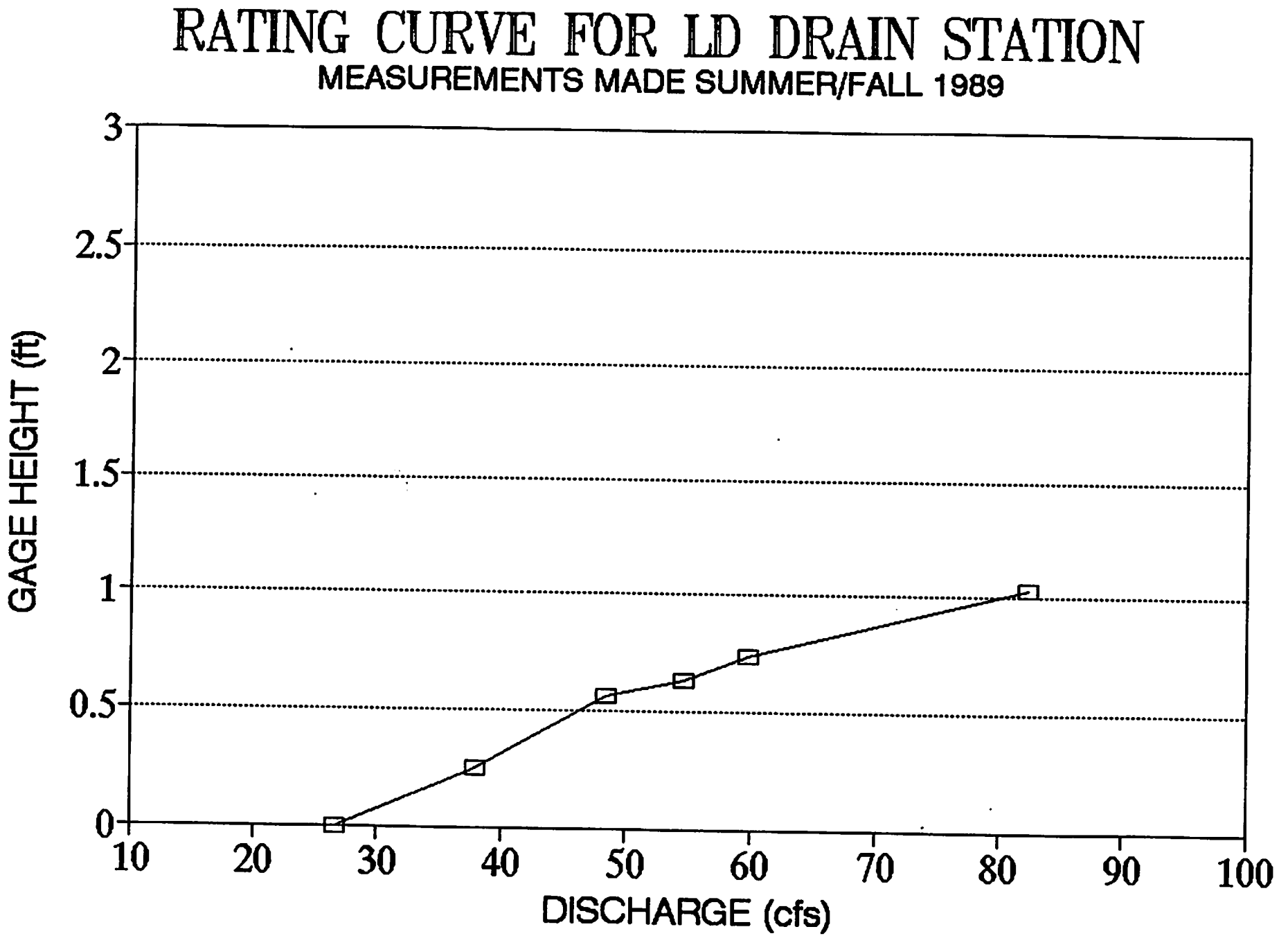

Fig. E.2. Rating curve for LD Drain Station.

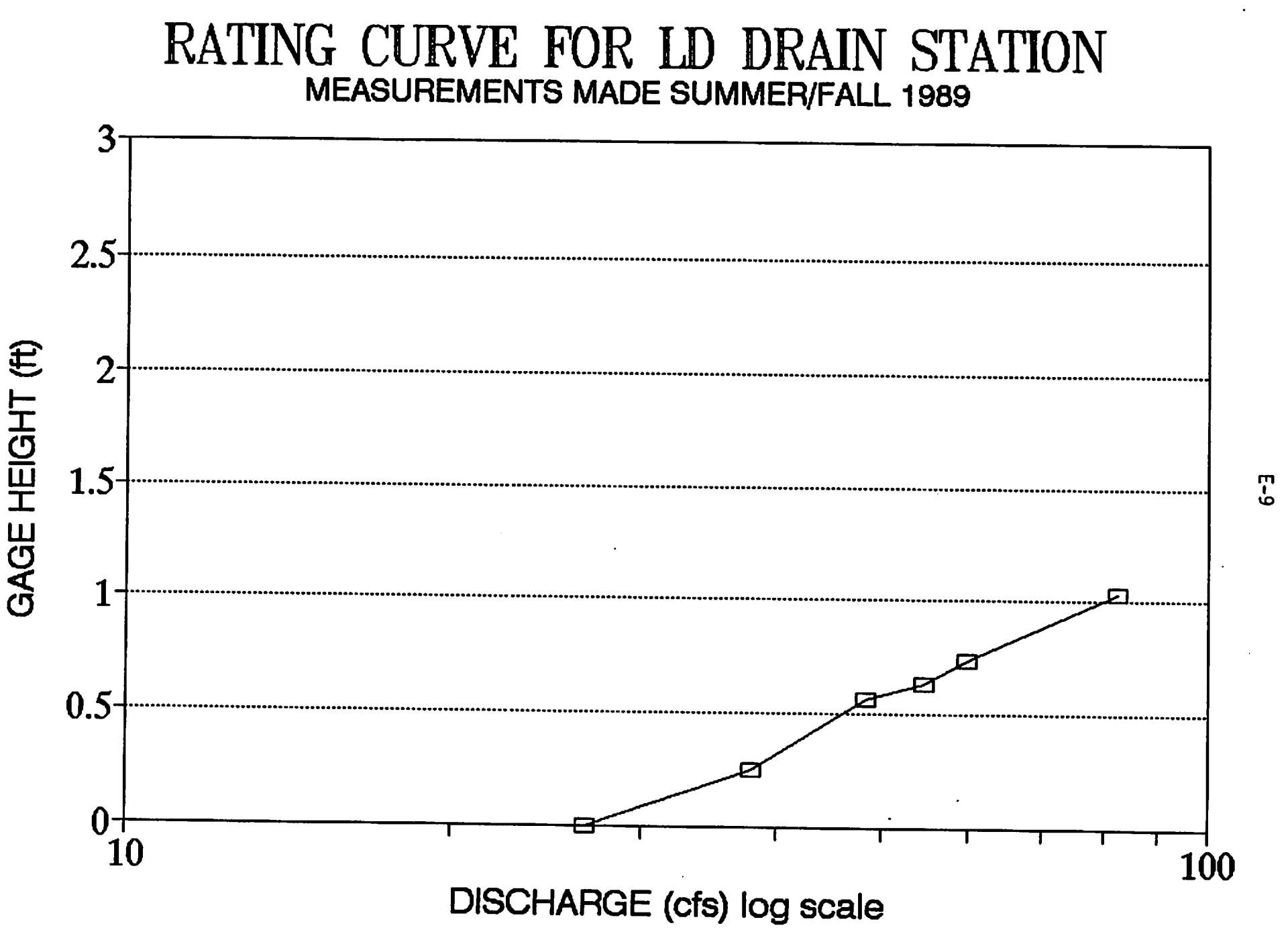

Fig. E.3. Rating curve for LD Drain Station (log scale).

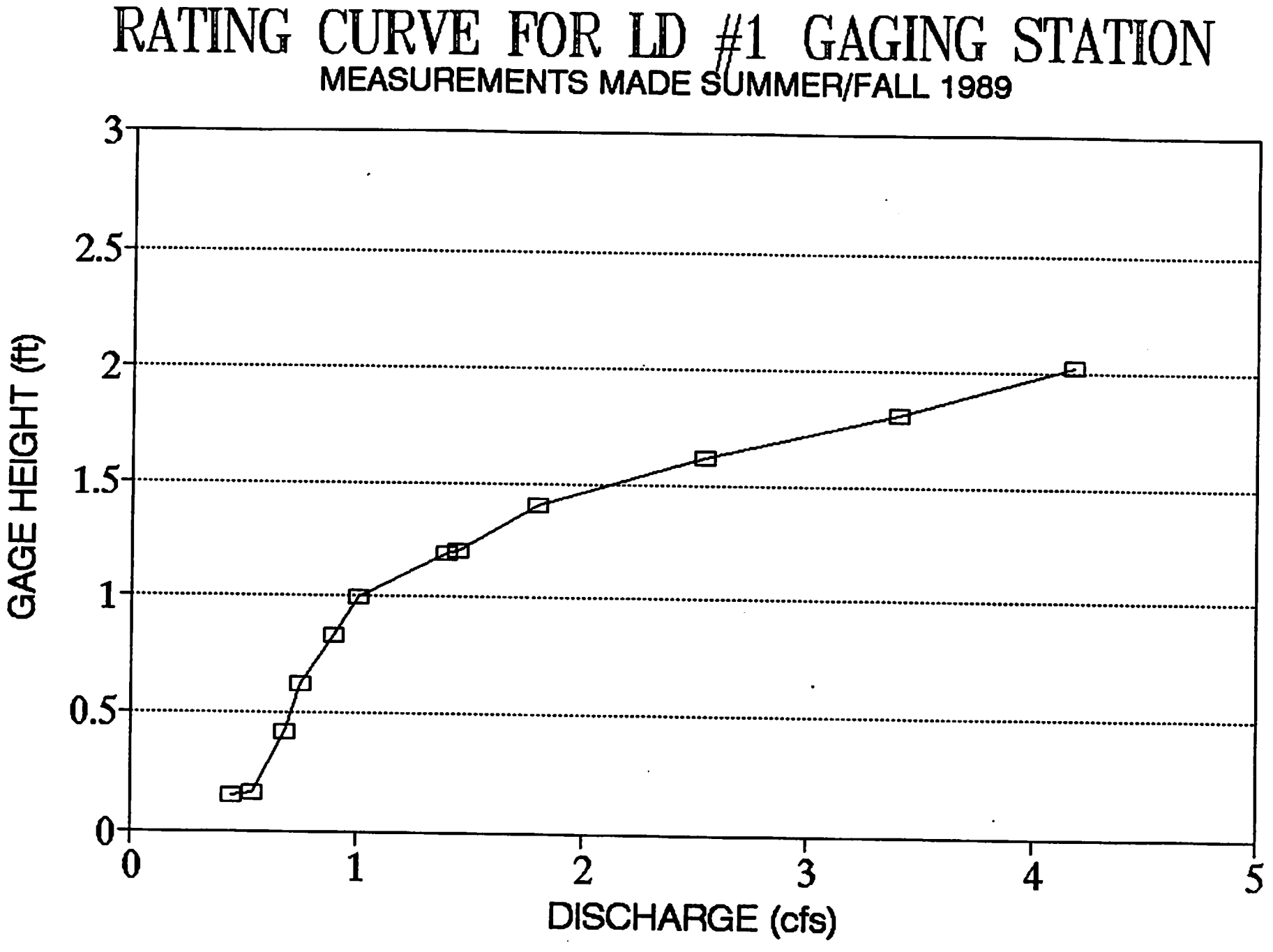

Fig. E.4. Rating curve for LD #1 Gauging Station.

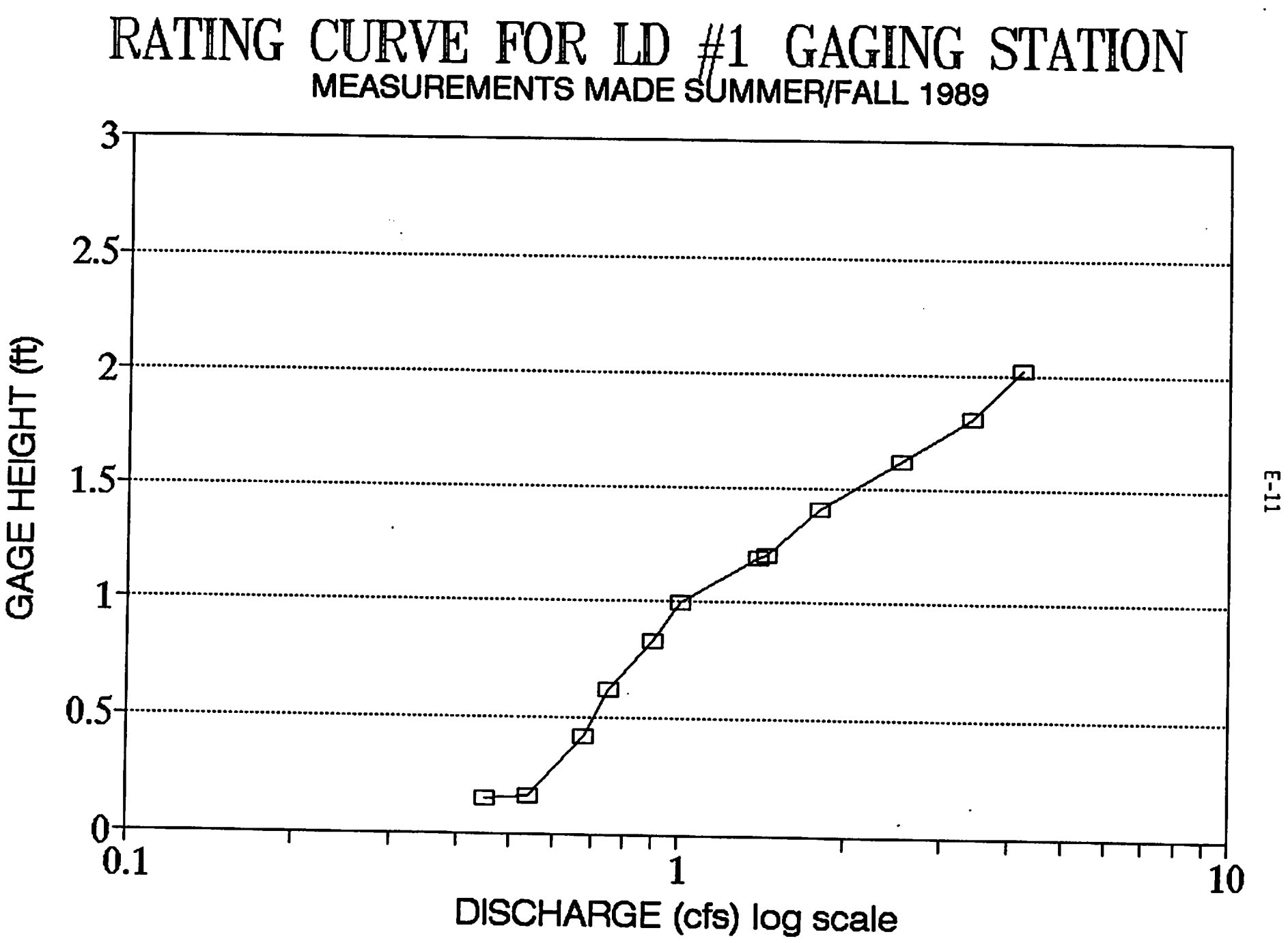

Fig. E.5. Rating curve for LD #1 Gauging Station (log scale).

where they were maintained at or near 4°C until received by the analytical laboratory. The coolers containing the samples were shipped via Federal Express for overnight delivery to the International Technology Analytical Laboratory in Knoxville, Tennessee. Chain of custody documents were completed and accompanied the samples to the laboratory. Trip blanks, field blanks, rinsate samples, and duplicates were included as part of the QA/QC measures.

The water samples were collected by wading out to the center of the ditch, facing upstream, and simply allowing the open container to fill by gravity flow while submerging it in the ditch. Samples for metals and anions were filtered through a 0.45 μ inert filter to remove large suspended particles. Sediment samples were also collected near the center of flow at each location by simply scooping sediment off the ditch bottom with the sample container. Other parameters measured at each sample location included water temperature, pH, and conductivity (Table E.2). Analytes of interest included volatile organic compounds, semivolatile organic compounds, petroleum hydrocarbons, PCBs, pesticides, metals, and anions.

The field parameter data shown in Table E.2 was measured in midstream prior to collecting water samples. The data shown are for the sampling event in August 1989. The same parameters were measured on successive sampling events on September 9, September 27, and October 10. The parameters remained relatively constant for all locations except SW-6 with respect to pH and conductivity. However, water temperatures declined a few degrees by the October sampling event. At SW-6 the conductivity ranged from 3000 μmhos/cm to 5500 μmhos/cm when no fresh water recharge was evident. SW-6 is located on an unnamed tributary to the LD Drain and is fed primarily by groundwater seeps. Occasional runoff from aircraft washing flushes the ditch with fresh water and accounts for the variable conductivity values observed. The pH was also higher at SW-6, ranging up to 9.39 which is more basic than the surface water at the other sample stations. The laboratory analytical results are too voluminous to include in this report but can be generally summarized by analytical category for water and sediment samples.

Table E.2. Field parameter data

Sample #	Loc. #	pH	Temperature, °C	Conductivity, μmhos/cm
3153	SW-1	8.34	18.7	1106
3157	SW-2	8.38	20.6	1130
3155	SW-3	8.91	21.6	1140
3159	SW-4	7.88	17.8	560
3161	SW-5	7.88	15.8	786
3163	SW-6	9.12	16.0	535
3165	SW-7	7.97	17.4	872
3167	SW-8	7.91	17.7	857

All data acquired 08/25/89.

μmhos/cm: micromhos per centimeter.

Water Sample Data

The results for volatile organic analysis by EPA method 624 on all water samples were negative: no analytes were present above the method detection limit of 5-10 μg/L. The results for semivolatile analysis of water by EPA method 625 were non-detect also, with the exceptions of samples 3161 and 3163 collected at SW-5 and SW-6 respectively on August 25, 1989. These two samples contained detectable amounts of 2-pentanone (a common solvent) at concentrations of 14 μg/L at SW-5 and 26 μg/L at SW-6.

Metals analysis were performed by EPA method 200.7 and yielded some interesting data. There were levels of several metals which exceeded baseline concentrations as recommended by federal and state criteria for aquatic habitat, and certainly many metals exceeded Safe Drinking Water Act criteria. The most notably elevated metals included arsenic, boron, barium, selenium, zinc, lithium, and sodium. The water is also high in total dissolved solids, exceeding 1000 ppm for most samples. These results are consistent with the metals recognized as elevated in a recent report issued by the U.S. Geological Survey (Hoffman et al. 1990). This report cites elevated levels of boron, lithium, arsenic, and molybdenum in surface water as having high correlation to the relative toxicity of water to fish in drainage ditches in the Carson Desert.

Anion analysis by method SM29 revealed that chloride ranged from 51 to 20,000 mg/L, with most samples containing less than 100 mg/L. Again the samples with the anomalous values were from SW-6. Similarly, sulfate concentrations ranged from 120 to 4000 mg/L, with all samples at less that 200 mg/L except those from SW-6.

The water samples were analyzed for total petroleum hydrocarbons by method 418.1 which revealed several samples with detectable concentrations (Table E.3). Even though these are detectable amounts of TPH, they do not represent significant concentrations. Furthermore, since the two upstream sampling locations, SW-1 and SW-5, also showed some slightly elevated TPH concentrations, there is no evidence that the source of the TPH is located on the facility.

Table E.3. Water sample petroleum hydrocarbon results

Sample #	Location #	Sample Date	Total TPH, mg/L
3412	SW-1	9/27/89	5
3424	SW-1	9/27/89	2
3426	SW-2	10/10/89	5
3418	SW-3	9/27/89	2
3186	SW-4	9/7/89	2
3417	SW-4	9/27/89	2
3161	SW-5	9/7/89	1
3413	SW-6	9/27/89	2
3407	SW-7	9/7/89	1
3430	SW-7	10/10/89	2

Note: Only samples above detection limits are included.

mg/L: milligrams per liter.

Sediment Sample Data

The analysis of sediment samples collected during the August sampling event can be summarized by analytical method. For volatile organic compounds there was only one sample with positively identified contamination. This was sample 3162 from SW-5 which revealed 29 μg/kg of 2,3,7-trimethyloctane (a gasoline component). Since this sample location is upstream from the facility on the LD Drain and also upgradient with respect to groundwater flow, the source is assumed to be upstream from the facility.

Analysis for semivolatile organic compounds revealed a variety of contaminants found in all sediment samples including 2-pentanone at concentrations ranging from 5400 to 120,000 μg/kg; acetic acid ranging from 1300 to 8300 μg/kg; 2-heptanol ranging from 700 to 2600 μg/kg; bis(2-ethylhexyl) phthalate ranging from 860 to 2800 μg/kg; and hexene-2-one ranging from 2100 to 6500 μg/kg. Additionally, each sample had from 3 to 7 unknown compounds in concentrations ranging from 640 to 8500 μg/kg. The sample from SW-3 contained 2100 μg/kg of napthalene, a common jet-fuel component. This sample location is at the confluence of LD #1 and the storm sewer which discharges runoff from the north end of the facility and receives runoff from the hot refueling area. Thus, it is likely that the source of the contamination is from the storm drain and not one of the contaminated groundwater plumes. It is not surprising that the semivolatile organics were found to be much more pervasive and at higher concentrations in the sediments than in the water considering that many of the compounds tend to adsorb to soil particles and have relatively high coefficients for adsorption to organic compounds (Koc). Thus, they tend to be readily attached to organic carbon molecules occurring naturally in the sediments. Similarly the petroleum hydrocarbon results for the sediment samples revealed higher and more consistent concentrations in the sediment than in the water (Table E.4).

The results for pesticide/PCB analysis revealed no detectable levels in the sediments sampled. The metals analysis, however, revealed possible elevated concentrations of the same suite of metals which exceeded the standards in the water

Table E.4. Sediment sample petroleum hydrocarbon results

Sample #	Location #	Date	Total TPH, mg/kg
3154	SW-1	08/25/89	7
3158	SW-2	08/25/89	11
3156	SW-3	08/25/89	43
3160	SW-4	08/25/89	8
3162	SW-5	08/25/89	6
3164	SW-6	08/25/89	43
3166	SW-7	08/25/89	0
3169	SW-8	08/25/89	21
3170	SW-8 Duplicate	08/25/89	29

Note: This table includes all sediment sample TPH data.

mg/kg: milligrams per kilogram.

samples. It is difficult to categorize metals in sediments as being high since the sediments have a very large mineral soil component and it is not known what the concentrations of metals would be naturally. The assumption is that the elevated metals concentrations occurring in the surface water are the result of leaching of the metals from the mineral soil by irrigation water and groundwater (Welch et al. 1989). Many of the metals may have been concentrated in the soils and groundwater in the area during the evaporation and disappearance of Lake Lahontan.

CONTAMINANT TRANSPORT CONSIDERATIONS

The analytical results presented above do not indicate any contamination along the two ditches that appears directly related to known plumes of contaminated groundwater on the facility. The two plumes, one in close proximity to LD #1 (Site 2) and the other close to an unnamed lateral tributary to LD (Site 16), did not seem to have any effect on the relative concentrations of organic compounds or petroleum hydrocarbons in the water or sediments of the ditches. The sample location related to the Site 2 plume, SW-2, is about 50 yards downstream from the suspected intersection of the Site 2 plume and the ditch; however, it did not contain concentrations of compounds related to the plume or in excess of the contamination described at other sampling locations. Similarly, the sample location related to the Site 16 plume, SW-6, did not contain concentrations of compounds related to the plume or in excess of the other sampling locations. However, the sampling events occurred during and at the end of the irrigation season when return flows to the ditches kept the water levels up. Implications are that the situation could change in the winter months when return flows cease and the baseflow in the ditches is composed almost totally of groundwater.

The mapping of the potentiometric surface along the reach of LD #1 adjacent to Site 2 where the plume of contaminated groundwater is close to the ditch has provided insight into

the potential contaminant transport from the site via surface water. Water-level measurements taken from groundwater monitoring wells and staff gauges along the ditch during the irrigation season were contoured to produce maps of the potentiometric surface. These maps show that at the time of water-level measurements during the irrigation season, the ditch was recharging the shallow groundwater. As long as the ditch is recharging the aquifer, there is little likelihood of the plume discharging into the ditch and migrating off site. However, in the winter months when the water level in the ditch drops significantly, the reverse may be true: the shallow groundwater may be discharging to the ditch and carrying contaminated water off the site. In fact, observations of the seepage face along the intersection of the ditch and the Site 2 plume during December 1990 and January 1991 indicated that petroleum hydrocarbons were discharging along with groundwater into the ditch. A sediment sample taken from the seepage face tested positive for petroleum hydrocarbons. Based on this information, recommendations have been made for the installation of a weir immediately downstream from the problem area. This weir will be constructed to maintain a positive head between the ditch and the shallow groundwater even during the winter months and will feature a floating boom structure to trap floating petroleum hydrocarbons which may reach the ditch.

The fluctuating nature of the interaction between the shallow groundwater and the surface water in LD #1 are further revealed by the periodic water-conductivity measurements made in the ditch and wells adjacent to the ditch. During periods of fresh-water recharge from the ditch to the shallow groundwater (irrigation season), conductivity values in the wells adjacent to the ditch are typically 700 to 1500 μmhos/cm, and the conductivity of the surface water is around 1000 μmhos/cm. However, during periods of groundwater discharge to the ditch, the conductivity of the well water increases to values ranging from 2000 to 10,000 μmhos/cm, and the conductivity of the ditch water increases to over 1500 μmhos/cm. This indicates a shift from mixing of surface water with groundwater in the aquifer during the irrigation season to the mixing of groundwater with the surface water in the ditch when irrigation return flows have ceased.

Potentiometric maps have also been constructed for the rest of the sites (Appendix D). They generally reveal an east - southeast groundwater flow direction in the shallow aquifer. Groundwater levels are measured monthly at all wells, staff gauges, and piezometers. Ultimately, this information will be used to reconstruct the yearly fluctuations in the water table and the interaction between the groundwater and the surface water at the facility.

SUMMARY

The investigation of water quantity and quality in the two drainage ditches, LD #1 Drain and LD Drain, established flow rating curves for staff gauges and water quality for water coming onto and exiting the facility. The interactions between the surface water in LD #1 and the adjacent shallow groundwater were also described for the end of the irrigation season (fall) and for the winter months. Continued monitoring of water levels and conductivity should result in a complete characterization of these interactions for the spring and summer. It is now known that the groundwater in the vicinity of the contaminated groundwater plume along LD #1 alternately discharges to and is recharged by the surface water in LD #1. However, there is no evidence that the interactions of the contaminant plume and the ditch water are having any significant impacts on the ditch ecosystem. Water fowl, fish, frogs, muskrats, and other fauna were frequently observed in the ditch during the sampling. These appeared to be more sensitive to the lack of water in the ditch than to any detected levels of contaminants in the water. However, there was some evidence of stress due to the naturally occurring high TDS (total dissolved solids) and dissolved metals (Hoffman et al. 1990). An aquatic toxicology study was scheduled for April 1991; however, it was canceled after the ditch was dredged in the fall of 1990 and a subsequent fuel spill in February 1991 caused considerable damage to the ditch ecosystem. The fuel spill was cleaned up in March, and by August 1991 many of the species previously observed in the ditch were back.

Either the construction of the recommended weir structure or the rerouting of the ditch should insure that no impacts result from the close proximity of the Site 2 contaminated groundwater plume to LD #1 by eliminating discharge of the plume to the ditch. The cleanup of the groundwater plume in the near future will remove any potential for contaminant migration from the area.

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NAS FALLON

NEESA PA/SI

INTERVIEW RECORDS

1987 - 1991

Received by NDEP at
11/17/99 Quarterly Meeting

Site Table
&
List
1987

9/24/87 Preliminary List of Sites

① Crash Crew Training Area
1. Jim Gormley (GAH)
Not there in 1951
Began Mid 1950's
Only pit @ station
2. Banovich
Everything into site.

② New Fuel Farm
1. Bob Larson
Known soil & GW contamination
Known tank leakage
Known spillage @ toy off rack
1985 several thousands of gallons
trucks overspilled
Wells @ site
sample analyses not available,
2. Capt. Davenport
separator does not work
3. Del Purcell
tank bottoms disposed on ground
defuel to ground for weed control
4. Chief Peterson
5. Keeping
6. Tank bottoms disposal to ground runoff to ditch

③ Hangar 300 Area

1. Master Chief Crawford
2. Terry Herring
3. Senior Chief Ryan
4. Senior Chief Paur
5. Keeping
6. Ron Nygren
7. Del Purcel

Ⓐ Dumping Av gas, hydraulic, JP etc north ~~side~~ and south of apron edges. Edge. ~~At least~~

~1960 to 1981

Drops tanks drained there

May be high lead (lead to 1968)

Squadrons and GSE

Ⓑ Bowser dumping between tarmac and ditch on north side

Ⓒ Separator

Building drains and wash rack to ~~trap~~ separator which received oil, Turco etc.

Separator overflowed to ditch

Ⓓ Wells Air Start

~~Oil~~ Lube oil and blowdown (compressor) disposed on ground

④ Transportation

1. George Leuchte
2. Dan Prockish (disagreed)

(A) Dumping of paint waste around building
Paint waste and petroleum products down building drain
Oil Water discharge from separator to sewer ?
Fuel leakage to ground South of road

⑤ ~~NEX~~ ~~Base~~ Service Station

1. Metzger

(A) Waste oil ~~spill~~ to surface stain

⑥ Hanger 1

1. Terry Herring
2. Senior Chief Ryan
3. Senior Chief Parr
4. Sturtzer

(A) Oil water separator discharge

7. Ordnance Area
   1. Mark Glass
   2. Herman Dixon
   3. Ron Nygren
   4. Everett Kissick
   5. Steve Spoerer (EOD)

(A) Former irrigation ditch filled w/ non-organic debris including pallets, boxes, cans, packing material, shells
Not cleaned up
Extent defined

(B) Ordnance disposal Area. Old live shells (20mm) in cases

8 Defuel Area
   1. Banovich
   2. Davenport
   3. Moore
   4. Patton
   5. Brunelle
   6. Lane
   7. Nygren
   8. Terry Herring
   9. Chief Peterson
   10.

} excavation in Area

(A) Disposal of defuel (JP. > 15,000 gallons

(B) GW contaminated (3 ppm)

9. Napalm Burn Pit
   1. Mark Glass
   2. Jim Reagan
   3. Banovitch
   4. Ron Nygren
   5. Charlie Moore

   (A) Excess napalm burned
   minor diesel fuel burned
   Probably not there now

(10) Bore site Range
   1. Dick Lane [redacted], Stortzer
   2. Ron Nygren
   3 Peterson

   A. Lead in soil, removed

(11) Sewage Treatment Plant
   1. Charley Driver
   2. Steve Richards
   3. Everette Kissick
   4. Dick Fields
   5. Jim Regan
   6. Ed Catlett

   A. Leaking tank 500 gallon diesel removed, continue to leak
   B. ~~Shady~~ Grit Chamber Disposal
   buried in pits
   C. Imhoff Tank

D. Settling Pond Sludge to creek banks

E. GW seepage from ponds

12. Original Waste Water Treatment Plant
   1. Jim Regan
   2. Ed Catlett
   3. Jim Gormley

A. Improper Disposal

13. Gator Compound
   1. Jim Gormley
   2. Ed Catlett
   3. Galin Jones
   4. Jerry Junc
   5. John Whidmore
   6. Dick Field

A. Discrepancy over location
   PCB transformer storage and leakage soils removed
   Unknown drum storage
   G.I storage
   Reported burial of PCB oil
   Murky water
   Asbestos Disposal
   Talk @ EOD

14. Paint Shop

1. Kim Neal
2. Jim Regan

A. Paint thinner lacquer thrown out to dirt ~~cov~~
Covered by concrete
Drum storage and spillage
Spray Booth

15. Pest Control

1. Larry Jones
2. Dave Radai
3. Steve Opdyke

A. Mixing and rinse, Pit ?

drain in area - 2 to leached near mixing area + wash area

16. Boiler Plant Tanks

1. Dick Fields
2. Charley Driver

A. ~~1~~ 2 U6 tanks, 1 full
Known surface spillage

17. Vehicle Maintainance

1. Bob Larson
2. Jim Regan
3. Dan Prockish
4. Fields

A. 2 tanks (unknown)
Gas station
Pits for oil change
Pipes concrete

18. ~~Old~~ Navy Exchange Gas Station
1. Dick Field
2. Galin Jones

A. Hydraulic oil in lube pit
~~Old~~ Tanks present

19 Old Fuel Farm
1. Galin Jones
2. Bob Larson
3. Jim Regan
4. Dick Fields
5. Ed Catlette
6. Everette Knisick?

A. 4 tanks
Not active since 1962
Av gas, & various fuels
Soil contaminated · Water?

20 Hangar 4
1. Barney Fritz
2. Lt Simrack
3. Chief Anda
4. Crawford

A. Surface runoff to road, Turco, spill washdown
Recent paving has covered to east

21 Landfill (WW II)
1. Kusick 4. Catlett
2. Reagan 5. Nygren
3. Lane

A. Discrepancy

22 Landfill (Post WW II burial) 1946-1949
1. Fritz
2. Catlett
3. Jim Gormley

A. just west of incinerator
trenches for surplus and garbage
Engine cleaning water inc. solvents
cosmoline

23 Landfill (SW corner) 1954 - 1965 possibly 70
1. Jim Regan 4. Gormley
2. Catlette 5. Lovette
3. Kusick

A. Wet garbage, fuels, burning.
Along perimeter fence

24. Landfill (North of Road) Mid 60's to early 1980
1. Regan 5. Kincaid
2. Kissick 6.
3. Glass
4. Keeping

A. Everything in, some burning, fuels
Segregation in time of burning / vrs. non
burning, wet garbage / dry garbage
Motor homes buried

25. Landfill (South of Current) early 80's to present
1. As above

A. 1981 to current

26. Defense Logistics Agency (1973 and 1984)
1. Galin Jones 2. Kissick

A. As below in 1984
Waste liquids (all types)
Debris, metal (inert)

27. Aircraft disposal (1977 or 1978)
1. Galin Jones

A aircraft buried (a C-54

28. Swale ~~Area~~ From Checkerboard to Old Area
    1. IAS Team

    A. Oil staining along swale

29. Oiling of Roads in site ~~Wash~~ Range?
    1. Kusick
    2. Glass
    3. Keeping
    4. Regan
    5. Catlette
    6. Prockish
    7. Branovich
    8. Huber

    Times

    A. All roads are likely old

30. ~~EO~~ Rubble Dump Onsite
    1. Jim Regan
    2. Dick Lane

    A. Part possibly Removed to drainage for engineered fill

31. Rubble Dump Offsite
    1. Jim Regan

    A. Asphalt Concrete

(1) Crash Crew Training Area
Mid 50's - Present
until early 80's - anything that would burn
since early 80's - off spec JP-5 only.
Biweekly 50-100 gals. each time

(2) New Fuel Farm
- Several thousand gals. at top off rack 1.5 yrs ago
- Separator malfunctions
- Tank bottoms pumped to ground.

(3) Hanger 300 Area
- Separator
- Bowser
- Dumping
- Wells air start

(4) P W Transportation
- Paint Booth
- Separator
- Stains

(5) NEX Gas Station
- Waste Oil

6) Hangar 1 Area
- Separators
- Wash Rack

7) Ordnance Area
- Irrigation ditch 50's - 60's
- Pit - 50's - 60's
- Utility line 87

8) Defuel Disposal Site
- > 15,000
- 60's - Mid - 70's
- Analytical results 3 ppm

9) Napalm Burn Pit
- > 3000 gal
- 60's - early 80's
- tanks to landfill

10) Bore Site Range
- Lead in butts

11) Wastewater Treatment Plant
~~42 - 61 Settling Tanks Evap/Perc ponds~~
- 61 - 85 Imhoff tank settling Ponds
- 85 - Present Aerated lagoons
- Grit to pits N
- Imhoff tank to pit E
- Solids - Canal bank ? or away

(12) Original WWTP
- 48 – 60
- 2 then 4 redwood settling tanks
- Evap./Perc. ponds (2+3)

(13) GATAR Compound
- Asbestos
- Oils
- Xfmrs.
- current Haz. Waste compound
- UG tanks

(14) Paint Shop
- Paint wastes to ground

(15) Pest Control
- 2 Drains to 2 leachbeds

(16) Old Vehicle Maintenance Area
- Gas Station
- Lube Pits

(16) Boiler Plant
- Stains
- Overfills
- Very old tanks

(17) Old Vehicle Maintenance Area
- Gas Station
- Lube Pits

(18) Old NEX Gas Station
- UG tanks part full

(19) Old Fuel Farm
- 4 UG unlined concrete tanks
- avgas
- diesel, #6, JP-5 in 70's
- contaminated Sample
- trenches in area

(20) Hanger 4 Area
- Wash racks
- cleaning.

(21) Original Landfill (1943-46)
- 20-30 tons/day

(22) Post W W II Burial Site
- everything to trenches + covered

(23) Landfill
- 1951 - Mid 60's
- 20-30 tons/day
- Everything and

FALLON

Crash Crew

~~Need to know when accepting solvent~~

~~ISOS 1982~~

Fuel Tank

separate

considered ~~past off~~ due to as part of fuel farm with due to prox. to other sources and similar nature of ~~this proof~~ waste and potential receptors

installed 1981

Sources

5 UG tanks (filter)

4 AG tanks

rainwater runoff

top off rack spills leaks and filter discharge

~~truck drainage 4-5 / day each truck~~

Current Ops Cover Letter

1. GSE Maint area
   recent leakage
2. O/W separators @ fuel farm doesn't work
   all separators need more maint
3. Tank testing for existing UG tanks
4. O/W sep in front of (north end) Hangar
   100. Needs to be identified as to
   purpose etc. Observed by IMS could
   not be ident by other personnel

Transportation

1. Most likely that paint wastes down drain
2. Outdoor Veh Maint. not a site spread around large and

Exchange

~~Location~~

No tank leakage

Hangar 100

RGI has MSDS # for Turco

Reportedly discharges to grassy area in front of O.I/W. sep.

rf addnl stdy.

addnl evaluation of outfall location needed !!!!!!

Ordnance

1950' exact time unknown, est @ 1950 (cant be older because ordance used to be @ taxiway) and old condition of material

500 cu yds (not size unknown assumed on basis of const trench exc.

Defuel –

not put avgas days
closed end @ 1975 – went to boilers
we have several reports of 1966
1972 not being done
1966 – 1972
60000 see Dunwich
need Perimeter study

Need to get ~~[illegible]~~ records of wells
in PW files not available
Base personnel and State do not
have data

Napalm
no starting date assume ~~[illegible]~~ early 60's
we know it was at least 1966

Gunn Butts
Dirt spread and gone

Treatment
Sludge went to landfills

GATOR

Transformer storage + leakage

need to ask Nygren, may be in same spot

Reported burial

use magnetometer to locate

cans

ask Nygren

Unknown drums

evidence of leakage is murky

water is most prob source drums

leakage from drums estimated

@ 500 gallons (top of head)

soil sample, check H_2O

Asbestos

rec. regrading

Both sites — Ask Nygren for Date and Quantity

Tanks

call Dick Field for info on

EOD 06 tanks

need dates

how old and cathodically protected

Paint Booth

Paint west beyond in U arm

drill concrete take samples

Text speculate that done longer

Pest control

used to be bakery
1974 to present, prob older
dont know / speculate that
older attempted to contact older
officer refused to talk
probably have changed pesticides
DDT, DDE, DDD
2 drums - 1 pest contr veh rinse
1 mixing + rinse empty
control

Boiler Plant Tanks
spillage is around waste oil tank
tank full now →

Old Vehicle Maint.
?

Quarrel Hut
Tank ~~m~~ is still full

Hangar 400
~~co~~ not current op due to change in chemical
+

Public Works

Second interview Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer Robert G. Ingersoll

Date 9/22/87

Interviewee Jim Regan

Shop/Area Public Works

I. Present History

What were/are your duties or responsibilities at the activity? At facility since late 1950s

In what operations were you involved?

Operation	Brief description	Dates
Landfill	1954 to 1963, maybe 1965. Started in new area landfill 3 legal areas.	
Weapons people had trench	live & spent shells where new bldg is now. Dug out trench, moved most of staff off-base, discovered in 1983, trench dug probably 1980.	
	10,000 foot runway before 1960, never uncovered any trash when the runway extended 9,000 feet.	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transportation/Storage of Hazardous Materials

How are the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?--

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?
Ron Nixon's dad worked here in

Do you know any other shop workers we should talk to?

* Burnt the 1959 - 1965 landfill. Everything in there, hydraulic fluids, paints, solvents, Jet fuel, Av gas, gas, diesel, scrap metal banding material, pipe, asbestos,
Maybe some transformers, switches, ballasts. Public Works would not have used high temp hydraulics.

* Mid 1970's started salvage metals. In second landfill, maybe - burn if wood there. Not regularly burned. Wood pit for burn. Napalm burn are just north of gun butts about 200 yards, when the new runaway is now.

* Fuel ~~stated~~ to tank at boiler for boiler feed about 1975.

* Oiled roads started mid-1960's to 1975, waste oil bowser with spray bar, stopped in 1975 → boiler, GSE may have continued.

* * * Defuel jet fuel ~~gas~~ not contaminated went to auxiliary boilers, medical, etc. from 1960's. Concerned about av gas.

* Boilers converted from #6 boilers to defuel in 1972.

* Well next to Bldg. 15) 1700 ft deep, drill in 1940's.

* Water treatment plant used to treat water from ditch, where the current transformer storage, mainly filtration ≈ 1940 - 1947, 1950 - 1960.

* Sewage Treatment Plant - Always had primary treatment, @ Imhoff treatment 1960 - 1984, 1984 aeration treated, non lined evaporation ponds. Some sludge went to landfill, some to farms fields

* Rubble on BLM land, asphalt, concrete, trash removed, Com off Hangar 300 when air start system came ~~water~~ on line, 10 years off & on 1970's until 1980.

* Rubble dump for contractors 1970-1980, mostly runway & road repair projects.

* Paint booth that GSE & PW used from 1980 to 1985, now small vehicle maintenance & 20 gals/month.

* Spray booth at old area, furthest east quonset hut. (1962-1972) Vehicle, furniture, signs, sprayed lacquers, latex, avge 10 gallons/month

* Years ago sandblasted between quonset huts by old paint shop.

* Public Works vehicle maintenance; 1973 to present; pre 1973 next to torpedo bunker which is still there (paint storage bunker).

* Hangar 3 blown up in 1970-1971, disappeared into town. (where X is on map)

* Buildings in Old Area not shown, during World War II, torn down & move to Indian reservation Arizona. BIA took from 47-50, Reactivated in 1950. Raised hogs in the swimming pool.

* Grease pit in Big Building, long bldg, north of current fire house. Probably vehicle maintenance, auto hobby from 1958 to 1973 Auto hobby to current location in 1973.

* Pest control used to be bakery. Probably no early pest control.

* Four concrete tanks used to be old fuel farm. Stored #6, diesel, JP fuel, AV Gas, Used for storage with year end money.

** Talk to Dick Fields concerning UST. One by hangar 300, one by quonset hut (old filling station shut down in 1970s).

* Problem at old ~~reserv~~ fuel farm.

* Pat Clancy put observation wells in near baseball field.

* Had monitoring wells by garbage dump, gone

* Put well in between road & ditch, auger & backhoe.

* Water sample high in petroleum outside of old fuel farm, dry down. took sample.

* water in ditches & soil is pretty constant.

* Water is all shallow, some variability.

See Dockside

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/22

Interviewee ~~[illegible]~~ Jim Reagan

Shop/Area PW

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

used for vehicles furniture signs
nobody assigned full time, laquer, synthetic
latex etc
10 gal months thinner, laquer/paint
Sand blasting also done.

Vehicle maintainance area
1973 — present

old shop next to old torpedo storage
@ Blue X on map was actually site
of old Hanny 3 destroyed in 1970 or 1971
given to any one who wanted it

old area (See map near present paint storage

---

torn down post WW2 moved to a Reservation in Arizona
Base decomissioned in 1947 reopened in 1950
BIA had it 1947-1952

North of existing fire house
old WW2 grease pit maint area.
was an hobby shop 1959 to 1970
Torn down mid 1970s
New hobby shop built in 1973

---

* Pest control — Larry Jones
talk to ↗

Old fuel farm —
* See Ron Nygren for last time they were
filled.

No areas of oily soils except those near fuel farms and the
little bit near run [illegible]

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Water wells 4 mile north
drilled in ~1960 drilled together
585 feet deep in basalt aquifer

Another well on base by bldg 15
1700' drilled for H_2O — drilled in 1940's
160°-
Old water treatment plant (1943- to 1947 1950-1960
@ site of current transformer storage
filtration, added soda ash-
wells chlorinated @ wells

Ron Nygren's father

Sewage treatment
Imhoff treatment from pre 1960
Aeration since 1984
unlined ponds, solids some to landfill
some to fields off base

* Steve Richards

Offsite Rubble dump
broken asphalt, concrete, household garbage (·
Hangar 300 ramp concrete
active for ~ 10 years 1970-1980

Paint booth
GSE and PW 20 gal month (near fuel farm)
paint booth - 1980-1985
small vehicle
maintaina 1985-
pre 1980 prob storage

Spray booth (see map)
Quonset Hut - farthest east (See) may used periodically from
1962-1972 -

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Landfill in
SW - 1954 to 1963 or 1965, received everything even wet garbage, this landfill had burned, thinners
to NE in 1966
moved across road in 1984

landfill near weapons building
found during excavation for bldg 1983
Landfill estimated to be from ~1980
Some ammo

Pre 1960, runway ~~[illegible]~~ 9000 ft

Scrap metal, waste auges, hydraulic oil etc, pipes asbestos etc. Fuel (5 gallons etc) burned

NE landfill - mid 70s began salvaging metals
burned periodically esp. if wood,

Napalm burn not in location on Ingersolls map
located near gun butts, 200 yds north of butts, new runway

Bowsers to tank for Boiler started 1975
continued to 1980
Used about 250 gallons/month
Roads oiled from mid 1960s - 1975
except for GSE which may have continued to oil roads

Excess de fuel burned in boilers early ~~[illegible]~~ on burned in boilers JP- 1972 on
Boilers used to burn ~~[illegible]~~ #6 ~~[illegible]~~ converted 1972

Glancy put some observations wells in near baseball field area (in brush)

PW monitoring well See map near old landfill
a sample taken near old fuel farm (dug w/ backhoe)

Jim Regan 9/24/87

1. Wells @ landfill
   A. Done in ~1979, prompted by State to look @ leachate from landfills. Samples taken by PW, clean, doesn't know where results are
   B. State also took samples doesn't know who

2. Will call back w/ info on WWTP pre 1960

3 Separator issue talk to Del Purcell

4. Tanks @ old fuel farm contained Av gas, JP-5, #6 oil, defuel, #2 heating oil

Jim Reagan 9/24/87

1. WWTP prior to 1960 consisted of large (32' across, 12' high) above ground septic tanks made of Redwood.

2. Tanks discharged to old pond at location of present mgs.

Jim Regan 9/25/87

Contract garbage services began ~~1968~~ 60's?
housing trash was landfilled until 1979
when it was removed off base

Talk to Lloyd Brewer (#2809)
re ~~housing~~ housing

Location of old sewer south of existing
(gave me plans)

Gator
Means Ground to air Transmitting + Receiving
Located on both sides of EOD
although original occupied area
south + west of EOD (not sure date)
but old

Second Interviewee Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/22

Interviewee Del Purcell / Ed Munch

Shop/Area ~~PW~~ PW - Engineering / Chief of Engineers

See Reverse

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
See Reverse		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Transportation has an oil water separator south of bldgs.

Been there since 1980

Separators —

Hanger @ 300 - ~~[illegible]~~ surface ditch

Fuel Farm — leach field

Transportation - sewer?

Ed Munch (Engineering)

Soil for Runway contaminated (located on MCG map 9/22)

Soil is being used ~~in~~ as fill —

Didn't realize until several days when odors accumulated in pits. Then hit it in a northern area

Water @ 7-9 feet

ROICC

* Mark Burnett (Lt.)

about contaminated soils

Southern area 6 weeks ago

northern area 3 weeks ago

Samples collected -

Comander ~~Barriman~~ Berriman

* Check Soil Results

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Replacing H_2O lines 6-7 years ago 1980?
ran into a concrete vault
could have been a value box for H_2O supply
Vault was 3x3'x4 ~~3-4" thick~~ 5-6" thick
blasted it (EOD)
Vault was empty

ROINC — most people only here 2-3 years
Supervisor const
* Jim Pellum #2925
* Dick Fields #2424 or #2486
* Mark Brunette / Steve Markey (Lt) # 2665
assnt officer in charge of const of project for runway soil
* ✓ Ed Munch (Engineer) #2773
Eng in charge of runway job

Wash Rack @ Hanger 300
oil water separator that dumps into a ditch
oils into ditch and in separator
Wash rack not in use, shut down for 3 months
* on apron — May be fleet Liason
Nygren may know
Submitted plans for new O/W separator

Redesigned O/W separator @ fuel farm
Big spill @ fuel farm — 1yr ago
top off rack — no idea how much spilled —
* Safety is aware

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Purcell

Del Purcell 1976 - Present
In charge of Planning
In charge of planning + funding
Design of many projects
Technical Assistance to Ships
Repairs and Maintainance

Principal Responsibility for Construction is in ROICC

Water Supply
3 wells -
* Records in/Maintainance + Utilities now/ Charlie Driver
~~Late 1950's early~~ 1960

During excavation for runway uncovered some ~~oily~~ soils

Areas w/ ~~prob~~
Old fuel farm
Excavation for sampling
No results -
Might have been for fuel leaking

Look for fields @ Boiler House

Contractor here about LUST (from Rancho Cordoba)
Bill Spawn
ER Man.
NV. Es.

~~Dec~~ Eng has put together permit application

Chemicals ask Dick Fields

Steam lines elevated in late 1940's

RECORD OF TELEPHONE CONVERSATION

DATE 9/29/87 JOB NO.: _____

RECORDED BY: RGI OWNER/CLIENT: _____

TALKED WITH: Del Pursel OF Public Works

NATURE OF CALL: INCOMING ☐ OUTGOING ☒ 2775

ROUTE TO:	INFORMATION	ACTION
Location		
Drainage		
Pump Schedule		
Disposal		

MAIN SUBJECT OF CALL: NAS Fallon Oil Seperators

ITEMS DISCUSSED: Listing of oil separators - No.

(1) * 300 to draing ditch (not in use)

(2) * Fuel Farm to leech

(3) * Hangar 100 drains to ? Del thinks grassy area

* Hangar #4, no oil separator

(4) * Transportation drains to sewer

* No other ones that he can think, either active or inactive.

* May have one at old transportation area, south side

4 oil separators that he knows.

* Pumping Schedule, not aware of regular schedule, may be one on fuel farm.

* Oil disposed, → fuel farm → boilers burn it.

* Water drained back to seperator

Second Interview Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/22/87

Interviewee Forest Kinkade

Shop/Area PW Maint. Cont.

I. Present History

What were/are your duties or responsibilities at the activity?
1966

In what operations were you involved?

Operation	Brief description	Dates
Sheet Metal Worker		Jan-Jul. 66
Planner + Estimator		66 - 74
Maint Cont. Div.		74 - Pres.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location	Disposal Method
Shipping + Receiving + Waste Storage area	Buried on base. bagged + boxed in 1970s, Two truck loads per site

Asbestos mostly pipe lagging + boiler insulation

Off-site

Location	Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Landfill Operations filled to water table (6-8 ft.)

SW corner oldest - late 60s early 70s. garbage from housing + dumpsters from industrial area

NE area - next area filled. also rubble from demo of hanger next to #4 demo'd. ≈ 1970.

early 70's - ≈ 1983 vols. 20-30 tons/days pre 82 40-60 tons/day - since 82

could have received waste liquids too.

Was a ditch running through ordnance area that - ordnance filled with junk - no ordnance he knows

Started using bowzers ≈ 1980

Current landfill - 1984 - present

all landfills - burial type with daily cover.

In ≈ 1985 established program to prohibit liquids going to landfills, operators also check to segregate liquids.

- John Paul - retiree still in area - did install some wells in landfill area to check g.w. quality
  423-4802

Rubble dump off E end of original runway asphalt grindings, concrete, rebar. mostly from runway repairs.

40x140 bldg in ordnance built in 1984 did turn up some rubble and metal scrap. Cleaned up + removed to?

Doesn't know of fuel or napalm disposal in landfill areas.

Started burning debris in early 1970s

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/22/87

Interviewee Forrest Kinkade

Shop/Area Public Works

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
Sheet metal worker / then Estimator	Asbestos Burial sites (early 1970's)	1966 - 1973
Maint. Control Director		1973 - Present

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) Asbestos (pipe insulation) 2 truckloads @ 2 sites

radiological materials _____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Jim Riggin

landfills - SW corner, late 1960's early 70's, housing and industrial waste
no Bowsers during the period

Hangar torn down - material given away, timbers, pipe etc.
~1970 torn down, Bowsers in late 1970's

Old Ditch - in north used by Ordnance to dump industrial waste

Landfills - no burning, daily cover theoretically

New landfill - operators supposed to check for Haz Mat since 1985 (40-60 tons/day present) ½ of this earlier on
last 4-5 years

* well points in to check for water quality ~1981
John Paul retired in Fallon 423-4802

Rubble dump - concrete, asphalt from renovations + repairs etc, removed for runway expansion

Ordnance Bldg - excavation uncovered rubble (ordance material) crates banding etc, cleaned, final disposition uncertain.

Boiler used #6 fuel prior to early 1970's, used defuel post early 1970's

Sewage treatment – on line in 1950's (1957)

Frank Shriver

Need to talk to:

Mike Reuda – General Foreman in Shops

Jim Gormley – Tool Room Mechanic

Everett Kissick – Transportation

Dick Fields – ~~the~~ PW on well supply

Charley Drive

Gravel Base on perimeter road – 1983 over old oil base

At the fuel farm –

what to investigate – contractor excavation · 1" JP-5 in GW

well points put down around farm

w/ backhoe 12" PVC screen, 1" rock base, then back

* Engineering has map of well locations

Del Purcell

Points put in ~~so~~ no southernmost and easternmost no JP-5

GW to Southeast (says Kincade)

* pump used (explosion proof fuel pump) – periodically pumped

talk to Lawson about

Petro-Purge ordered on station but not installed

* talk to John Whitmer

Soils pretty tight, takes several hours to refill

Water Supply –

wells 3450' deep – water @ 70-80' into casing

3 wells for Base (1956-1957 drilled)

off Base property – Navy owns property

14" line to base into ~~Melton~~ gal 2 500,000 gal tanks

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/23

Interviewee Dick Lane (#2930)

Shop/Area ROICC

I. Present History

What were/are your duties or responsibilities at the activity? gone Thurs

In what operations were you involved?

Operation	Brief description	Dates
		Since 1985 but in Reserves / Navy for 24 yrs

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Some muck from ditch (South runway) removed and stockpiled (See Map

No excavation ~~of~~ in area of reported WWII or Korean rubble area at SW end of runway

No indication of oily soils or waste (petroleum) seen @ all dummy runway excavation.

~~X~~ Dick looks @ Treasure Island (them 1 time/month)
Bldg 62

New Bldgs in Ordnance
are prototype for new weapons systems

Mak Brunette recons when Gun butts moved

Dick was surprised @ lack of projectile @ gun butt from reports

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

40 years ago area was drainage ditches
Dick thinks area of "contaminated soil" related to organic material (tules etc).

Const Chief in NAC (in reserve)

Const rep - Liason between eng. and contractor

Typical 50 year operation

Landfill he considers first class
looks to him like "haz" materials kept out

Explosive ordnance area has problems
Mark Glass

Dick building new bunkers
Live ordnance buried (area on map)
Power line uncovered some live, some dead mater...
20 mm shells, Rocket cases
Probably buried in old irrigation ditches

Soils - silty sands, relatively impermeable

Involved in Ni-Cad battery shop in Hangar 300
Drains to holding tank

Fluctuation in GW levels 2-3 feet seasonal

for example - U6 Reservoir in Ordnance area -

Concrete at east side of runway
large blocks moved to abandoned ditch area (12' deep)
near south end of runway, Concrete used to stabilize ditch
also the organic material, Only 2-3 loads ended up
on pad area (near Tower) some removed

SITE SURVEY QUESTIONNAIRE

Interviewer NIPD/TO

Date 9/23/87

Interviewee Dave Radai

Shop/Area Pest Control

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
Pest Control	application operations	1974 - present
CB's	equip operator truck driver	1972-74

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

refer to p'cs

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

delivery by chemical

Were they transported from place to place on-site? If so, how?

in sprayers and other equipment

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

1974-76 started to get rid of old stuff.

Location — Disposal Method

7-8 yrs. ago. old cans not labelled. Went to county landfill, after procedures through could not use.

Off-site

Location — Disposal Method

Class 3 county landfill

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

None

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Cator compound

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Charlie Dorner

FIELD MEMORANDUM

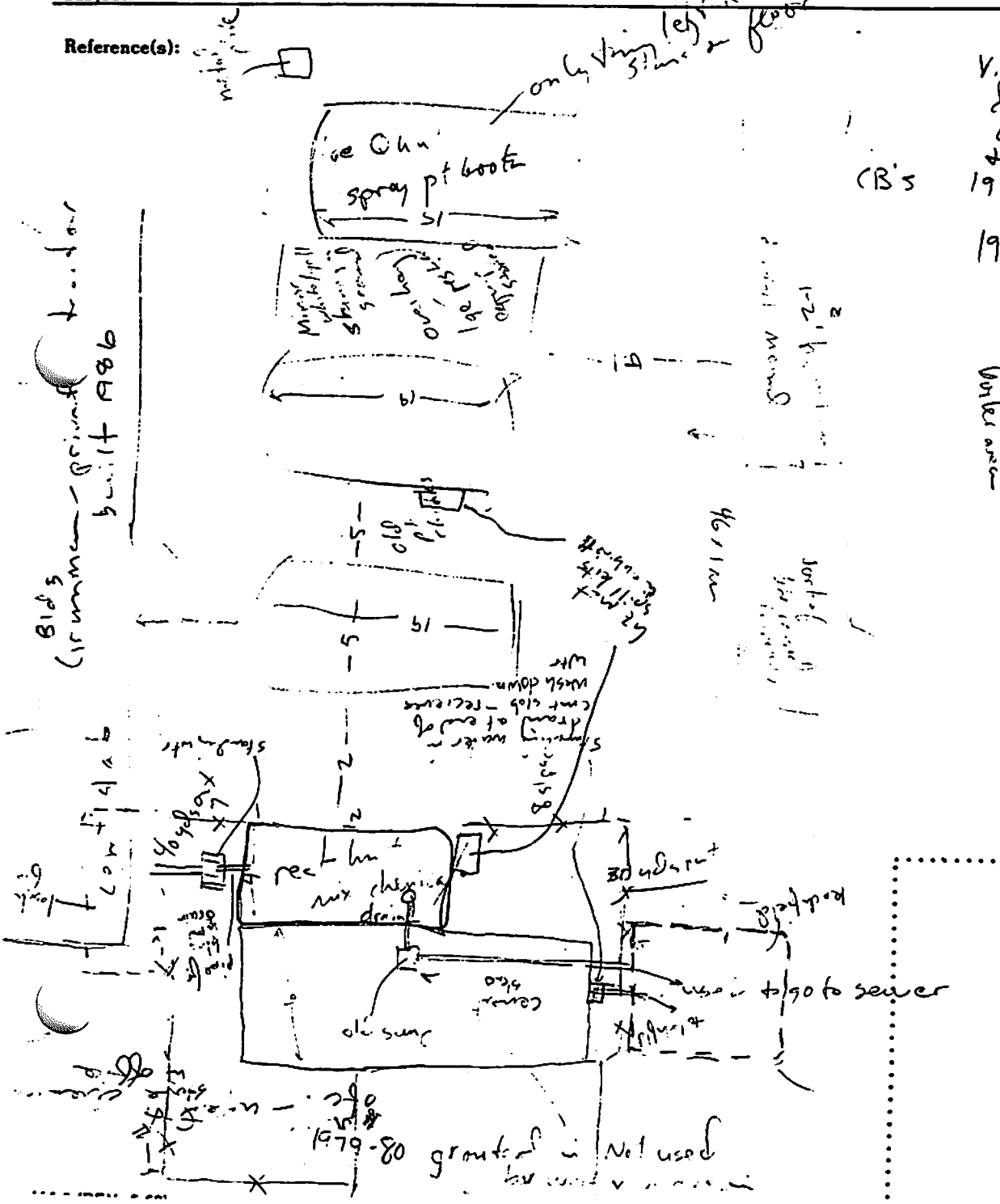
ACTION	INFO	
To:		File: pest control
		9/23/87
		X-Ref:
		Date:

From: ⇐Z

Reply Required By:

Subject:

Reference(s):



V. little pest into drains [illegible] wash down trucks & [illegible] spray pts.

CB's 1972-74

1974 - pest in pest control

Boiler area

ROUTING

SITE SURVEY QUESTIONNAIRE

Interviewer NJD/TO

Date 9/22/87

Interviewee Larry Jones

Shop/Area (Public Wks) Pest Control

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
oversees program for pest control now	– developed program put together annual plan	3/84 – present
Sr. Certified Pest Controller	applied stuff. had 1 tech + 2 summer hires	early 74 – 84

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acids, bases, preservatives) see ann. rpts.

radiological materials Chlor HC, organophosphates

dursban, malathion, pyrethrins, resmythrins

biological agents herbicides, round up rodeo.

2. Ordnance materials (e.g., explosives, propellants) _____

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) will get copy of current plan and one in late 70's

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity? Used to come thru Nuy supply. pre. 77-78 / Van Waters & Rogers - chemical supply co. now post 77-78

Were they transported from place to place on-site? If so, how?
ULV ultra low vol. machine } mosquitos
mist machine

1-500 gal + 1-100 gal herbicide tanks. all stored at pest control place.

IV. Waste Disposal

What waste products were generated from these operations?

Do mixing there
Storage shed for herb's
" insecticide

How were these wastes stored prior to disposal?

Quarter hut stores machines do repairs.

How were these wastes disposed?

On-site

Location | Disposal Method

No disposal problems w/ chems. Use everything up or EPA cancels.

Off-site

Location | Disposal Method

Take ~~dis~~ containers to county dump. They have fenced in area just for pest containers. Everything triple rinsed.

Name of Waste Hauler

Take there themselves. 1-2/week

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

No spills.

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Dave Radai - since 72
0800 wed appt

Sterilize ground around ammunition storage

LJ Trigs to incorporate state program where possible.

John Paul - retired 1987. Here since year 1.
predates Larry Jones. Antiquated equipment
Used basically the same chem cans
Votex, Malathion, Vibrisin dust
Overseas CB's. Pest control just part of his job.

LJ says pest control storage + op. was real mess, when he came on JP did take containers to county dump

(Industrial Hygienist)

Mound of dirt
Love Canal
Since 1940's

Regan:

never a pit
mound used for gravity drainage

Used to be a bakery

Look in the area - paint thrown on ground by paint shop

Investigate furthest East Quonset hut 1962-72
spray paint booth + sand blasting operation.

Torpedo

Quantities

REPRODUCED AT GOVERNMENT EXPENSE

...GEMENT PLAN AND PURCHASE APPROVAL REQUEST
12ND ... NV 6250-14 (REV. 5-78)

INSTRUCTIONS: Pre... is form annually. Due at WESTNAVFACENGCOM on 1 September. Sup... ...ry forms, if any, due 1 March.
1. S... ...ne of ... seasonal applications. Specify frequency for year round applications.
2. Us... ...ved pe... ...ame. Add name of special commercial formulation in parentheses if needed.
3. Use one of the following as appropriate: % conc., oz./gal., lbs./100 gal., oz. or lbs./1000 sq. ft., lbs. acre, etc. Outdoor applications - state whether rate is for active ingredient (ai) or product (pr), e.g. 5 # pr/AC.
4. Use following wo... ...abbreviations: crystal (CR), dust (D), emulsifiable concentrate (EC), granule (G), pellet (P), soluble powder (SP), solution (S), wettable powder (WP), aerosol, gas, paste, strip, bait.
5. List precautions applic... ...le to the specific situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for elm leaf beetles.

...e Bertex
...e Malathion

This form is to facilitate ... program, and to obtain pur... pesticide dispersal equipment. 6240.3D, Marine Corps Order P...

FROM (Activity name and address): NAVAL AIR STATION, FALLON, NV 89406-5000

TO: WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PER... FRO...

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED					
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPE...
. Housing and Industrial areas (1,100 acres), pastures and open fields (5,150 acres)	Mosquitoes (adult)	Summer/daily for 4 mo. 1 June - 11 October	SBP-1382 40 mf (synthetic pyrethroid) EPA REG # 432-595	0.007 # ai/ac	SLN (power ULV)	10 GL	3.34 #/GL	Penick	$370/GL	
			Cythion (malathion ULV conc.) EPA REG #241-208A	.026 to .10 #ai/ac	Conc. (power ULV)	630 GL	9.33	Cyanamid	$ 24.50	
Pastures and open fields (5,150 acres)	Mosquitoes (adult & larva)	Summer-Twice/Month 15 July - 15 Oct	Parathion 8E EPA REG # 1202-265 AA	1.6 fl oz/ac	EC (Air)	80 GL	8#/GL	Puregro	$ 23.75/GL	
Living Quarters (301 units), barracks (10 units) & office buildings (40 units)	Mosquitoes and small flying insects	All seasons/request	d-Phenothrin (Aerosol Bomb) EPA REG #901-79	10 sec/1,000 cu.ft.	Aer (Hand)	48/12 cans	2%	6840-01-067-6674 (Aerosol Co.)	$ 2.80/can (Aerosol Co.)	
On person	Mosquitoes	Spring and Summer months per request	Insect repelent (bottle) EPA REG #901-37	71.5%	Conc. (hand)	72/2 bottles	71.5%	6840-00-753-4963	$40.00	
			Deet Repellent (aerosol) EPA REG #121-15	32%	Aer (hand)	3 cases/12/6.1 cans/case	32%	6840-01-003-9590	$22.20/CS	

750 gal

50 gal
more early 70's

WESTDIV

annual planning and approval of the activity pest c
chase approval for pesticides, pest contr Lsuppl
(References DOD DIR [illegible] OPNAVINS
[illegible]1000.8A, WESTNAVACENGCOMINST [illegible]

OD COVERED (Dates)
[illegible] 11/1/86 TO 10/31/8

CIAL PRECAUTIONS

(5)

...GEMENT PLAN AND PURCHASE APPROVAL REQUEST
12ND ... 6250-14 (REV ...78)

INSTR... NS Pre... is form annually. Due at WESTNAVFACENGCOM on 1 September. Sup... ...ry forms, if any, due 1 March.
1. S... ...ne of ... seasonal applications. Specify frequency for year round applications.
2. Us... ...ed pe... ...ame. Add name of special commercial formulation in parentheses if needed.
3. Use one of the following as appropriate: % conc., oz./gal., lbs./100 gal., oz. or lbs./1000 sq. ft., lbs. acre, etc. Outdoor applications - state whether rate is for active ingredient (ai) or product (pr), e.g. 5 # pr/AC.
4. Use following wo... abbreviations: crystal (CR), dust (D), emulsifiable concentrate (EC), granule (G), pellet (P), soluble powder (SP), solution (S), wettable powder (WP), aerosol, gas, paste, strip, bait.
5. List precautions applic... ...le to the specific situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for elm leaf beetles.

...e Bertex
...e Malathion } 50 gal
more early 70's

WESTDIV

This form is to facilitate annual planning and approval of the activity pest c... program, and to obtain purchase approval for pesticides, pest control sup... pesticide dispersal equipment. (References DOD DIR 4150.7, OPNAVINS... 6240.3D, Marine Corps Order P11000.8A, WESTNAVFACENGCOMINST...

FROM (Activity name and address)
NAVAL AIR STATION, FALLON, NV 89406-5000

TO WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PERIOD COVERED (Dates) FROM 11/1/86 TO 10/31/8

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED					
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPECIAL PRECAUTIONS (5)
. Housing and Industrial areas (1,100 acres), pastures and open fields (5,150 acres)	Mosquitoes (adult)	Summer/daily for 4 mo. 1 June - 11 October	SBP-1382 40 mf (synthetic pyrethroid) EPA REG # 432-595	0.007 # ai/ac	SLN (power ULV)	10 GL	3.34 #/GL	Penick	$370/GL	
			Cythion (malathion ULV conc.) EPA REG #241-208A	.026 to .10 #ai/ac	Conc. (power ULV)	630 GL	9.33	Cyanamid	$ 24.50	
Pastures and open fields (5,150 acres)	Mosquitoes (adult & larva)	Summer-Twice/Month 15 July - 15 Oct	Parathion 8E EPA REG # 1202-265 AA	1.6 fl oz/ac	EC (Air)	80 GL	8#/GL	Puregro	$ 23.75/GL	
Living Quarters (301 units), barracks (10 units) & office buildings (40 units)	Mosquitoes and small flying insects	All seasons/request	d-Phenothrin (Aerosol Bomb) EPA REG #901-79	10 sec/1,000 cu.ft.	Aer (Hand)	48/12 cans	2%	6840-01-067-6674 (Aerosol Co.)	$ 2.80/can (Aerosol Co.)	
On person	Mosquitoes	Spring and Summer months per request	Insect repelent (bottle) EPA REG #901-37	71.5%	Conc. (hand)	72/2 bottles	71.5%	6840-00-753-4963	$40.00	
			Deet Repellent (aerosol) EPA REG #121-15	32%	Aer (hand)	3 cases/12/6.1 cans/case	32%	6840-01-003-9590	$22.20/CS	

750 gal

REPRODUCED AT GOVERNMENT EXPENSE

P... AGEMENT PLAN AND PURCHASE APPROVAL REQUEST
12ND ... V 6250/14 (REV 5-78)

INSTR... NS. Prepare this form annually. Due at WESTNAVFACENGCOM on 1 September. Sup... ary forms, if any, due 1 March.
1. Sp... ime of year for seasonal applications. Specify frequency for year round applications.
2. Use approved pesticide name. Add name of special commercial formulation in parentheses if needed.
3. Use one of the following as appropriate: % conc., oz./gal., lbs. /100 gal., oz. or lbs./1000 sq. ft., lbs./acre, etc. Outdoor applications - state whether rate is for active ingredient (ai) or product (pt), e.g. 5 # pr/AC.
4. Use following words or abbreviations: crystal (CR), dust (D), emulsifiable concentrate (EC), granule (G), pellet (PL), soluble powder (SP), solution (S), wettable powder (WP), aerosol, gas, paste, strip, bait.
5. List precautions applicable to the specific situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for clothes beetles.

This form is to facilitate annual planning and approval of the activity pest ... program, and to obtain purchase approval for pesticides, pest control suppl... pesticide dispersal equipment. (References DOD DIR 4150.7, OPNAVINS 6240.3D, Marine Corps Order P11000.8A, WESTNAVFACENGCOMINST ...

FROM (Activity name and address)
NAVAL AIR STATION, FALLON, NV 89406-5000

TO WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PERIOD COVERED (Dates) FROM 11/1/86 TO 10/31/8...

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED					SPECIAL PRECAUTIONS (5)
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	
. Standing water ...en fields & astures (9,000 acres)	Mosquitoes (larva)	Spring and Summer - daily for 4.5 months	Baytex 4 EPA REG #3125-73	.05 #ai/ac	EC (power)	20 GL	4 #/GL	Chemgro (Mobay)	$61.75/GS	
III. Living quarters (301 units)	Roaches, ants, flies & similar pests on label	As per chit	Pyrethrin (BP-300) EPA REG # 11540-1	.5 fl oz/ 1,000 cu ft	SLU (Power ULD)	1 GL	3%	Micro-Gen	$106/GL	
			Dursban 4E EPA REG # 464-360	.25% & .5%	EC (hand)	1 GL	4 #/GL	Dow Chemical	$78.15/GL	
			PT 270 (.5% Dursban) EPA REG #499-147-ZB	.5%	Aer (hand)	4/28 FL OZ cans	.5%	Whitmire	$ 4.05/CN	
			Perma-Dust PT 240 (Boric Acid) EPA REG # 499-220-AA	20%	Aer (hand)	5/20 FL OZ cans	20%	Whitmire	$ 4.20/CN	
			Sta-Gon (boric acid) EPA REG #5481-79-AA	95%	Dust (hand)	10 LBS	95%	Atlas Chemical Co.	$ 1.89/LB	

$50

...AND PURCHASE APPROVAL REQUEST

...STDIV 6250/14 (REV.5-78)

INSTRUCTIONS. Prepare this form annually. ... WESTNAVFACENGCOM on 1 September. Supplementary forms, if any, due 1 March.
1. Specify time of year for seasonal applicati... ...ly frequency for year round applications.
2. Use approved pesticide name. Add name o... commercial formulation in parentheses if needed.
3. Use one of the following as appropriate: ... conc., oz./gal., lbs./100 gal., oz. or lbs./1000 sq. ft., lbs./acre, etc. Outdoor applications - state whether rate is for active ingredient (ai) or product (pr), e.g. 5 # pr/AC.
4. Use following words or abbreviations: crystal (CR), dust (D), emulsifiable concentrate (EC), granule (G), pellet (P), soluble powder (SP), solution (S), wettable powder (WP), aerosol, gas, paste, strip, bait.
5. List precautions applicable to the specific situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for elm leaf beetles.

This form is to facilitate ... program, and to obtain ... pesticide dispersal equip... 6240.3D, Marine Corps ...

FROM (Activity name and address)

NAVAL AIR STATION, FALLON, NV 89406-5000

TO WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED				
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIM... UNIT CO...
... BEQ Barracks (3 units), BOQ Barracks (2 units) Crash House (1 unit) Fire House (1 unit)	Bedbugs, ants, Spiders, roaches, aphids mites, mice, scorpions, & similar pests on label	All seasons-once or twice/yr/unit	Malathion DSA #400-72-C-7548 or 551-131	.1% - 1%	EC (power & hand)	2 GL	57%	Baird & McGuire (6840-685-5437)	$18.1...
			Dursban 2E EPA REG # 464-586	.25% & 5%	EC (power)	10 GL	2 $/GL	Dow Chemical Co.	$34.95...
		As per chit or survey	PT 270 (.5% Dursban) EPA REG # 499-147-ZB	.5%	Aer (hand)	4/28 FL OZ cans	.5%	Whitmire	$ 4.05/...
			Perma-Dust PT-240 (Boric Acid) EPA REG # 499-220-AA	20%	Aer (hand)	4/20/FL OZ cans	20%	Whitmire	$ 4.20/...
			Sta-Gon (Boric Acid) EPA REG # 5481-79-AA	95%	Dust (hand)	10 LB	95%	Atlas Chemical Co.	$ 1.89/LB
			Maxforce (amidinohydrazone) EPA REG #241-267	1.65%	Bait (hand)	1 BX	1.65%	American Cynamid	$37.44/BX

BASE APPROVAL REQUEST

WESTDIV

...ine at WESTNAVFACENGCOM on 1 September ... tary forms, if any, due 1 March.
...time of year for seasonal applications. Specify frequency for year round applications.
...general pest control areas. Add name of special commercial formulation in parentheses if needed.
4. Use one of the following ... conc., oz./gal., lbs./100 gal., oz. or lbs./1000 sq. ft., lbs./acre, etc. Outdoor applications - state whether rate is for active ingredient (AI) or product (pr), e.g. 5 # pr/AC.
5. Use following words or abbreviations ... aerosol (AER), dust (D), emulsifiable concentrate (EC), granule (G), pellet (P), soluble powder (SP), solution (S), wettable powder (WP), aerosol, gas, paste, strip, bait.
6. List precautions applicable to ... site, situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for elm leaf beetles.

This form is to facilitate annual planning and approval of the activity pest ... program, and to obtain purchase approval for pesticides, pest control supp... pesticide dispersal equipment. (References DOD DIR 4150.7, OPNAVINS... 6240.3D, Marine Corps Order P11000.8A, WESTNAVFACENGCOMINST ...

FROM (Activity name and address)

NAVAL AIR STATION, FALLON, NV 89406-5000

TO WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PERIOD COVERED (Dates) FROM 11/1/86 TO 10/31/8...

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED					
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPECIAL PRECAUTIONS (5)
			Pyrethrum PT 150 EPA REG # 499-148ZA	.25%	Aer (hand)	12/1 LB 4 OZ cans	.25%	Whitmire	$ 5.15/CN	
IV. Ornamentals (trees 1,500 and lawns 50 acres)	Aphids, scales, springtails, mites, sod webworms and similar pests on label	Spring and summer months or per chits	Diazinon 4E EPA REG # 551-220 or 550-136	.5%	EC (hand & power)	5 GL	4 #/GL	6840-782-3925 or NAMCO	$30.75/GL	
			Malathion DSA #400-72-C-7548 or 551-131	.07%-3%	EC (power)	15GL	57%	6840-685-5437 (Baird & McGuire)	$18.15/GL	
	Elm Leaf Beetles & similar pests on label		Sevimol 4 EPA REG # 264-321	.5 FL OZ/GL (2 QT/100GL (H_2O)	EC (power)	2 GL	4#/GL	Union Carbide	#23.55/GL	
V. Lawns (50 acres)	Broadleaf weeds	Spring thru Fall	Formula-40 2,4-D EPA REG 464-1-39511	1 to 3 QT/ acre	SLN (power)	30 GL	4#/GL	Vertex	$9.00/GL	
			Round-Up EPA REG # 525-308	1% to 2%	EC (power & hand)	30 GL	4#/GL	Monsanto Co.	$84.00/GL	

REPRODUCED AT GOVERNMENT EXPENSE

P... AGEMENT PLAN AND PURCHASE APPROVAL REQUEST
...TDIV 6250/14 (REV 5-78)

WESTDIV

INSTR... NS. Prepare this form annually. Due at WESTNAVFACENGCOM on 1 September. Sup... ry forms, if any, due 1 March.
1. ... me of year for seasonal applications. Specify frequency for year round applications.
2. Use ... oved pesticide name. Add name of special commercial formulation in parentheses if needed.
3. Use one of the following as appropriate: % conc., oz./gal., lbs./100 gal., oz. or lbs./1000 sq. ft., lbs. acre, etc. Outdoor applications state whether rate is for active ingredient (ai) or product (pr), e.g. 5 # pr/AC.
4. Use following words or abbreviations: crystal (CR), dust (D), emulsifiable concentrate (EC), granule (G), pellet (PL), soluble powder (SP), solution (S), wettable powder (WP), aerosol, gas, paste, strip, bait.
5. List precautions applicable to the specific situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for elm leaf beetles.

This form is to facilitate annual planning and approval of the activity pest c... program, and to obtain purchase approval for pesticides, pest control suppl... pesticide dispersal equipment. References DOD DIR 4150.7, OPNAVINS 6240.3D, Marine Corps Order P11000.8A, WESTNAVFACENGCOMINST 6...

FROM (Activity name and address)
NAVAL AIR STATION, FALLON, NV 89406-5000

TO
WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PERIOD COVERED (Dates) FROM 11/1/86 TO 10/31/8...

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED					
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPECIAL PRECAUTIONS (5)
...adsides, Industrial ...eas, transformer pads and runway skirts (800 acres)	All weeds	Fall months and first part of spring	Bromacil EPA REG #352-287	5 to 10 LB/ acre	WP	650 LBS	80%	Dupont	$11.40/LB	
			Arsenal EPA REG # 241-273	2 to 6 PT/ acre	SLN (power)	20 GL	2 #/GL	Cynamid	$169.00/GL	
Ditches (22 miles)	Cattails, milk-weed & similar weeds on label	Summer and Fall months	Rodeo EPA REG #524-343	3/4% to 1.5%	EC (power)	25 GL	5.4 #/GL	Monsanto Co.	$108.00/GL	
			ORTHO X-77 State Reg # 239-50037-AA	1 to 2 QTS/ 100 GL of H_2O or as/ label	Conc. (power)	10 GL	Conc.	Ortho	$10.00/GL	
Ornamental Plantings (30 acres)	Broadleaf Weeds	Spring	SURFLAN AS EPA REG # 1471-113	1 GL/ acre	AS (hand & power)	30 GL		Target Chemical	$69.50/GL	

1000

REPRODUCED AT GOVERNMENT EXPENSE

PE[illegible]GEMENT [illegible] AND [illegible]URCHASE APPROVAL REQUEST
1/NO W[illegible]V 62

INS[illegible]
1. [illegible]nually. Due at WESTNAVFACENGCOM on 1 September. Su[illegible]ary forms, if any, due 1 March.
2. [illegible] applications. Specify frequency for year round applications.
3. [illegible] name. Add name of special commercial formulation in parentheses if needed.
4. [illegible] conc., oz./gal., lbs./100 gal., oz. or lbs./1000 sq. ft., lbs./acre, etc. Outdoor applications: state whether rate is for active ingredient (ai) or product (pr) e.g. 5 # pr/AC.
5. List precautions applicable to the specific situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for elm leaf beetles.

This form is to facilitate annual planning and approval of the activity pest [illegible] program, and to obtain purchase approval for pesticides, pest control suppl[illegible] pesticide dispersal equipment. (References DOD DIR 4150.7, OPNAVINS 6240.3D, Marine Corps Order P11000.8A, WESTNAVFACENGCOMINST 6[illegible]

FROM (Activity name and address): NAVAL AIR STATION, FALLON, NV 89406-5000

TO: WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PERIOD COVERED (Dates): FROM 11/1/86 TO 10/31/8[illegible]

PEST CONTROL OPERATION: AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	PESTICIDE AND APPLICATION RATE: COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	PESTICIDE PRODUCT TO BE PURCHASED OR USED: FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPECIAL PRECAUTIONS (5)
			Dursban - LO EPA REG # 464-571	.25% & 5%	EC (hand)	1 CS (12-1.35 FL OZ Bottles (per case)	4#/GL	Dow Chemical Co.	$107.20/CS	
			PT 565 (Pyrethrum) EPA REG #499-182-ZA	.5%	Aer (hand)	6/6 OZ Cans	.5%	Whitmire	$ 3.50/CN	
		Spring and Summer or per chits	Diazinon 4E EPA REG # 551-220 or 550-136	.5%	EC (hand & power)	3 GL	4 #/GL	6840-782-3925 (Baird & McGuire) or NAMCO	$30.75/GL	
			Pyrethrin (BP-300) EPA REG # 11540-1	.5 FL OZ PER 1,000 CU FT	SLN (power ULD)	.5 GL	3%	Micro-Gen	$106.00/GL	
	Mice & Rats	Fall and Winter months	Talon-G EPA REG #10182-41	.005%	Bait (hand)	5 LB	.005%	ICI Americas Inc.	$ 2.08/LB	
VII. Galleys (4 units). Clubs (3 units, Snack Bars (3 units), Theater (1 unit), Coffee messes (40 units) Commisssry (1 unit), and Navy Exchange (1 unit)	Roaches, Spiders ants, flies, & & similar pests on label	Once/month normally, twice in heavy traffic, per building	Dursban 4E EPA REG # 464-360	.25% & .5%	EC (hand)	2 GL	4 #/GL	Dow Chemical	$78.15/GL	

REPRODUCED AT GOVERNMENT EXPENSE

PE... ...GEMENT PLAN AND PURCHASE APPROVAL REQUEST
12ND W... ...DIV 6750/14 (REV. 8/78)

INST... ...S Prepare the form annually. Due at WESTNAVFACENGCOM on 1 September. Sup... ...ary forms, if any, due 1 March.
1. S... ...me of year for seasonal applications. Specify frequency for year round applications.
2. Use approved pesticide name. Add name of special commercial formulation in parentheses if needed.
3. Use one of the following as appropriate: % conc., oz./gal., lbs./100 gal., oz. or lbs./1000 sq. ft., lbs./acre, etc. Outdoor applications - state whether rate is for active ingredient (ai) or product (pr), e.g. 5 # pr/AC.
4. Use following words or abbreviations: crystal (CR), dust (D), emulsifiable concentrate (EC), granule (G), pellet (P), soluble powder (SP), solution (S), wettable powder (WP), aerosol, gas, paste, strip, bait.
5. List precautions applicable to the specific situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for elm leaf beetles.

This form is to facilitate annual planning and approval of the activity pest ... program, and to obtain purchase approval for pesticides, pest control suppl... pesticide dispersal equipment. (References DOD DIR 4150.7, OPNAVINS 6240.3D, Marine Corps Order P11000.8A, WESTNAVACENGCOMINST 6...

FROM (Activity name and address)
NAVAL AIR STATION, FALLON, NV 89406-5000

TO WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PERIOD COVERED (Dates) FROM 11/1/86 TO 10/31/87

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED					
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPECIAL PRECAUTIONS (5)
			Pyrethrin (BP-300 EPA REG # 11540-1	.5 FL OZ/ 1,000 CU FT	SLN (power ULD)	1 GL	3%	Micro-Gen	$106.00/GL	
		Spring & Summer per survey	Diazinon 4E EPA REG # 551-220 or 550-136	.5%	EC (power & hand)	1 GL	4 #/GL	6840-782-3925 (Baird & McGuire) or NAMCO	$30.75/GL	
		As per chits or survey	PT 270 (.5% Dursban) EPA REG #499-147-ZB	.5%	Aer (hand)	4/28 FL OZ cans	.5%	Whitmire	$ 4.05	
			Perma-Dust PT 240 (Boric Acid) EPA REG #499-22-AA	20%	Aer (hand)	4/20 GL OZ cans	20%	Whitmire	$ 4.20/CN	
			Sta-Gon (Boric Acid) EPA REG # 5481-79-AA	95%	Dust (hand)	20 LB	95%	Atlas Chemical Co.	$ 1.89/LB	
			PT 150 (Pyrethrum) EPA REG #499 - 148-ZA	.25%	Aer (hand)	8/1 LB 4 OZ cans	.25%	Whitmire	$ 5.15/CN	

REPRODUCED AT GOVERNMENT EXPENSE

PE... ...GEMENT PLAN AND PURCHASE APPROVAL REQUEST
12ND ... ...TDIV 6250/14 (REV 2/78)

INSTR... ...NS: Prepare this form annually. Due at WESTNAVFACENGCOM on 1 September. Sup... ...ry forms, if any, due 1 March.
1. S... ...me of year for seasonal applications. Specify frequency for year round applications.
2. U... ...oved pesticide name. Add name of special commercial formulation in parentheses if needed.
3. Use one of the following as appropriate: % conc., oz./gal., lbs./100 gal., oz. or lbs./1000 sq. ft., lbs./acre, etc. Outdoor applications - state whether rate is for active ingredient (ai) or product (pr), e.g. 5 # pr/AC.
4. Use following words or abbreviations: crystal (CR), dust (D), emulsifiable concentrate (EC), granule (G), pellet (P), soluble powder (SP), solution (S), wettable powder (WP), aerosol, gas, paste, strip, bait.
5. List precautions applicable to the specific situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for elm leaf beetles.

This form is to facilitate annual planning and approval of the activity pest c... program, and to obtain purchase approval for pesticides, pest control suppl... pesticide dispersal equipment. (References DOD DIR 4150.7, OPNAVINS 6240.3D, Marine Corps Order P11000.8A, WESTNAVACENGCOMINST 6...

FROM (Activity name and address)
NAVAL AIR STATION, FALLON, NV 89406-5000

TO WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PERIOD COVERED (Dates) FROM 11/1/86 TO 10/31/8...

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED					
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPECIAL PRECAUTIONS (5)
			Maxforce (amidinohydrazone) EPA REG #241-267	1.65%	Bait (hand)	1 CTN	1.65%	American Cyanamid Co.	$135.36/CTN	
			Dursban LO EPA REG # 464-571	.25% or .5%	EC (hand)	2 CS (12-1.35 FL OZ bottles/CS	4#/GA	Dow Chemical Co.	$107.20/CS	
			Knox Out 2 FM (Diazinon) EPA REG # 4531-335	1%	EC (hand or power)	2GA	2 #/GA	Pennwatt Corp.	$42.00/GL	
			PT 565 (Pyrethrum) EPA REG # 499-182 ZA	.5%	Aer (hand)	6/6 OZ cans	.5%	Whitmire	$ 3.50/Can	
			PT 260 (Diazinon) EPA REG # 499-156 ZA	1%	Aer (hand)	12/1.25 LB Cans	1%	Whitmire	$ 4.05/Can	
			Flytek EPA REG # 2724-274-50809	.025%	Bait	20 LB	.025%	ZOECON Corp.	$2.98/LB	

REPRODUCED AT GOVERNMENT EXPENSE

...GEMENT PLAN AND PURCHASE APPROVAL REQUEST
...TDIV 6250/14 (REV 5-78)

INSTRUCTIONS. Prepare this form annually. Due at WESTNAVFACENGCOM on 1 September. S... ...ary forms, if any, due 1 March.
1. ...ime of year for seasonal applications. Specify frequency for year round applications.
2. ...ved pesticidename. Add name of special commercial formulation in parentheses if needed.
3. ...e of the following ... oz., gal., lbs. 100 gal., oz., or lbs./1000 sq. ft., lbs./acre, etc.. Outdoor applications - state whether rate is for active ingredient (ai) or product (pr), e.g. 5 # pr/AC.
4. Use following words or ... of RL dust (D), emulsifiable concentrate (EC), granule (G), pellet (PL), soluble powder (SP), solution (S), wettable powder (WP), aerosol, gas, paste, strip, bait.
5. List precautions applic... ...on in which the pesticide is to be applied, e.g., do not use on lace formulation, do not use for elm leaf beetles.

This form is to facilitate annual planning and approval of the activity pest c... program, and to obtain purchase approval for pesticides, pest control suppl... pesticide dispersal equipment. (References DOD DIR 4150.7, OPNAVINS 6240.3D, Marine Corps Order P11000.8A, WESTNAVFACENGCOMINST ...

FROM (Activity name and address)
NAVAL AIR STATION, FALLON, NV 89406-5000

TO
WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PERIOD COVERED (Dates)
FROM 11/1/86 TO 10/31/8...

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED					
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPECIAL PRECAUTIONS (5)
	Mice & Rats	All seasons per chits & survey	Talon-G EPA REG # 10182-41	1/4-16 OZ per bait station	Bait (hand)	11 LB	.005%	ICI Americas, Inc.	$ 2.08/LB	
			Traps		Hand	6 DZ		3740-252-3384	$ 3.80/DZ	
VIII. Warehouses, Industrial areas and stable area (153 units)	Spiders, ants, scorpions, termites & similar pests on label.	All seasons- 1 or 2 treatments per infested bldg per year	Dursban 2E EPA REG # 464-586	.25% & .5%	EC (power)	10 GL	2 #/GL	Dow Chemical Co.	$34.95/GL	
	Roaches, ants, spiders & flies	As per chits or survey	Pyrethrin (BP-300) EPA REG #11540-1	.5 FL OZ per 1,000 CU FT	SLN (power ULD)	1 GL	3%	Micro-Gen	$106.00/GL	
			PT 270 (.5% Dursban) EPA REG # 499-147-ZB	5%	Aer (hand)	4/28 FL OZ can	.5%	Whitmire	$ 4.05/CN	
			Perma-Dust PT-240 (Boric Acid) EPA REG# 499-220-AA	20%	Aer (hand)	2/20 FL OZ can	20%	Whitmire	$ 4.20/CN	

REPRODUCED AT NAVFACENGCOM

PES. ...GEMENT PLAN AND PURCHASE APPROVAL REQUEST
...ND ...DIV 6250/14 (REV. 5-78)

INST... ...NS. Prepare this form annually. Due at WESTNAVFACLNGCOM on 1 September. Su... ...ary forms, if any, due 1 March.
1. ...me of year for seasonal applications. Specify frequency for year round applications.
2. ...oved pesticide name. Add name of special commercial formulation in parentheses if needed.
3. Use one of the followingas appropriate: % conc., oz./gal., lbs./100 gal., oz. or lbs./1000 sq. ft., lbs./acre, etc. Outdoor applications - state whether rate is for active ingredient (ai) or product (pr), e.g. 5 # pr/AC.
4. Use following words or abbreviations: crystal (CRI, dust (DI, emulsifiable concentrate (EC), granule (G), pellet (PL, soluble powder (SP), solution (S), wettable powder (WP), aerosol, gas, paste, strip, bait.
5. List precautions applicable to the specific situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for elm leaf beetles.

This form is to facilitate annual planning and approval of the activity pest ... program, and to obtain purchase approval for pesticides, pest control suppl... pesticide dispersal equipment. (References DOD DIR 4150.7, OPNAVINS 6240.3D, Marine Corps Order P11000.8A, WESTNAVFACENGCOMINST 6...

1. *(Activity name and address)*

NAVAL AIR STATION, FALLON, NV 89406-5000

TO WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PERIOD COVERED (Dates) FROM 11/1/86 TO 10/31/87

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED					
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPECIAL PRECAUTIONS (5)
			Sta-Gon (Boric Acid) EPA REG # 5481-79-AA	95%	Dust (hand)	10 LB	95%	Atlas Chemical Co.	$1.89/LB	
			Flytek EPA REG # 2724-274-50809	.025%	Bait (hand)	20 LBS	.025%	Zoecon Corp.	$ 2.93/LB	
	Mice & rats	As per chits or survey	Talon-G EPA REG # 10182-41	1/4-16 OZ per bait station	Bait (hand)	11 LB	.005%	ICI Americas Inc.	$208.00/LB	
			Traps		Hand	4 DZ		3740-252-3384	$ 3.80/DZ	
IX. Station Grounds & lawns (30 acres)	Gophers	All seasons as needed	Strychnine EPA REG # 36029-1	.035%	Bait (hand)	2 LB	.035%	Wilco Distributors, Inc.	$3.75/CN	
	Ground Squirrels	All seasons as needed	Chlorophacin-One - Liphadione EPA REG# SLN No.-NV 790005	.005%	Bait (hand)	8 LB	.006%	Target Chemical	$ 6.15/CN	

PEST [illegible]MENT PL[illegible] AND PURCHASE APPROVAL REQUEST
12ND W[illegible] [illegible]250/14 (REV. 5-78)

SUPPLEMENTAL TO PLAN [illegible]

WESTDIV

INSTRUCTIONS: Prepare this form annually. Due at WESTNAVFACENGCOM on 1 September. Sup[illegible]ry forms, if any, due 1 March.
1. Spec[illegible] of year for seasonal applications. Specify frequency for year round applications.
2. Use [illegible] pesticide name. Add name of special commercial formulation in parentheses if need[illegible]
3. Use o[illegible] the following as appropriate: % conc., oz./gal., lbs./100 gal., oz. or lbs./1000 sq. ft., lbs./acre, etc. Outdoor applications - state whether rate is for active ingredient (ai) or product (pr), e.g. 5 # pr/AC.
4. Use following words or abbreviations: crystal (CR), dust (D), emulsifiable concentrate (EC), granule (G), pellet (P), soluble powder (SP), solution (S), [illegible]ettable powder (WP), aerosol, gas, paste, strip, bait.
5. List precautions applicable to the specific situation in which the pesticide is to be applied, e.g., do not use oil base formulation, do not use for elm leaf beetles.

This form is to facilitate annual planning and approval of the activity pest c[illegible] program, and to obtain purchase approval for pesticides, pest control suppl[illegible] pesticide dispersal equipment. (References DOD DIR 4150.7, OPNAVINS[illegible] 6240.3D, Marine Corps Order P11000.8A, WESTNAVACENGCOMINST 6[illegible]

FROM (Activity name and address)
NAS Fallon

TO WESTERN DIVISION (10A)
NAVAL FACILITIES ENGINEERING COMMAND
P.O. BOX 727, SAN BRUNO, CALIFORNIA 94066

PERIOD COVERED (Dates) FROM 11/1/86 TO 10/31

PEST CONTROL OPERATION			PESTICIDE AND APPLICATION RATE		PESTICIDE PRODUCT TO BE PURCHASED OR USED					
AREA (Type of buildings or terrain to be treated)	PEST (Common Name)	TIME OR FREQUENCY (1)	COMMON NAME AND EPA NO. (2)	CONC. OR RATE (3)	FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPECIAL PRECAUTIONS (5)
PASTURES AND OPEN FIELDS (5,150 ACRES)	MOSQUITOES (ADULT [redacted]	SUMMER AS REQUIRED 15 JULY-15 OCT	DIBROM 14 EPA REG# 239-1721-AA	.1 LB PER ACRE	EC (AIR)	30 GAL	14 LBS / GAL	ORTHO	57.50 / GAL	TOXIC TO FISH BIRDS AND OTHER WILDLIFE DIRECT APPLICATION TO WATER IS PROHIBITE

[illegible] NAVFACENGCOM
[illegible] NAV [illegible] 6250.4
[illegible] Entomologist
9-21-87

PEST CONTROL OPERATION — PEST (Common name)	TIME OR FREQUENCY (1)	PESTICIDE AND APPLICATION RATE — COMMON NAME AND EPA NO. (2)	APPLICATION OR RATE (3)	PESTICIDE PRODUCT TO BE PURCHASED — FORM (4)	APPROXIMATE AMOUNT (lbs or gals)	CONC. (lbs/gal or %)	PROBABLE SOURCE (Std stock no. or company name)	APPROXIMATE UNIT COST	SPECIAL PRECAUTIONS (5)
X. Cooling Towers (4 units)	Water (Algae)	One tube/ month or when need arises	Algaecide (Potassium permanganate) EPA REG # 5135-00009	80%	Briquettes	4 CS	80%	Water Services Div Universal Oil Products Co. (UOP)	$250/CS	
		Lohen Required	MSA-Cleaner Santiize RII EPA REG # 4204-4			4BX		MSA	$13.60/BX	

APPROVED: USE AUTHORIZED
WESTERN DIV. NAVFACENGCOM
PER OPNAVINST 6250.4
G.R. Christopherson
5/24/87 Entomologist

(ON-PESTICIDE PEST MANAGEMENT PRACTICES TO BE UNDERTAKEN (e.g., ADMINISTRATIVE PRACTICES - Promulgation of sanitation procedures to prevent fly breeding on loading docks, cancellation of agricultural outleases to prevent mosquito breeding sources; LIAISON - establishment of area cooperative weed or rodent control plans with local agencies; ENVIRONMENTAL MODIFICATION - installation of welded wire on magazine tops to prevent ground squirrel burrowing, water drainage to prevent seagulls at air fields; BIOLOGICAL CONTROL - installation of mosquito fish for mosquito control, use of bacteriological disease spores to control oak moths; CULTURAL PRACTICES - destruction of tomato crop residues to prevent fly populations, removal of ice plant to destroy mice harborages.)

1. Stock all ditches on outleased areas with mosquito fish.

2. Use artificial nesting sites to encourage barn and tree swallows (insectivores) to utilize the area around and within the station's boundaries for feeding sites. (Biological control method.)

3. Exclude birds from hangar, with the use of plastic netting.

4. Include integrated Pest Management (IMP) practices into the control of insects in the galleys, clubs and Navy housing areas.

NAME (typed) AND SIGNATURE OF PEST CONTROL COORDINATOR	DATE	NAME (typed) AND SIGNATURE OF PUBLIC WORKS OR MAINTENANCE OFFICER	DATE	NAME (typed) AND SIGNATURE OF ACTIVITY MEDICAL OFFICER	DATE
[illegible] JONES, NATURAL RESOURCE SPECIALIST	21 Oct 86	J. W. BERRIMAN, LCDR, CED, USN - PWO	21 Oct 86	S. KENNEDY, LCDR, SMO, USNR	21 Oct 86

NAVFAC 6250/14 (REV. 1-78) – (BACK)

SITE SURVEY QUESTIONNAIRE

Interviewer Tom Olson

Date 22 Sep 1987

Interviewee Larry Jones

Shop/Area Public Works

I. Present History

What were/are your duties or responsibilities at the activity?
Natural Resources Specialist/Manager

In what operations were you involved?

Operation	Brief description	Dates
Pest Control	[redacted] Pest control	1975?–3/84
Nat. Res. Mgmt.	Land-use plants, still overseas pest control, revegetation (for example, near the new runway).	3/84–Present

II. Operations Data Remainder of questionnaire N/A. See last page.

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Gary Pfiefle, Soil Conservation Service, Fallon, NV. – Possibly more information on plant species, vegetation types in vicinities of base, ranges.

Larry Jones gave brief background of plant types, and wildlife habitats on the base and ranges. Discussed revegetation effort (inland saltgrass) at the new runway. One very old (1950s?) land management plan was developed for the base. Not well done. A new land management plan is about to be initiated through University of Nevada – Reno.

Larry stated what printed information, literature is available. He will attempt to get copies of everything for us, including:

1) Old land management plan
2) Christmas bird count for area south of the base
3) Soil and plant inventories, conducted in conjunction with SCS, on the base and ranges.
4) Inventories of all trees on bases, including those planted.
5) EA's conducted for: a) geothermal project; b) silicon project.

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/22

Interviewee Mark Brunette

Shop/Area ROICC - Asst Resident Officer in charge of Const.

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

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VI. Site-Specific Areas of Concern

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Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Borrow Pit Contamination (see Del Purcell)
Samples @ site taken by Ron Nygren
Initial

Possibly 2 rounds of sampling
water samples
Flash tst only 122° (he thinks)

Problem evolution (Bruncte has a phone log w/ all calls)
21ST Aug - Ron Nygren said some women said
NPI was taking Haz Waste off base for disposal
Investigation by ROICC showed nobody from NPI
out site
Inspection by ROICC that day of water. No
odor @ site, no water odor etc., no sheen
no discolored soil
Next week Nygren took sample
Site left open as per Safety (Nygren)

Remove site in old landfill
Newspapers uncovered were 12 years old
Some contractor may have complained to EPA

Deepest cuts in area of new runway were 3 feet
No contaminated soils encountered

Nygren may have been involved because a lady contacted
a State agency

Nygren told Bruncte that dumping had occurred @ site
(was probably the ESI report)
Borrow pit will be reclaimed

SITE SURVEY QUESTIONNAIRE

Interviewer GAIT

Date 9/22/87

Interviewee Charlie Driver

Shop/Area PW Utilities

I. Present History

What were/are your duties or responsibilities at the activity?
1968

In what operations were you involved?

Operation	Brief description	Dates
Utilitees always.		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

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On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Opened new one 1985

2 aerated lagoons + one settling pond, chlorinat
no solids removal to date

---

start ?? Runoff tanks - 4 settling ponds, chlorinator
terminated 61

discharge to drain ditch

Whenever dried out would clean once every 10 years.

Doesn't know what was used prior to old plant

New industrial area + housing always connected

250 - 300 thousand g d. for past 4-5 yrs.

old flows about ½ current

Never major problems with ind. waste disposal. Do get a little oil now + then

Would bury north of ponds. Several truckloads

at checkerboard did get some oil in lift station wet well.

Boiler Plant

Boilers were outside then bldg. built over them.

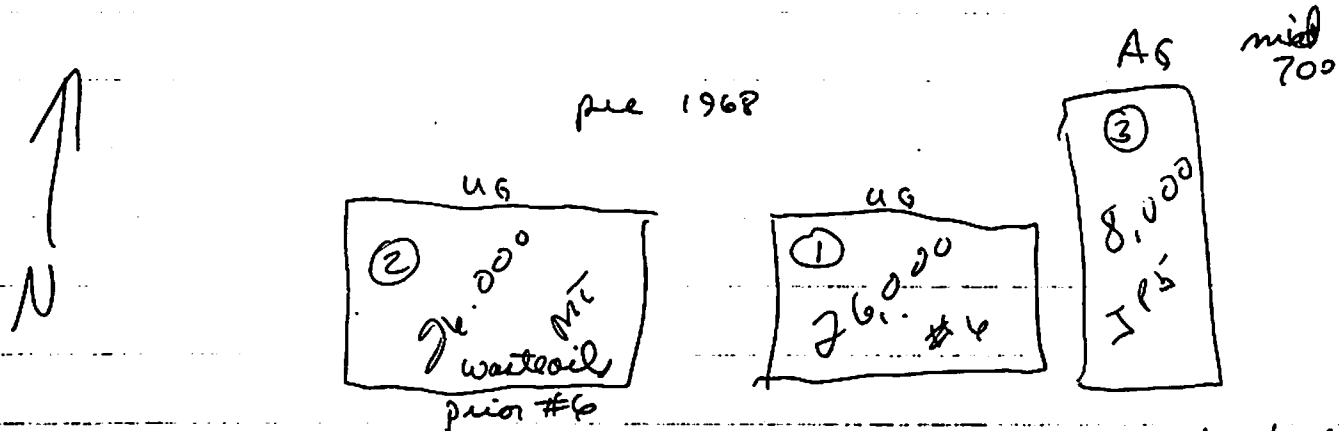
Burned #6 oil had to heat to pump.

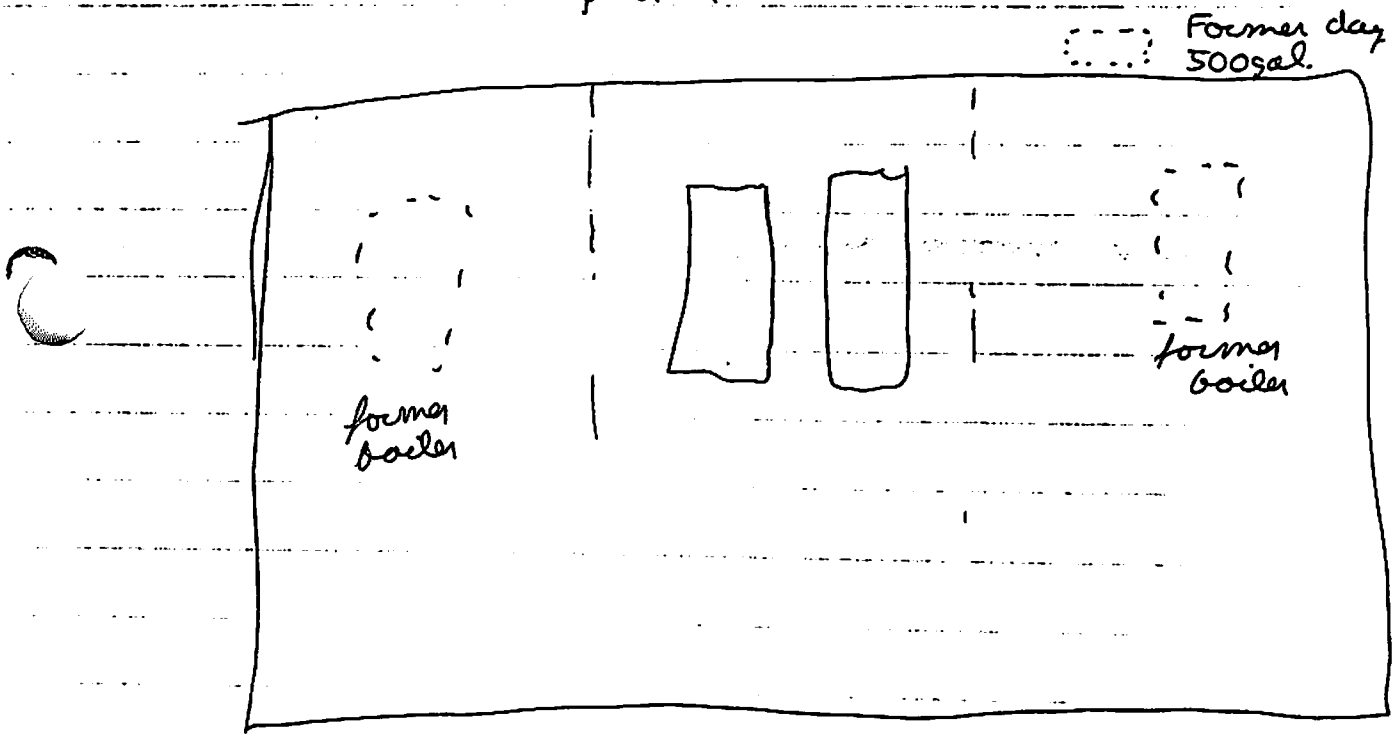
Started burning waste oils 1978-1985

no transformer oil burned. Mostly lube oil but some

no mogas or 4 hydraulic, JP-5

All Elec. comes outside always that way. Except for checkerboard.





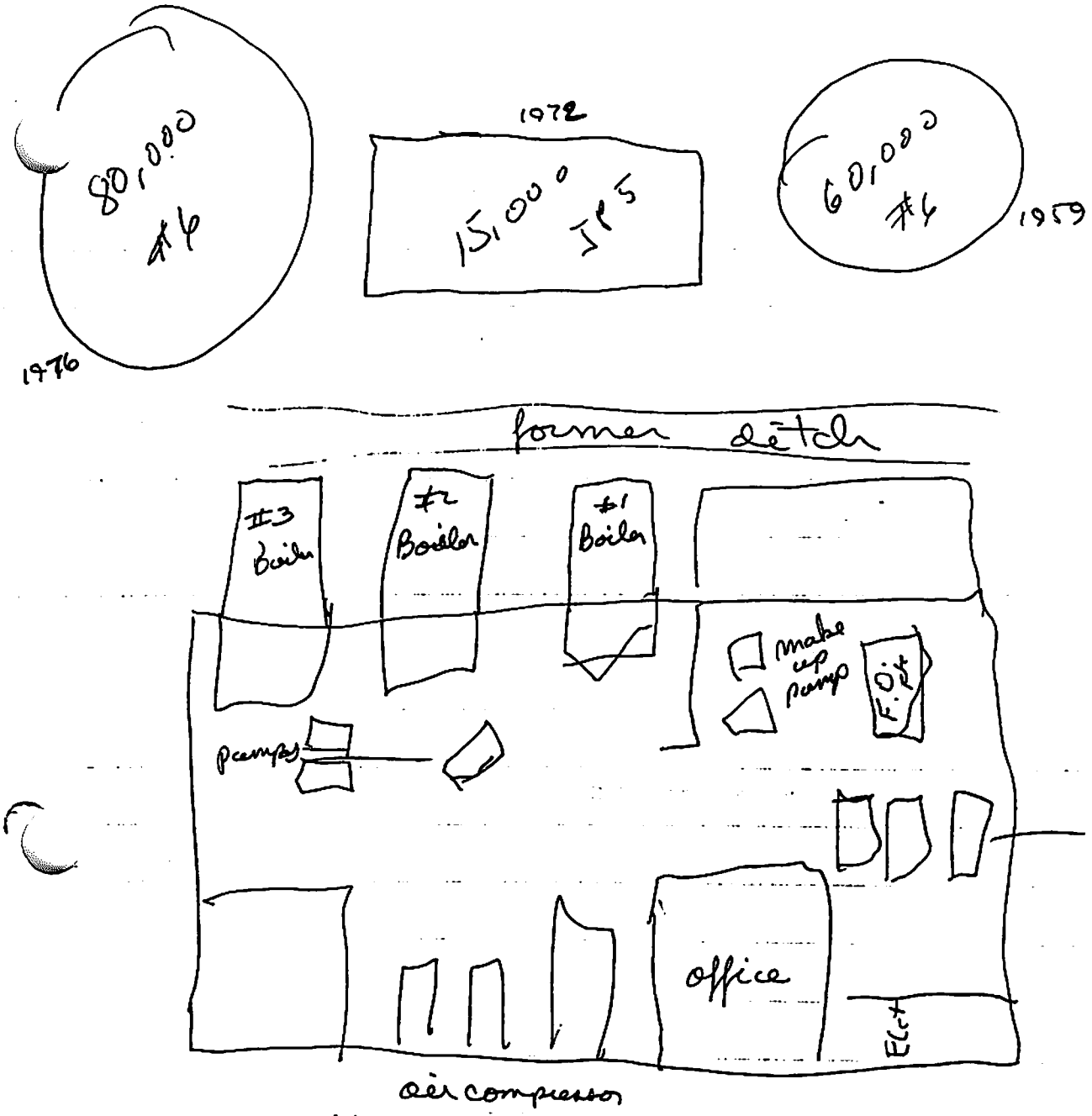
(1)+(2) #6 tanks would overflow through vent when heated (76?)

(1) Kept full but not used since 1978 when nat. gas brought. plant generates steam for old area only.

(2) Has JP in it but not full
one leak in bldg. kept inside

some chems used but not sure what

Dick Fields



Sodium Sulfite used in boilers use chlorohexamine for algaecide

Built ~1959 all 3 tanks AG bermed but not lined. lines all AG never leaked.

Hot water boilers - provide heat for never used compressors blown down to a barrel which is turned in. Never only leaks. Used to dump pump oil in ditch 3-4 gal./month until ~73.

---

3 Wells pre 1968 wells are several hundred feet deep ~1 MGD currently, old days 12 million gal/month

Swimming Pool + Officers (closed in winter)
Soda ash, chlorine, hydrochloric acid
installed as 1972-73 ..... Dicks Fields operates
use diatomaceous earth for filters.
SW corner fill operating when he started closed
shortly after.

Never disposed liquids to dumpsters - soap etc only

2nd interview record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/23/87

Interviewee Steve Richards

Shop/Area WWTP

I. Present History

What were/are your duties or responsibilities at the activity?

1976

In what operations were you involved?

Operation	Brief description	Dates
	Dec. 85 - Started opns. on aerated lagoons ≈ 10' deep. Settling ponds ~ 3'	

Discharge limits

~~BOD~~-Suspended Solids - 90 ppm Cl residual - no reqmt. about 1 ppm

BOD - 30 ppm

Fecal - 400

TDS - no reqmt. - about 1900 average. (1750-2

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

older than 5 years 170,000 - 220,000 gpd

350,000 - 400,000 gpd ~~average~~

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

No plant upsets
Use Cl_2 gas (150 lb cylinders) Water clarity better than ditch. Have had some air problems but BOD have only been 37 + 39 twice in 2 yrs

---

Old plant exceeded limits all the time

Old plant built 1961-62. Opened Fall 62.
would get 85% reduction at best in Imhoff tanks
Each pond drained about every 5 years and cleaned. (3-4" inlet 1" outlet removed - vol. ?)
Burial - ? thinks went to landfill. Trucked off.

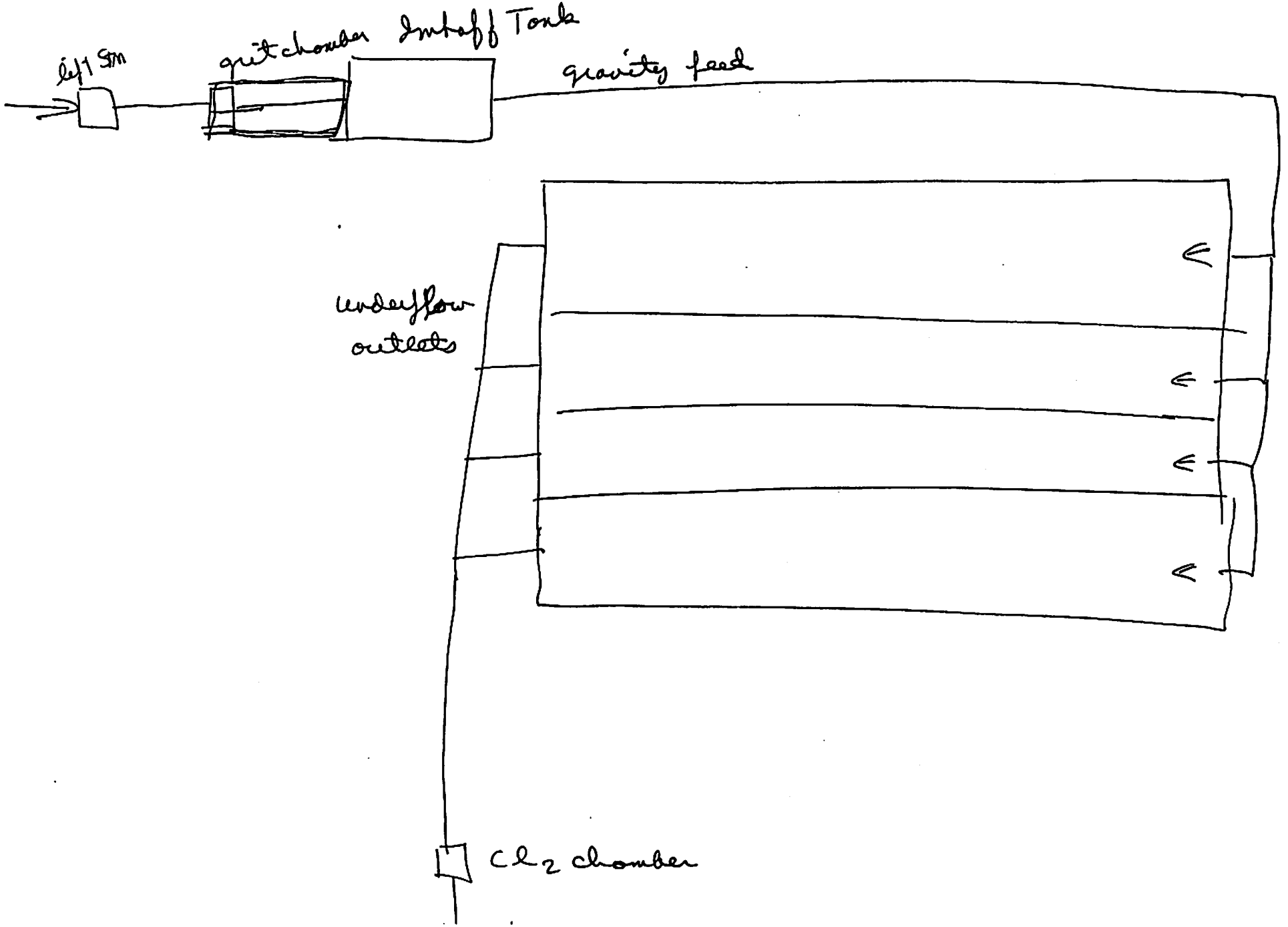
Did have a pit east of the ponds. Did pump coating matl in Imhoff tanks to pit once. ~1980
To pump solids from bottom would drain + put solids in #3 pond to dry
Did put grit chamber sludge into 4-5' deep pits behind Imhoff tanks (north of ponds). About every 3 months about 55 gals.

Don't test for metals
Never used $CuSO_4$ as algaecide
NPDES permit from state. Revised July 86

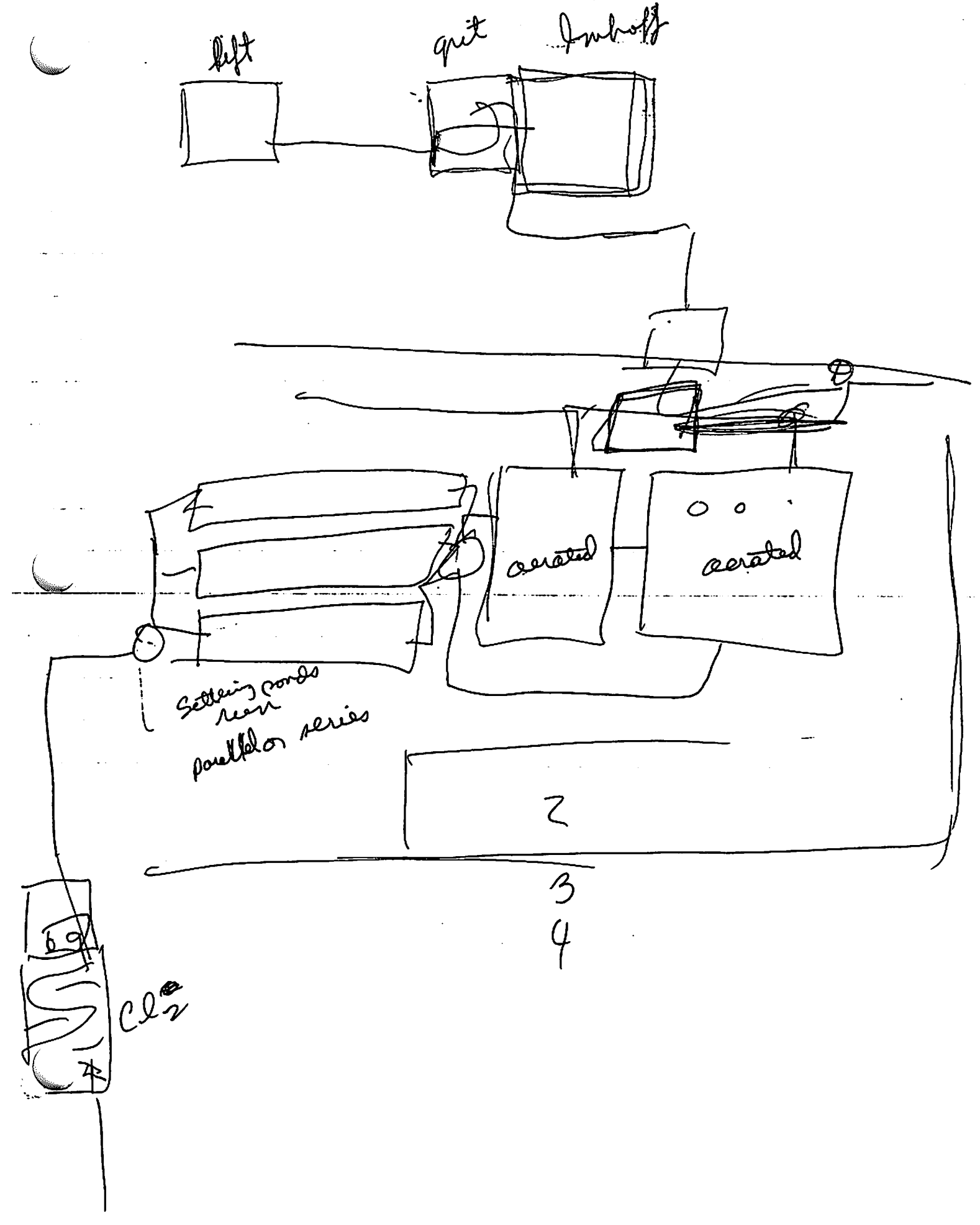
Never encountered trash when digging pits
Was oil in ditch (N-S to W of plant) but source was unknown.
was constant since 1976 until last year or so.

Thinks pre 1961 was septic tanks he thinks but not sure. Was a foundation for an incinerator on corner near WWTP

Old + New Plant



New plant


lift
grit
Imhoff
aerated
aerated
settling ponds
rear
parallel or series
2
3
4
Cl2

SITE SURVEY QUESTIONNAIRE

Interviewer Robert G. Ingersoll

Date 9/23

Interviewee Steve Richards

Shop/Area Wastewater Treatment Plant

I. Present History

What were/are your duties or responsibilities at the activity? @ 1976 at the plant. only operator for 11 years. Class III. In carpenter job before that

In what operations were you involved?

Operation	Brief description	Dates
Problem in 1976-1979, sporadic oil in influent, traced back to Air Force Rec Hall (day care now located). Pit where the day care playground is now, auto maintenance, covered pit when the found it.		
Problem with road sealant (asphalt emulsion), from drain at Bldg 19 about 1977 or 1978.		
Imhoff plant 1976 went in got these. Aerated lagoons December, 1985. Discharge? Ponds 8 to 10 feet deep, settl: 2 aeration		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Current system uses approximately 2/3 of the first of four old ponds.

Problems go to 3 or 4 pond for storage

Effluent - 30 BOD
- 90 TSS

Run fecal coli 400

Chlorine residual test (normally runs about 1 ppm)

TDS no limit — 1900 average, 1750-2350 ppm.

Past operations

Plant in 1960-1961, operational prbably 1962. Not much maintenance.

Four ponds, ~~one per~~ each pond scraped twice (1976-1985)
All four cleaned out in 1985.

~~Probably~~ No guess on sludge quantity. Assuming the sludge went to landfill.

Pumped Imhoff tank to the pit immediately east of ponds, in al 1980, removable of floating stuff.

Grit removal to a couple of 3-4 or 5 foot deep pits within the fenced area. Every 3 months put a 50 gal of grit to the pits.

- No bug kill in 2 weeks.
- Never tested for metals
- Never used copper ~~sulfate~~ sulfate as an algaecide.
- NPDES Permit through State
- Check last application w/ PW engineering, new permit in July 86.
- Never dug into trash with pits.
- Ditch west of plant, oil in ditch. Any place along ditch maybe problems continously (1976-?), not this last year.

Before 1960, probably septic tanks. Foundation for an incinerator

- 350-400,000 gpd current
- 170-180,000 gpd, avg 250,000 gpd in 1976
- Jim Gormley - Tool Room Mechanic - 1940's, early 50's

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/22

Interviewee George Levette 1973

Shop/Area Transportation

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
Shops	Sheet Metal -	1973-1980
Transportation	Chief of Transportation which has 2 div. Maintainance and Operations.	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) muriatic acids diluted and radiological materials too drains, 1 man shop 1 qt/week diluted

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

(2)

Steam lines old are in about the same position as new lines but U.G. Old lines parallel the paving.

~~Abbott et al~~

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Steve Richards - Sewage Plant Operator
Everett Kussick - Operator in Transportation
Al & Bianchi - Retired (involved in
Remo Matteucci - Lives near Lakonton Dam
Frank Adams - retired from Transportation

Sewer plant = overflow to canal 1973-1980

changed in 1980 - concreted up ~~manhole~~ so couldn't leave site. 1/month overflow between 100-1,000.

Drainage from shops to sewage plant

(1)

Sewage plant built ?

~~origin~~ originally settling system to 1980?

water allowed to evaporated

solids - cleaned w/ loaders and taken to

? not sure but as per State agreemat

landfill by checkboard operated until mid 1970's

not sure when started — active at least since mid 1960's

no wet garbage but not sure

but paint cans in there

Perimeter roads oiled w/ waste oil from Bowsers

anything in Bowser - spread solvents etc

ended in 1980 was in practice when George got here

(2) Shops - paint cans, spray cans, solvent (PD-680 ~~clean~~ used since 1982)

doesn't know type used prior to 1982. Paint thinner

lacquer thinner

~~oil~~ galvanized scrap metal, brass, copper

All this material what to landfills prior to 1981?

began to be separated + recycled in ~~1976~~ 1976-1977

Present landfill active

(A) on map (Ingersoll) area of landfills

Old underground vaults (concrete vaults) associated w/ old steam line in old parts of station - abandoned when steam lines went overhead. Vaults were filled w/ what ever was

Continue disc w/ George Leveth 9/23 8am

Car wash built ~ 1977, drains into open ditches, no separator
A new car wash has been ~~installed~~ ordered and will replace old one soon

Paint Booth
is a unit inside a Bldg. Bldg built in 1976. Paint booth added 1978.
Has not been used since 1984.
Used loaded paint for painting cars etc
Used ~ 1 gal paint/month w/ lesser amounts of lacquer and paint thinners

Booth has a concrete floor, cracked some oil stains

Outside booth is light equip repair (lawn-mower, small equip). Room has a floor drain reported by Leveth to drain into the ground. Probably received various fluids (possibly the paint solvents, radiator fluid etc.). A worker present said that it was very slow draining and he "had trouble draining a couple of

gallons of radiator fluid" in the past.

Booth had a dry filter system. Filters were irregularly replaced and landfilled.
The booth @ Transportation replaced an old spray booth in Old Hangar 300 (65E). No info from Levette on that hangar.

Spent containers from Maintenance used to be ~~landfilled now~~ they used whenever possible, some prob landfilled.

Separator @ Transportation
drains pressure washer area. Built ~ 1977
currently separates solids, no oil in now, but in past received oils.
Drains to sanitary sewer

Kissick will call me

Some stains up to 10' diameter present in equipment area.

SITE SURVEY QUESTIONNAIRE

Interviewer Bud Stuntzen

Date 22 Sept

Interviewee Mr Prockish

Shop/Area Vehicle maintainence

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
· Vehicle Maintainance of all equipment/transpon vehicles - Jeeps, tractors etc	· Engine maintainance · oil change · replace brakes · painting - thinners · radiator repair - Batteries & other car parts - PD-680	1968 - 74

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint (lacquer enamel) thinners, acides, bases, preservatives) PD-680 Miniatie acid (radiator)

radiological materials ∅

biological agents ∅

2. Ordnance materials (e.g., explosives, propellants) ∅

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) ∅

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?
oils

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?
engine oil, Batteries, vehicle parts, brakes, - lubricants
radiator fluid, transmission fluid; paint thinner/paints ⌐ enamel
└ lacquer
How were these wastes stored prior to disposal?
mechanical parts + Batteries → stored on pallets → auctioned off to junk yards
Lubricants-oils - in 500 gallon Bowzer - filled 1-3 times/yr.
How were these wastes disposed?

On-site

Location
Active landfill / dust control; Roads

Disposal Method
used for dust control + excess was disposed of in the active landfill at the time.

Off-site

Location

Disposal Method

Name of Waste Hauler
See shipping & recieving

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?
Galen Jones @ shipping & receiving.

- Steam cleaning ~~was~~ was performed over sump any solids ~~was~~ were collected & put in dumpster rest of rinsate went down drain to sewage treatment facility

- brake pads → dumpster → landfill

- hydraulic fluids - radiator fluid & waste oils went into 500 gallon Lugen, spread over roads for dust control any left over/excess went to the current landfill. this was reported from 63 - 74. ~~probably always~~ this was probably the practice for all time at NAS Fallon up to 1981. Shipping & receiving handles all waste oils now (1981 - present) put in 55 gallon drums.

- Paint thinners - enamel / lacquer > small unused quantities went down drain & to STP.
- PD 680 ~1 gallon / 3 months

- Batteries - current, stored in 55 gallon plastic drums before being ~~stored~~ to sent to shipping & receiving.
  - prior to being sent to shipping & receiving (1981 & before) batteries along w/ other

Radiator maintainance: small amounts of miniatic acid was used to [redacted] clean off any corosion this was rinsed into a 100 gallon tank, tank was drained. [redacted] 1/week down the drain.

SITE SURVEY QUESTIONNAIRE

Interviewer Robert G. Ingersoll

Date 9/22/87

Interviewee John Whitmer

Shop/Area Electrical Supervisor

I. Present History

What were/are your duties or responsibilities at the activity?
At Fallon since 1975, transferred from Alameda. Electrical Supervisor since 1976.

In what operations were you involved?

Operation	Brief description	Dates
Complied with Federal PCB regulations. Currently 12 PCB transformers (50 or greater) on property, ≈25 PCB contaminated 3 month monitoring on PCB transformers, no monitoring on PCB contaminated. pad mount 6 PCB transformers 1981, started checking pole mounted transformer 1986 still checking 6 pole mounted transformers, Not marking PCB contaminated. Probably shipped 15 PCB transformers off to shipping & receiving, stored in Gator Compound ≈40 transformers stored, started shipped 1982 & 1983; now the asbestos storage area.		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Gator compound cleanup - visually checked for PCBs, sampled the soil, shipped it off to Hearlong, CA, disposal center

- Current storage by Bldg. 15 lot, currently have 16 transformers, highest 290 PCB.

* No spills of PCB transformers since 1981 when started checks
* No spills of any transformers since 1976.
* No rebuilting, no reconditioning.
* Two PCB capacitors on base.
* Guy that ~~went~~ came before quit, John never heard of problems before he could on board.
* Program - ballast, tubes, switches goes to shipping & receiving. Talk to Shipping & Receiving about everything.
* Doesn't know about hydraulic fluids.
* Before 1981; ballasts, switches probably went to disposal areas. Nothing was burned.
* Safety in on the picture now, unknown items at Shipping & Receiving now
* ~~many~~ solvent for aircraft stock cleaner chlorinated solvent previously, no drums
* ~~Chlorinated~~ solvent drums - PD 680, good disposal program.
* No carbon tetra here

Talk to Ford about P/C sites, not aware of any PCBs on ranges.

SITE SURVEY QUESTIONNAIRE

Interviewer Robert G. Ingersoll

Date 9/22/87

Interviewee Kim Neal

Shop/Area Carpenter/Paint Shop Supervisor

I. Present History

What were/are your duties or responsibilities at the activity? 12 yrs, 1976
5 yrs as supervisor at both shops. In those shops all 12 yrs.

In what operations were you involved?

Operation	Brief description	Dates
Historically, U shaped building (COLD Area) paint, thinner & solvents dump on bare ground in the U of Bldg. 15. Area now covered with concrete & Paint shop then from base began. Area got vehicular movement, pedestrian, not really stained. No other shop dump there. GSE Hangar two paints yellow gear, Transportation had paint booth. Drums outside of paint shop in U shape area, siphon out of drum, some drop dumped on ground. Dryed paint, paint cans to disposal areas. Carpenter shop, just normal carpenter com trade compounds, nothing unusual.		In August, 1986

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) Currently 55 gal drum of mineral spirit lacquer, toluene, & dope thinner. Usually use 1 drum ea per year.

radiological materials Same useage historically.

Latex ~ 15 gals every 3 days
Oil based paints – 3-5 gal every 4 months (signs, metal doors) } Historical use also

biological agents

2. Ordnance materials (e.g., explosives, propellants)

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.)

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Bullseyes on ranges, ~~painted~~ excess paint to be blown up dumped on target, Range Department. One time, 500-1,000 gallons of excessive paint to bullseyes in 1979-1981? Probably no solvents or lacquers.

& Foreman before Kim had same type of operation.

SITE SURVEY QUESTIONNAIRE

Interviewer Robert G. Ingersoll

Date 9/22/87

Interviewee Dale Jensen

Shop/Area Pipefitter Foreman

I. Present History

What were/are your duties or responsibilities at the activity? At Fallon 1972, most of time. Pipeshop foreman since 1985.
Mechanic 4 yrs, welder 9 yrs.
In what operations were you involved?

Operation	Brief description	Dates
D.	Water soluble cutting oils currently, some in past. PD-680 solvent for machine shop, 5 gals a month currently & historically. Asbestos from pipe insulation in burial area. Still lots asbestos on pipe. Asbestos from pipes used to go into disposal areas, until maybe early 1980's. Ron Nigron started asbestos burial program. Some asbestos siding & ceiling tile (little bit) in asbestos burial ground. Small quantities & sizes of PVC pipe glue & prim thrown away empty. Some sandblasting with beads, doesn't know where beads go. at boiler house (Bldg. 19)	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Cooling towers - probably 6 or 8 at 800 blg & barracks. Doesn't know about water treatment -John Widmer knows.

* Shavings at machine shop go DPTO for recycling. Historically went to disposal area. Very little lead pipe if any on base.

* George already covered disposal areas.

* Pipe shop put in wells, dug with backhoe, PVC pipe down hole, slotted the pipe in pipe shop, 1/8" by 6" slots 8 or 10" pipe, 5 to 3 to 5 slots, 25 cuts in each one, bottom 4 ft slotted, put some gravel around well, backfilled with dug out material. Fuel farm runs monitoring program. Everett Kissock was operator digging the holes.

* All fuel lines cathodically protected. Old days uncertain. Four concrete tanks at old fuel farm in use. Safety/Engineering should have list of tanks.

* Doesn't recall any pipeline breaks. Fuel farm handles most of piping at fuel farm.

* One leaking pipeline where pipe enters the property, right by road & pump station.
Doesn't recall any leaking tanks.

* Old fuel farm in old area (Gerry Hole already spotted)

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/24/87

Interviewee Dick Fields

Shop/Area PW 50 Boiler House

I. Present History

What were/are your duties or responsibilities at the activity? water lab - 2486 boiler - 2424

In what operations were you involved?

Operation	Brief description	Dates
	*	/

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

At Base
Since

Dick Fields (1972) MCG 9/24/87

Old Service Station (might be 1942)
2 - 8000 gal tanks
have stored JP-4 - had to be burned
Oil left in pit when hoist pulled/hydraulic
oil (old 300 gal) in the hoist

Boiler Plant Operator
Pipe fitter
Heat + Boiler equip mech

Talk can of swimming pool
water test lab
Keep all tanks full of #2 diesel
and wells

in pit under hoist

Hangar 4 -
has 4 55,000 gal tanks
Old fuel farm
2 Tanks abandoned 2000, gal
by EOD just south of Strike
Gator Bldg, tanks held #2 diesel
pumped out last May

Wells (drilled 1961)

Water chlorinated near @ well head

chlorine stored in cylinders over concrete in a block house. 5 cylinders present.

use about 5 pounds/day

#2 and 3 600 feet deep

1250 gpm

drawdown 3.9' 9.3 ph

#1 southwell

pumps 600 gpm

25' drawdown

1,mil gpd

1 time wk - bacteria sample

1/yr mineral iron, as. Fl (.84)

Pools

O club - at least 14 yrs old

New pool (enlisted) built 76

soda ash - summer keep

HCl -

Sodium bicarbonate - for alkalin

Calcium Chloride - for keeping water hand

Chlorine -

Use variable.

Boilers - on natural gas
1984 to nat gas
#6 prior and #2

Pool (Enclosed) B16
chlorine stored in cylinders
chemicals stored in bags
storage bldings have chemicals in bag
drain in floor receives backwashes
& DE filter material which
means pool water goes down
Sacks to garbage,
No spills reported of any materials
And cleaned pool once this year, spent
wastewash to sewer.
Minor white DE and soda ash on floor of
treatment room - concrete floor

Minor pool testing chemicals to sewer, few drops
per day (unknown)

Boilers
Sodium Sulfide - deoxygenater
Closed System

3 boilers @ HTW (new boiler house)
1 @ Garage @ Transportation (burns #2 diesel
make steam,

6 sacks/year
use phosphate ~ ppts sludge — continuous blowdown
sodium sulfide — 2/time/week
Old boiler @ least 15 years old
~1972?
in water

goes in drain to sewer system
50-75 gallon

New boilers (3) built 1957
makes hot water
no condensate just hot water
H_2O heated to 400° heats a secondary exchanger
exchanger uses cyclohexamine
coats pipe inside keeps corrosion
→ use about .5 gal/month in line to barracks

1 boiler @ checkerboard
very old (20 years) ~1967?
hot water + steam
Sodium sulfide, phosphate
powder (powder)
→ cyclhexamine
no spills

2 more boilers @ pest control
steam
same chemicals

all chemicals stored @ Tower —
Cyclohexanone @ Hangar 300

all hot water bldgs
we 1881 corrosion inhibitor
~~[illegible]~~
Cooling towers we 446. corrosion inhibitor
BOQ 447 corrosion inhibitor

No spills or leaks.

Tanks

2 - 12,000 gallon tanks steel UG
2 - 85,000 gallon tanks AG
~~all 4 above~~

→ #2 diesel (maybe in past JP-5)
still in use, probably put in 60's (has not sum) maybe even late 50's // Put in when working on DEW (Distant Early Warm System)

Use - 1 for boiler
1 for generator shop

Old Service Station by Quanset Hut Bldg 62
2 - 7,000 gallon tanks steel
in hut is old mechanics pit has hydralic fluid 500 gallons in it open (under boards)

When installed - 1944?
for diesel or gasoline
later used for JP-5
no indications of leakage

@ EOD

2 V6 Tank

JP-5 or #2

old (doesn't know) steel

probably 1500 gallons

Not in use

---

old Vehicle Maintenance

may have old tanks, Dick is unsure

noone has tried to store

---

2 26,000 UG tank

behind Bldg 19 (old boiler house)

1 full, 1 empty

1 tank was waste oil, (JP-5 and gas mix) 1983-1986

Used to hold #6

1944 vintage probably steel

Other tank still has #6 as of 1987

At new boiler house 3 tanks #6

1-66000 steel #6 tank

No indication of leakage from any

Middle tank has #2 diesel (used last year for 3 days)

Other 2 have #6 (has not been used for 4 years)

Old Wells Air Start
had a tank 2,000 diesel steel
UG:
Dug up in 1986 covered w/ concrete
No indication that it had
leaked. Dug up for line from
new building.

Hangar 300 tank boiler
dug up 1984 2000 gallon.
No indication of leakage

Dispensary (behind)
still in use for standby
generator and compressors
2 tanks 1524 gallon steel
Water from dentist office drained
into a sump behind Med
Bldg - came up about near
corner of bldg

Present Service Station (Fuel Farm)
have to talk to Larson

Base Station
Myers (Special Services)
near chapel

Strike has a tank
lock @ bldg on left side

2000 gal diesel
in use for heat in
winter

Access from Strike is old air force
galley. Old tank hasn't been
used in 10 years. Used to fuel
boiler (not in use)
#2 diesel
1958? Air force
Pumped out 2 years ago

Theater UG 2000 diesel
Current
for a small oil heater
Ponderosa UG 500 gal
new 1987 #2 diesel

Water Lab
test for TDS, Conductivity,
for Boiler and return
Some acid — HCl one pint/year
down drain

SITE SURVEY QUESTIONNAIRE

Interviewer NTD

Date 9/23/87

Interviewee Everett Kissick

Shop/Area Transportation

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
All over base	Truck Driving Equip. Op. construction equip + crane work	1973 - present

II. Operations Data

see notes back page

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

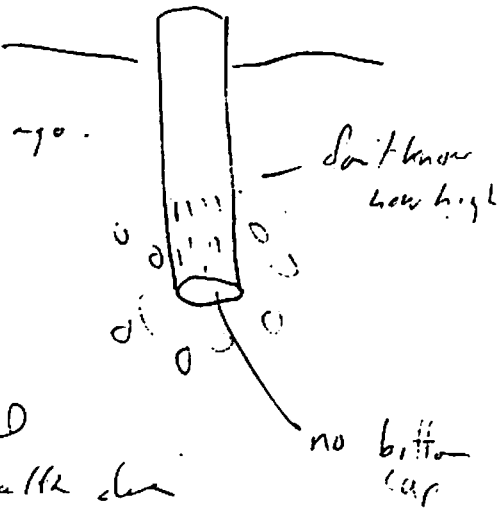
Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Bowser - used oil. Dumped on [illegible] to hold down dust. Had spray bar on back of it.
No fuels, gasoline, JP, diesel ever put into Bowsers.
CB's usually did road oiling. DK only did it once.

Test Holes

10-12' deep 6" PVC
most still there. Doesn't know lab results.
Maybe a dozen at the most.
10 maybe.
Other operators put in rest of them.
Dale Palmquist passed away couple yrs ago.
DK put in 3 of them.



Paint Booth - used for painting vehicles
Joe Beaver took one & use it. Retired few years ago shut down by Occ. Health dept & safety. Painting contracted out - town now. Enclosed booth w/ water drain & hose off vehicles
DK never did it.
Office is in Transp. bldg

Batteries stored on pallets. Acid dumped on ground. Then sent & [illegible]

Ek never saw solvents, etc. Only minor spills of waste oil
~~[illegible]~~ Oil went from trucks to 5 gal cans to bowser
Few years ago, started putting in 55 gal drums. No more bo
prob. 1978

Hangars had their own bowsers. Dk doesn't know their
practices

Some diesel spillage when filled + dispense fuel out to

Landfills

① SW - checker board, see map, before Ek time but heard from
oldest guys

Charley Driver
Jim Gormley } here from start
tools Bldg 15

② WWII - see map, before Ek time ↗

③ Sewer Plant Dump see map, " probably WWII vintage

④ Shipping + Recieving before bldg - PDO - Properly Disposal
Gator compound see maps 2 asbestos areas.

FIELD MEMORANDUM

ACTION INFO

To: Sketch drawn by

File:

X-Ref:

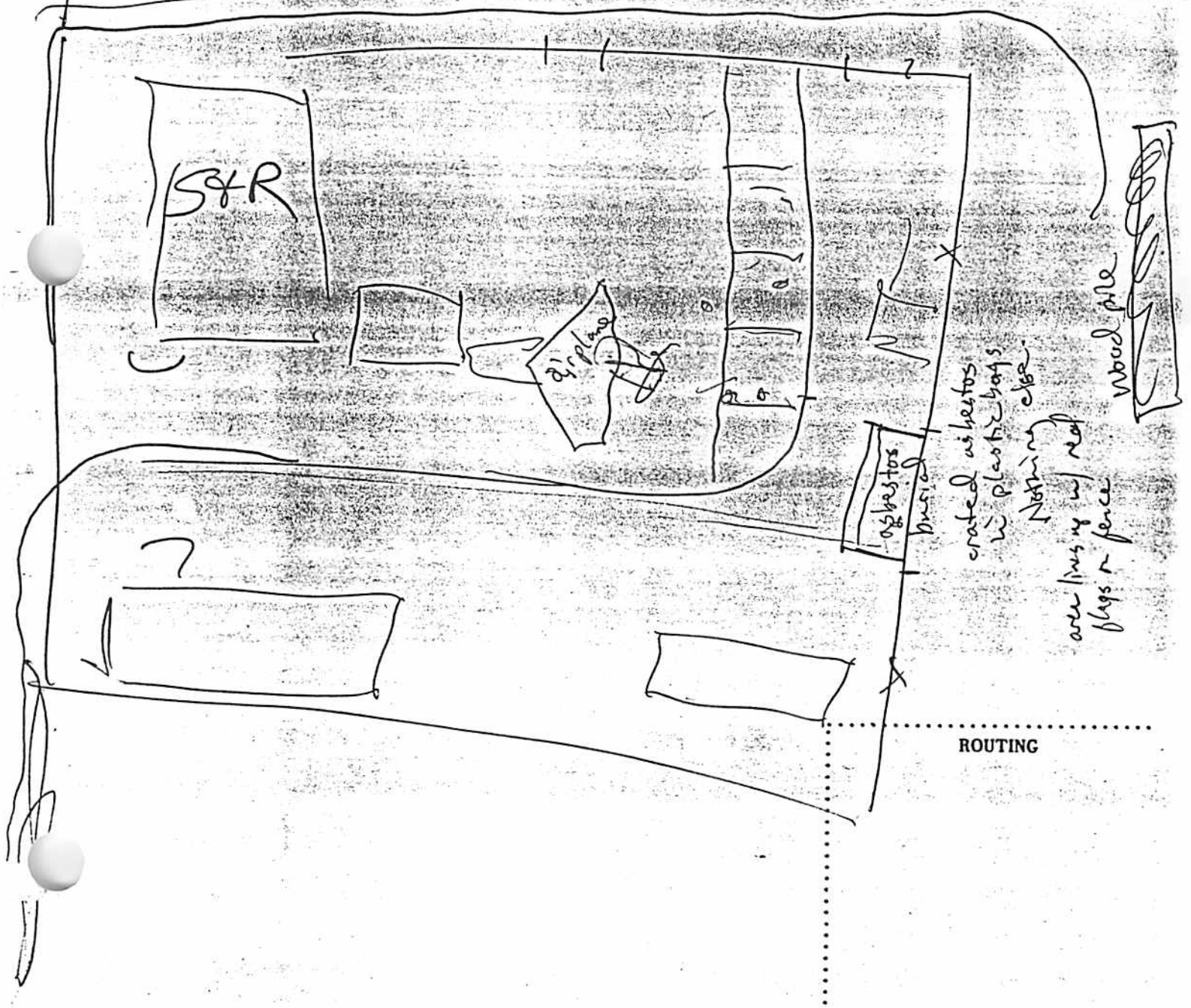
Date: 9/23/87

From:

Reply Required By:

Subject:

Reference(s):



ROUTING

FIELD MEMORANDUM

ACTION | **INFO**

To:

File: Gator Compound

X-Ref:

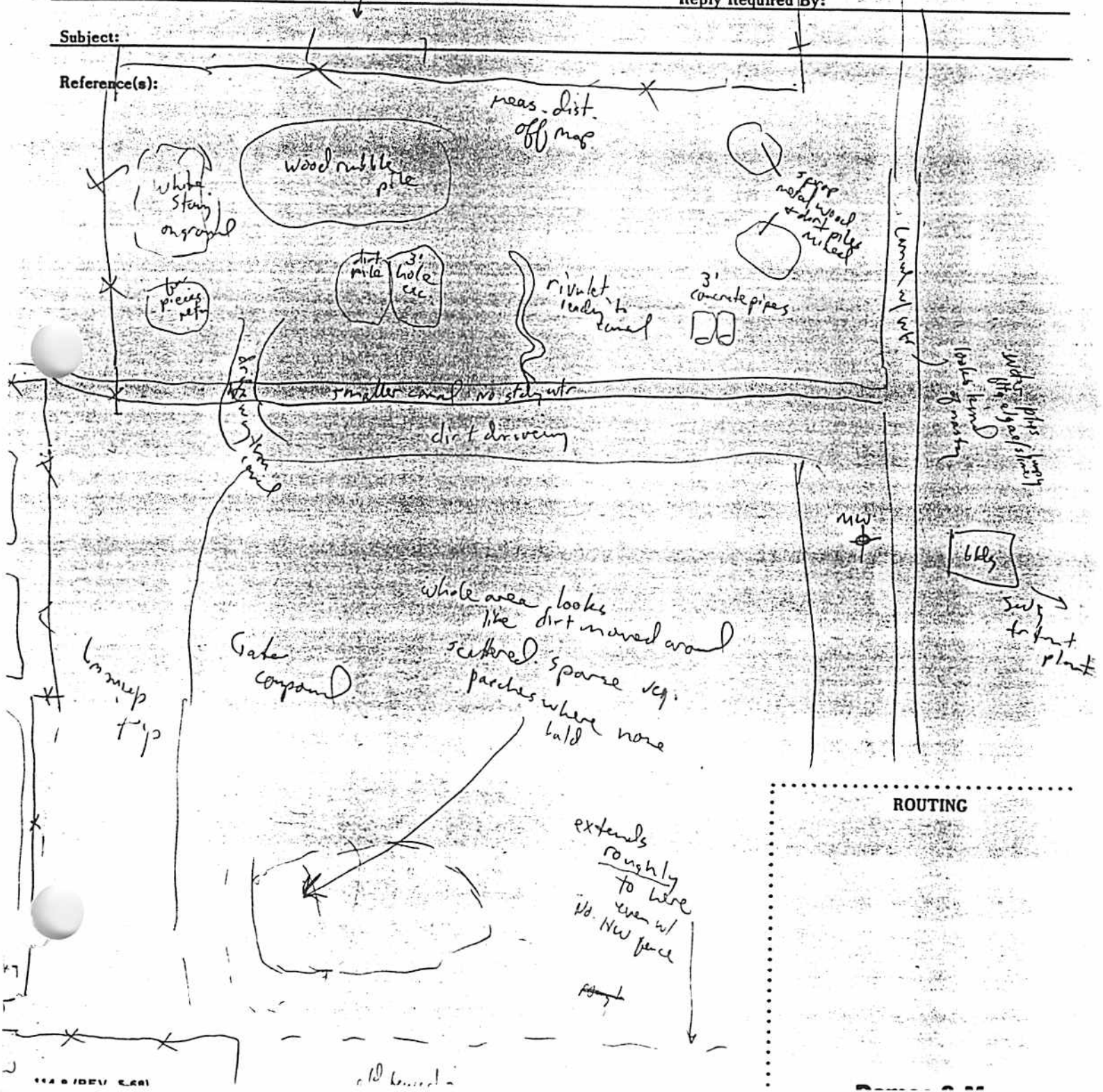
Date:

From:

Reply Required By:

Subject:

Reference(s):



ROUTING

9/24/87 MCB interview

Everett Kusick - Operator, instructor
here since 1973 (site visit w/ MCB, Kusick, and Bd)
visit all known landfills

near ordnance dump
see map for limits
old material
hit it during trenching in 1981 or 1982
didn't hit any live ammo -
but he suspects it was

old dump & near new one
batteries everything here

In void
EK buried 2 camping trailers (all parts)

Old wells near old landfill
EPA directed
1978-1979
Forrest Kincaid
or in Barracks 4 MCD

Older Dump moved across road in 1984

WW II dump (see my

Muck from sewage treatment
used for berms

Supply Bldg Build 12
reported old WWII material buried
never been dug up.
See Map for location

EK dug up old tank at ground in 1985
diesel fuel, 500 gallon
leaked,
discharge into adjacent ditch, smells now
leaking into H2O
See Map
Glenn Shaw ask about tank

Tank at old TAKAN near Tower
diesel, no contaminated soil
removed last 2 or 3 years

Checker board dump
closed since EK got here
dug up metal, barrels

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/24/87

Interviewee Jim Gormley

Shop/Area PW. Tool Room

I. Present History

What were/are your duties or responsibilities at the activity?
Started 1951 when reactivated
In what operations were you involved?

Operation	Brief description	Dates
	Laborer	
	Truck driver	
	" " heavy	
	Equip. Operator	
	Tool Room	

Dump in 1951 - SW corner. Checkerboard built on a dump. Then went to EC. area.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/24/87

Interviewee Ed Catlett

Shop/Area P.W

I. Present History

What were/are your duties or responsibilities at the activity?
1958

In what operations were you involved?

Operation	Brief description	Dates
WWTP	67 - 73	
Hauled Garbage	1958-59	
Plumbing	[redacted] 10 yrs.	
Scheduler		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Doesn't know about fuel dumping.

No fire training when he started. Doesn't remember when started but FFTA is only area ever used here.

Was a dump ~~[illegible]~~ where WWTP is now used after SW corner (≈ late 50s early 60s) - He's sure of this

thinks old Redwood WWTP was back to 40's

Also heard of dump of junk in 1946 west of incinerator

DLA trenches in 73 yes - junk not sure about liquids

No details on old fuel farm

2 old magazines, torn down ~ 1952
no old disposal, contents went to Hawthorne

Did do napalm burning

Gator area asbestos burial + several (?) 1 gal. cans of PCB oil buried there ≈ 1984.
(Charles Newnham Jr)

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Jim Gormley

Do you know any other shop workers we should talk to?

Garbage Hauling

Landfill in SW corner town area near transmitter farm north fenton. Doesn't remember oil to dump but cans yes.

WWTP

Old plant — Solids disposal to ??

Probable original plant

behind were two redwood tanks above ground about 30' ϕ 15' high. Just settling tanks + discharge to canal add in 1958

New area in 1958 4 barracks, fuel farm in place in 1958, medical, BOQ (old)

new runway extension ~ 1960

Did have one WWTP plant upset in 67 on oil problem but source not determined. No Cl_2.

Imhoff tanks solids put in settling pond and picked up by sailors. Never had to clean out ponds. grit chamber pumped out + put in a truck. to ??

Office since ~ 1973

Does have some knowledge of oiling roads but doesn't remember details. Thinks perimeter road from fuel farm to Ponderosa was asphalt (not oiled)

Doesn't remember fuel dumping or napalm burning

Never fuel farm in use when he started.

Doesn't know if #6 leaks but ~~Kent~~ believes
may be were avgas leaks, some contam. soils
near tanks. but not big spread
Suggested talking to Jim Gormley - do at 1500

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/24/87

Interviewee Glen Shaw

Shop/Area PW - Generator Shop

I. Present History

What were/are your duties or responsibilities at the activity?
1972

In what operations were you involved?

Operation	Brief description	Dates
	Generator Repair + Maint. throughout	

All generators are diesel powered

Generators at Checkerboard stopped use in 1974 then weekly alternate. To go to Air Force.

AG tanks belong to Housing. (Dick Fields)

generators fueled by UG tanks size + number ? (Dick Fields)

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Use motor oil for lube oil. 4-7 gal capacity.
↳ 60KW
Changed every 300 ~~hrs~~ hrs. every two weeks. Most generators. ON ranges used to burn in incinerators (one at each range) burned with garbage etc. up to present. Next change will be to barrels. Last change ~ 2 yrs ago
Just one brought back in barrels
B generators: Security at EW 15KW
B-16, B-17, B-19 at operational centers at each range.
2. 60KW 1-100KW

ON Base Generators - 25 total.
~~Tower~~ Runway Lights - 4 corners (B 220)
Tower - ~~B~~ B. 301
Receiver - B340
Transmitter - B. 342
Radar (ASR-4) B. 230
Site 63.
B. 226 (Tacan)
B. 84
B. 19
B. 130 (light station)
B. 314
B. 309
H. 1
H. 1 (fire pumps) 3 gens.
Bldg at water tanks - 2 gens. 2 250 gal tanks

See list for tanks

Bldg 806 +
6 Backup gens. (on wheels)
drain to 5 gal. cans to barrels. when full go to Shipping + Receiving since 1984.
Prior. put in barrels + sent to old boiler house

Maintenance at B. 806
Used a parts cleaning tank PD-680
50 gal drum now use a pan. do outside waste goes to barrel. Before barrels went to bowser to boiler house. 1 drum lasts 6 months only one on hand at a time.

Never any diesel or oil spills. Never any solvent spills at B. 806.

Landfills E → W then W → E

No napalm burning observed
Never observed fuel dumping

Base built in 40s.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

PUBLIC WORKS DEPARTMENT
TANKS

BLDG #	TYPE FUEL	CAPACITY	UNDER/ABOVE GROUND
806	DIESEL	12,000 Gallons	Underground
820	DIESEL	80,000 Gallons	Aboveground
820	DIESEL	80,000 Gallons	Aboveground
19	DIESEL	480 Gallons	Aboveground
460	DIESEL	777 Gallons	Aboveground
18	DIESEL	1,235 Gallons	Aboveground
19A	DIESEL	26,016 Gallons	Underground
19B	DIESEL	26,016 Gallons	Underground
19C	DIESEL	8,022 Gallons	Aboveground
407	DIESEL	777 Gallons	Aboveground
413	DIESEL	777 Gallons	Aboveground
405	DIESEL	272 Gallons	Aboveground
412	DIESEL	777 Gallons	Aboveground
62A	DIESEL	7,761 Gallons	Underground
62B	DIESEL	7,761 Gallons	Underground
385	DIESEL	777 Gallons	Aboveground
430	DIESEL	777 Gallons	Aboveground
477	DIESEL	8,000 Gallons	Aboveground
427	DIESEL	2,000 Gallons	Underground
424	DIESEL	2,000 Gallons	Underground
375	DIESEL	685 Gallons	Aboveground
333	DIESEL	11,021 Gallons	Aboveground
303	DIESEL	544 Gallons	Aboveground
315	NO #6	60,000 Gallons	Aboveground
700	DIESEL	15,000 Gallons	Aboveground

REPRODUCED AT GOVERNMENT EXPENSE

GENERATOR BUILDING
TANKS

BLDG #	TYPE FUEL	CAPACITY	UNDER/ABOVE GROUND
19	DIESEL	500 Gallons	Aboveground
309	DIESEL	1,000 Gallons	Underground
84	DIESEL	350 Gallons	Underground
~~220~~	DIESEL	~~1,000 Gallons~~	Underground
Not sure ~~239~~	DIESEL	~~50 Gallons~~	Aboveground
301	DIESEL	2,000 Gallons	Underground
314	DIESEL	~~2,500~~ Gallons	2500 ~~Aboveground~~ Under
326	DIESEL	~~1,000~~ 275 Gallons	Underground
341	DIESEL	1,000 Gallons	Underground
343	DIESEL	1,100 Gallons	Underground
63 Auto	DIESEL	750 Gallons	Underground
B-16	DIESEL	2,500 Gallons	Underground
B-17	DIESEL	2,500 Gallons	Underground
B-19	DIESEL	2,500 Gallons	Underground
ASR-8	DIESEL	1000 Gallons	Underground
800	DIESEL	300 Gallons	Underground
MLT B-17	DIESEL	1,500 Gallons	Aboveground
HANGAR 1	DIESEL	500 Gallons - Fire Pump	All
HANGAR 1	DIESEL	500 Gallons - Fire Pump	Aboveground
HANGAR 1	DIESEL	500 Gallons - Fire Pump	
HANGAR 1	DIESEL	300 Gallons - Water Pump	Both
HANGAR 1	DIESEL	300 Gallons - Water Pump	Aboveground
HANGAR 1	DIESEL	550 Gallons - Generator	Underground

Supply

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/23/87

Interviewee Galen Jones

Shop/Area ~~Supply Shipping & Receiving~~

I. Present History

What were/are your duties or responsibilities at the activity?
1962

In what operations were you involved?

Operation	Brief description	Dates
Sailor	Av. Hydraulics Mech.	Nov. 62 - 66
Civilian Emp.	Shipt receive	1978 - Pres.

No real program for HW management prior to Jerry Jane Did try to make station aware of HW requirements Prior to 1985. Oil bonzers spread on road, aircraft washed on apron. Would take off spec paint out to range and used it on the bullseyes.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Old Fuel Farm
4 Concrete tanks were avgas.
put fuel oil in them in 1970s.

probably have leaked, unlined

Ed Catlett, Mike Rue at PW many know of conditions
Were deactivated by 1966 but in operation 1957-59
Doesn't remember if there were leaks

New Fuel Farm was already here in 1957. He thinks fire training area was at present location.
Trucks fill (top off) at rack + drive over to apron to fuel planes 5000gal. capacity. Truck bottom drains drained every day each truck is 4-5gal./day. 15 trucks used on average. Max. issuance 50,000g pd.
5 runs/day/truck average.

3 Ug tanks JP-5
1 Ag JP-5
1 Ag

1bbl = 42gal

13,000 bbl - 2 → Ug - steel lined tanks, cathodic. pre-1957
5,000 bbl - 1 →
15,000 bbl - 1 - Ag - ~~only~~ late 60s → lined steel tanks
30,000 bbl - new - Ag - 1987

2 more tanks moved old to new farm in mid 60s

New fuel farm since ≈1945

Will probably install another 30,000 bbl AG tanks when new fueling system becomes operational in 1-2 weeks

Busiest recently - 3,500,000 gal/month. JP-5

Also handle gasoline + diesel. Have 6000 gal. gas here
All JP comes in via Ug pipe from Reno So. Pac. Pipeline

Minor spills - trough around top off fac. goes to concrete tank. Try to avoid defuelers. Concrete tanks and wells pumped off weekly.

Separator installed about 1981. Prior to separator fuels disposed to ground. Tank bottom waters + fuel disposal to soil then ditch.

Used to dispose defuel to old boresighting range
Used to take it to boiler plants. → occasional
→ mostly 1000-5000 gals/month stopped in about 1978

Would pump about weekly 50 gal/tank 3 tanks, mostly water - JP-4, then JP-5. Currently run bottoms through filter about 1 gal water goes to slop tank (about 1000 gal separator tank) since about 1981

No known significant leaks. Tank 3 did have a leak in the 1960s.

Avgas - never had any solids bottoms.
nor in other tanks.

Drain each truck every morning goes to drums then to fire dept. for burning.

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/22/87

Interviewee Jerry Jum

Shop/Area Shipping & Receiving

I. Present History

What were/are your duties or responsibilities at the activity?
2½ yrs here at shipping & receiving

In what operations were you involved? Hazardous waste & records until July, 1987 when Safety took over.

Operation	Brief description	Dates
* Navy personnel – AK1 Grimm ran program. ~~Non~~ Almost No Records when Jerry took over. Compound buried ordinance in S&R area, asbestos pit here & one at EOD at sinkholes, Dumped fuel on other side of runway also ran generators & boilers. Never received any algaecide or biocides, got sodium phosphate (25 gal) one time → for haz waste cleanup team. Old gas station (tanks) at quonset hut. Pulled tanks from the old fuel farm. Suspicion that there are vent pipes west of Fire House ≈ 500 yds.		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Over at landfill area picked up isobar - sealant drum, garbage crew dozing the landfills pretty good. Basically no haz management until 1984 & 1985 & Some the wash down from Hangar 4 got into ditch system, ~~the~~ aircraft cleaning compound, oil & grease, Ditch used to get hard & crusty

Heard about fuel smell soils on the other side of runway. Dug the ~~pit~~ wood pit, no problem (down to 4 feet deep).

* Got rid the PCB transformer this Feb, 1987 through DRMO. Sat here for about a year. Copy of manifests at Safety. Had shipped PCB stuff off property prior to Jerry take over. Safety did Yearly PCB report.
* 80% hydraulic fluids, oils
  20% acids, paints, solvents, lacquers including nitrocellulose
* used high temp hydraulic fluids,
* used to be presses at Public Works, no PCBs - tested. Did have Cadmium & chromium.
* Sampling program — mostly unknown drums
* Stored in this yard, haz waste
* Paints, oils & muddy water in Gator area when Jerry took over,
* PCB transformers at S&R & PW yard when you took on
* Only capacitors shipped were for repair/not shipped for disposal
* DPDO yard at base, closed about 1979 & 1980, probably right here.

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/22/87

Interviewee Bob Lawson

Shop/Area Fuel Farm

I. Present History

What were/are your duties or responsibilities at the activity?
A B.200 Fuelfarm 1964

In what operations were you involved?

Operation	Brief description	Dates
Fuel Farm only.	driver operator workleader foreman.	3-4 yrs. last year

II. Operations Data

What materials were used in the operations described above?

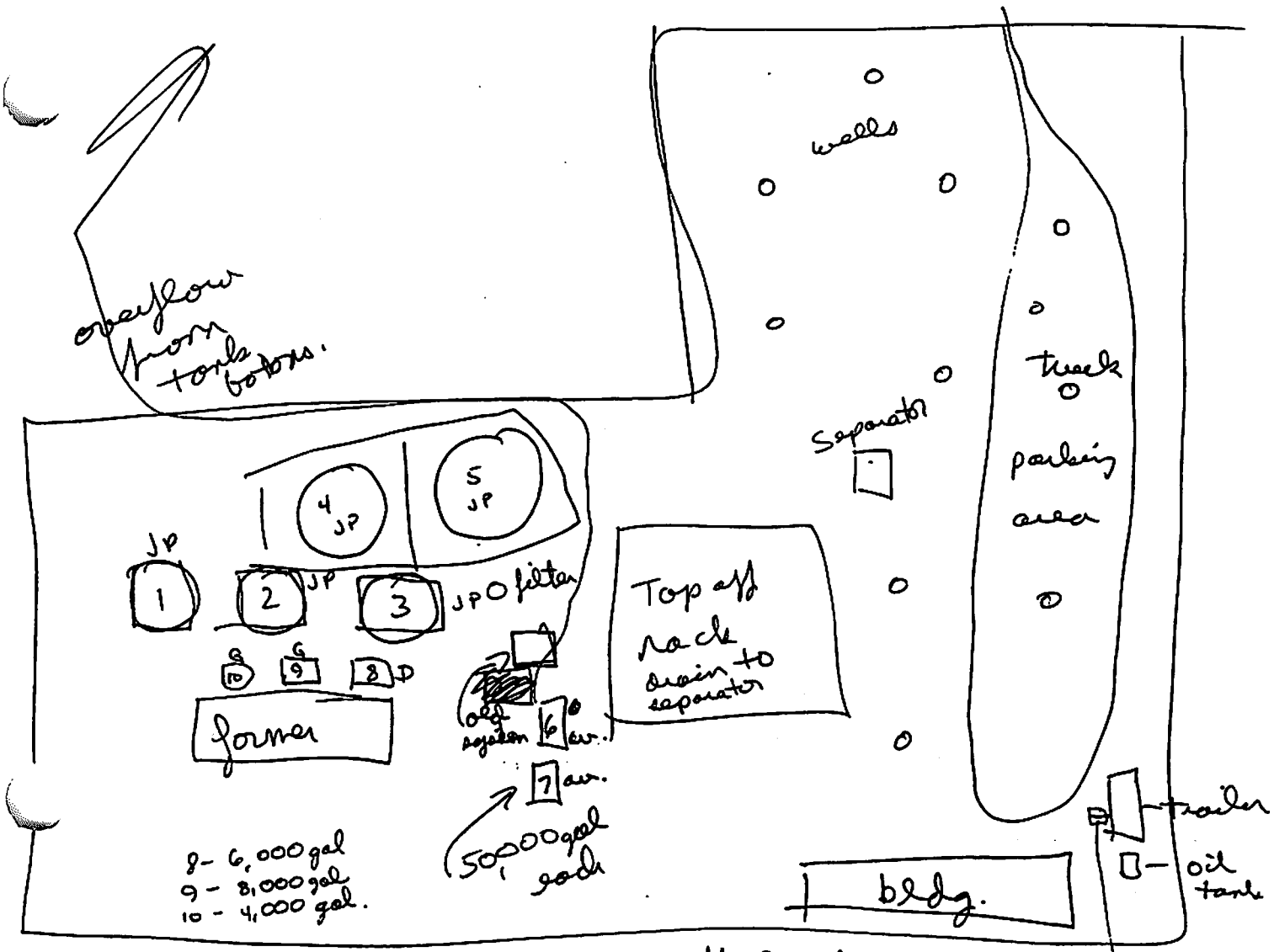
1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) Fuels Avgas, JP-5

radiological materials No

biological agents No

2. Ordnance materials (e.g., explosives, propellants) No

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) No



JP fuel in

6 tanks 10 - no leakage

Top Off Rack

- filters at ~~top~~ off racks take out water which goes to drain to separator
- surface drains to separator

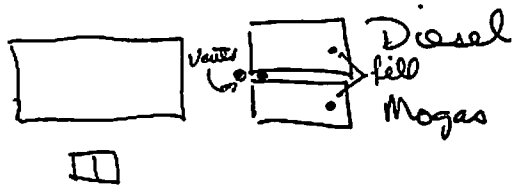
two flammable lockers Paints & alcohol

Truck area - check every day + dump water to barrels

Wells put in wells backhoe ~~DB~~ -20' set casing installed ~ 1985

Charlie Driver, Ken Townsend

9/24/87
addendum Military Stn.



Mogas	10,000 gal	steel	very old at least 15 yrs old.
Diesel	3,000 gal	steel	cathodic? thinks not

At old station – doesn't remember any leaks or spills. Vehicle maintenance was right behind gas stn.

No leaks or overspillage at current station. Small stain around piping. Have lost some fuel but think its paperwork or theft ~~loss~~ loss.

Had a spill at Top Off Rack ≈ 1.5 yrs. ago. ≈ 2,000 gal. spill. Truck valve failed overflowed area. Dug up dirt + dept finding more contam. going to add automatic flow pumps. Mixed water/fuel 14 wells in stuff removed. Use a hand gauge with paste to stick wells. Pump to waste truck to fire dept.

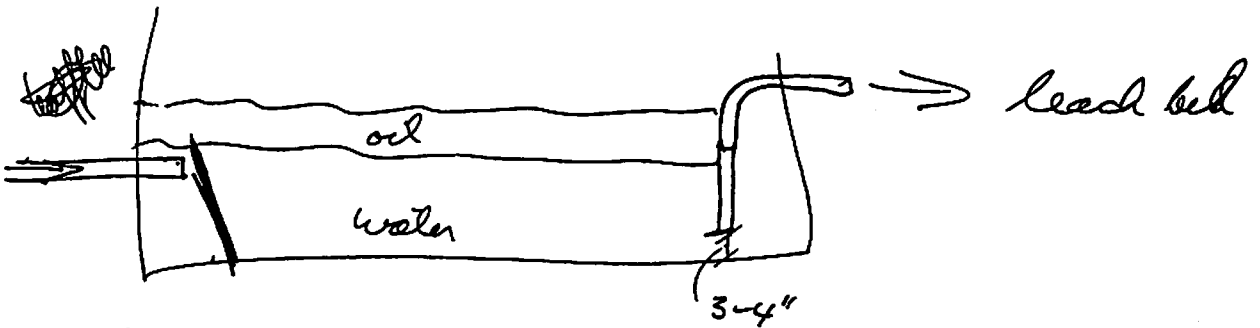
~~Sep~~ Separator

Water flow to leach field 50 yds E of separate keep ≈ 42" water in it ~~it~~ at all times. Pump fuel off to waste truck to fire dept. filters + top off to separator. Clean sludge out annually little sludge also goes to fire dept.

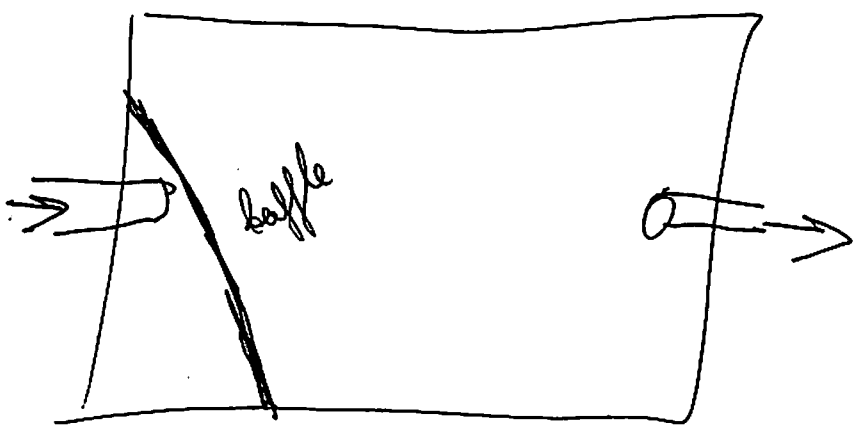
Doesn't work – doesn't separate really

thinks fuel goes to leach bed.
Unlined concrete any cracks – leaks.
– Used to spray a little fuel on ground for weed control.

Wells near leach bed have much more fuel than elsewhere. Source - separator tank is ~ 5000 gal.



baffle to rest above inlet



SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/23/87

Interviewee Ron Keeping

Shop/Area Air Start

I. Present History

What were/are your duties or responsibilities at the activity?
1981

In what operations were you involved?

Operation	Brief description	Dates
PW Trans.		74-81

Current Facility - Air Compressor - Feb. 87
Generators - Mar. 85

480 input ⇒ 575-400 hertz ⇒ to apron. Power conversion to get amperage needed for aircraft

Air Start Compresses to 175 psi ⇒ apron drop to 45 + 75 psi to aircraft

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

While in PW Trans

Tranny overhauls on Trash trucks.
fluids went to bowzers. Couldn't drain
trannys well. Had problems with fluid
spilling out when disassemble. Tried to keep
clean. If fuel vehicles had ~~fuel~~ JP leaks would park it
S of road until fixed. Minor spills but
no major problems. Would steam clean
equipment. Steam cleaner discharged to sewer
after a sump (he thinks ~~no~~ didn't work right)
solids were removed. Most leaks were a few gallons
occasional occurance.

...l sprog ...t road
or ... his
pu... starting
there.

~~Operated~~ Repaired crane (drag line) at landfill also. (1974-1981)
landfilled from E to W north of angle road.
in 1974 were ~100yds W. of bend in road. By
1981 were about 100yds W of T intersection at
Ordnance. Doesn't know details of opns.

Everett Kissick operated mostly

Ro... tower moved 1986 to present Loc
...paired generators.
When repaired generators at Trans, Rec. + Radar
oil pumped to bowzer on truck near med. one at corner (for tower)
Glenn Shaw repaired generators at PICS - in part
now in elec. shop. also on ... done by

- Wells unit (metal bldg) to north now deactivated. Being moved to China Lake

500 psi unit only. Operated 1978 - 1987
4 compressors electrical. 1qt/day for all 4 to ground 1qt/day for 9 yrs

- used GSE equip. for starting prior to '78.

4 disposal pipes to ground - heavy stains in area holes

Generators electrically operated (480V power generator 575V)

Lube oil only fluid. 30W non detergent in 5gal. pails.

store ~~v 12 gal~~ ~ 5 gals. normally

Change every 5000 hrs (2-3 yrs)

in use - ~ 1 gal/generator 3 generators (one new one to come)

waste oil to GSE barrel

old time - in barrel then bowzer contractor removed oil from base

---

Compressors Electrically.

460Hp 165 cfm 3 units

7½ gal. Anderol 500 (synthetic oil) per compressor also changed every 5000 hrs. still original oil will be disposed to drums.

≈ 1gal oil / 10hrs operation goes to air (probable average 1gal/1.5 day)

Some down on sewer (95%) + other "mist" to air (entire compressor room has a "mist" floating in it causing health problems. Get an oil film covering every thing every several weeks. 3 gal PD-680 + 1qt trans oil solvent tank parts cleaner never leaked

---

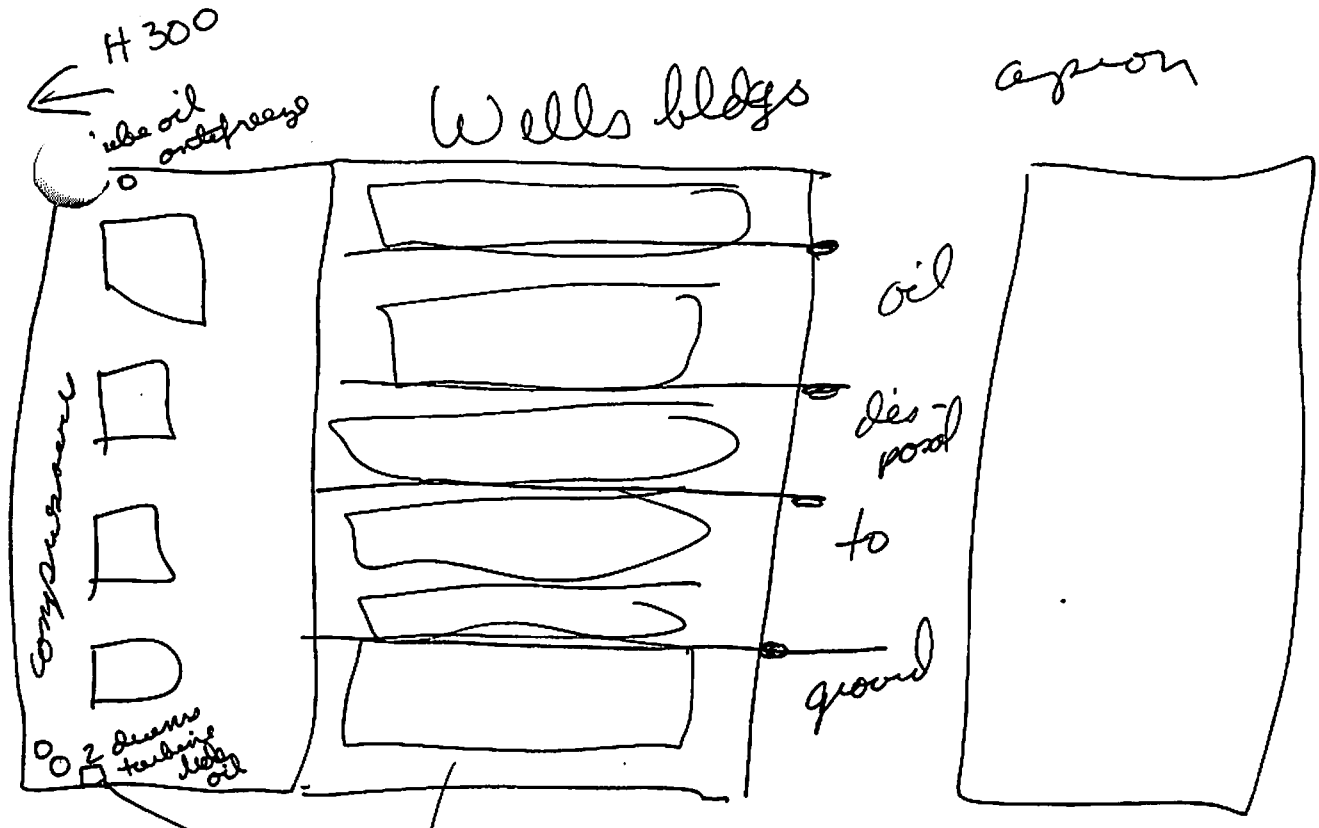
Wells unit - oil changes to 55 gal. drum at GSE then removed off base by contractor

---

Never spilled or leaked nor dumped to ground

no broken oil lines or like that.

Knows of no other problems. Had bowzers then. Stopped



Remembers when he was at Trans - brought in a number junk vehicles (no engines) for use as targets. Weren't good enough so they were buried in the rear of trans. area. (dug hole, put junk in, crush + cover. See Map

SITE SURVEY QUESTIONNAIRE

Interviewer MCb

Date 9/25

Interviewee MMJ White

Shop/Area LOX

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
OVCL		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

White has been there 1.5 years

Lox shop been ~~there~~ there since WW II

Same location

GX shipped in

Use Argon

N_2

O_2

Freon (doesn't have a # for it)

Use ~~1 gal/year~~ 1 gal/year

used for cleaning parts for O.X use

No spills he knows of in present or past

2nd + 3rd Interview Records Attached

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/23/87

Interviewee Gailon Jones

Shop/Area S&R

I. Present History

What were/are your duties or responsibilities at the activity? Here since 1962. 1966 Sailor. 1973 - now Ship & Receiving

In what operations were you involved?

Operation	Brief description	Dates
	Up to Jerry, no one had concerns. Bob England & Gailon tried to get things going, not much cooperation. No haz waste program until 1985. No shipments of haz waste until 1985.	
	Old Paint to range bullseye. Brought paint from Bay Area to Fallon for bullseye. S&R sits where junkyard used to be, DLA cleaned up, buried asbestos, live ammo, junk they couldn't sell right here in the compound. Pits w/ cats 1972-1973. Waste liquids in here. Waste oil on gravel roads. Dug 4 pits - 12' wide X 30-40' long X water table, filled & covered, Part of blacktop over it.	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Dump at SW. corner closed in 1970. Doesn't know if other dump.

Drainage w/ oils came from Hangar 4 to the ditch.

1973 - 1976-77 - ~~DPDO~~ DLA Bill Russell, retiree in Grand Junction, CO

1977 - S&R, DLA moved off-site

No liquids to DLA,

Liquids to landfills.

Silver recovery to contractors direct, X-Rays, photo development from 73 on until 84 to Hearolds.

Gator Compound belonged to Air Force til 75, no chemicals until 1980

- lots of unknown chemicals, still a lot of drums (Safety has storage)
- PCB transformers at Gator, out of sight, out of mind, catchall for wayward drums.
- The bins originally scrap, mixed would ship all the empty drums to Richmond, empty drums shipped with residuals in drums.
- Carbon tetra when sailor, used carbon tet until 75, hangar 4, 360, PW transport ultra-sonic cleaner, 1975.
- Tusco is the major cleaner @ 8011, 8012 - dry cleaner.

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingerson

Date 9/24/87

Interviewee Gaylon Jones

Shop/Area S&R

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
Gator Area	- Safety has haz drum storage 1/2 of compound east side - EOD has the west side, bldg. - No storage west of bldg, only the area where haz. drums are now - The pit behind the S&R was probably disposal pit for the C-54 plane carcass. EOD had blown up the wings. West of where the wood burn pit is now.	'77 or '78

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

* Old fuel farm was not active in 1962. Pumped them dry two years 1985 ago. Had to heat the oil, probably #6. Portable boilers had to heat it. Dry the last two years.
* Old gasoline station, two tanks, at Navy exchange at S curve (quonset hut setting out by itself). Two tanks probably taken out about 1977. Steel tanks.
* Ed Cattlet operated wastewater treatment plant early on.
* NAS Fallon, old Area - 1116188; '69, updated through 82.
* NAS Fallon, New Area - 1116199; '69, updated through 82.
* Old vehicle maintenance area - 3 story bldg., vehicle parking where the bunker is now.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

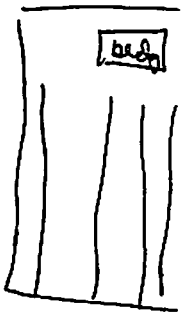
Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Road



Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Retirees Jasper Wheeler, Bill Lee worked here long ago.

Ship + Receive Area Do you know any other shop workers we should talk to?

DLA built this bldg. in 1973. Prior to then pits area was a junkyard. Much of the junk, including ordnance, was buried at the compound. Anything they couldn't sell was buried. Waste chems were also likely buried here. Dug 4 pits 12'X 80' or 90' X 8' and filled them up. Pushed stuff in, ran cats over to compact + covered over.

Old landfill near checkerboard - operating 1962 close about 1970

LA [redacted] - 1973 - 1977 then moved off base. Operated by Bill Russell. No liquids handled. Waste liquids disposed with regular trash. Silver recovery material shipped direct to contractors.

1977 Supply moved in. Bins originally used to store scrap. empty drums only until 4-5 years ago. emptied sent to Richmond, CA to reconditioning.

Gator Compound - Air Force till 1975. Then Housing used to store white goods. No chems. stored here until ≈ 1980. Still stuff there don't know what contents are. Turned over to Safety. "Back lot" storage.

Residuals shipped with drums

Used CCl4 when he was here as a sailor, used up to about 1975.

Hangar 300, Hangar 4; PW Trans

Major Solvent used is Turco, dry cleaning solvent 8011 or 812

Galen Jones 11/5/87

DLA in ~ 1968

used to be a junkyard, probably all excess materials either recycled on base, buried in lf's, or

DLA was responsible for taking old materials screening them, recycling on base, selling or disposing.

S+R took over in 1977 and did the same thing. Disposal was offsite to DDO or DRMO in Herlong, CA

S+R only transfers materials to DPDO, they then dispose of it

DPDO not on base. They come up and visit site to get haz waste

The burial site behind S+R is unplotted and occurred when DLA took over ~~from DLA~~ 1968? question as to date

Asbestos 3 wooden boxes each 77 cu ft
In 1979 or 1980

2 incl Interview Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/22/87

Interviewee Bernie Fowler

Shop/Area Supply

I. Present History

What were/are your duties or responsibilities at the activity?
1972 - Receiving
In what operations were you involved?

Operation	Brief description	Dates
Shipping + Receiving Shop Store 6		2 1/2 yrs previous

II. Operations Data

What materials were used in the operations described above? Receive all Haz. Substances.

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) all on base Stock alcohol for deicing aircraft (isopropanol) 4 drums each month also sulfuric acid for batteries. stocked at B.12 30 gal. most in 1 gal containers

radiological materials None

biological agents None

2. Ordnance materials (e.g., explosives, propellants) Will get small arms ammo. One or two boxes Class C explosives. About once/month

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

Types endrin. Receive one to two shipments/year. Generally come in pallet loads + one in a ~~bag~~ drum.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Everett Kissick. equip. operator.

Jerry June - ran DPDO - will interview.
Fred Furgison at Sevmart on hydraulic fluid
Galen Jones - out sick (X3470)

Knows of no leaks in X fmrs stored in yard.

Solvents - 12 drums - oil, 2-3 drums solvents/week.
lube oil
PD-680 most common.

engine oil ≈ 1800 gal/month in quarts. Similar over time
hydraulic oil ~~[illegible]~~ 60 qts/week ~~[illegible]~~ about 630 gal/month

also receive trans. fluid, brake fluid, gear oil.

Motor oils will come in as leakers once in awhile. Will drain into another drum.

No ~~[illegible]~~ major leaks or spills.

GSE would spill ≤ 1 gal oil when transferring from their bowzer to drums occasional spills.

SITE SURVEY QUESTIONNAIRE

Interviewer Robert G. Ingersoll

Date 9/22/87

Interviewee ~~Jerry June~~ Bernie Fowler

Shop/Area Shipping & Receiving

I. Present History

What were/are your duties or responsibilities at the activity? Here in 1972, with S & R 2½ yrs. Before that auto maintenance at Transportation Jerry here for 2 yrs.
In what operations were you involved?

Operation	Brief description	Dates
DPDO yard	Jerry June ran the DPDO,	

* PCB - Doesn't know about PCBs. No knowledge of any PCB leaks.
* Solvents - dozen drums of oil, some 3 solvents in a week, Solvent - PD 640 most common. Basically same quantity drum last couple years. Hydraulic fluid by the cases (12 4 qts. to a pallet). Fred Ferguson knows exactly. Receives transmission, lubes, not as much as hydraulic fluid.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____

2. Ordnance materials (e.g., explosives, propellants) _____

_____

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

* Don't know what type of posticide compounds they receive. 1 to 2 shipments per year. Something in drum, most in cases.
* Small arms primer, rifle bullets through S&R, maybe once a month.
* No radiation or biological material
* Stock alcohol, isopropanol, 4 55-gal drums a month
* Sulfuric acid stored at Bldg. 12, comes in standard cases you see @ auto store, variable, 8 cases about as large a shipment.
* Had leakers come in on truck, mostly motor oil, drain into another good drum.
* No knowledge of popping drums
* Handling haz. material, GSE had trailer mounted tank used to transfer to drums, small (<1gal) spills occasionally.
* 630 gals / month of hydraulic oils } Fred Ferguson
* Engine oil triple that
* Used lumber dump behind yard, just wood, sometimes burned off.

2nd Interviewee Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/22/87

Interviewee Jerry Jeane

Shop/Area Supply - Shipping & Receiving

I. Present History

What were/are your duties or responsibilities at the activity?
2½ yrs. Handled waste disposal (Hazardous) and recordkeeping until July 1987 when Safety took over

In what operations were you involved?

Operation	Brief description	Dates
Warehousing		1 month

no records when he took over. Used to bury ordnance in this compound. Also asbestos site in rear. Asbestos pit in EOD area. Knows of old fuel or oil disposal on ground on other side of runway. Some used to fuel boilers at boiler plant.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?
PO1 Gremm ran for ~2 yrs prior to Jerry

Doesn't know of algaecides or biocides. Sodium phosphate was used for cleaning (once - 25gal., contractor picked up

ug tanks at former gas station
" " " old fuel farm (thinks at least one removed)
has found vent pipes across from fire station (west of
about 100 yards west.
Was also a napalm burn pit near current landfill
Was a drum of "isopar" (sealant) picked from landfill
he picked up once.
HW program basically started 1984-85.
Some aircraft wash down (Hangar 4) runs off of apron into ditch
Have excavated new wood burning pits - no fuel odors.
Has heard of fuel odors in soil on other side of runway.
PCB Xfmrs disposed Feb. 87 to DRMO contractor.
Manifests now at Safety.

[redacted] Liquids - 80% hydraulic fluid, oil
20% paints, solvents, lacquers
acids

[redacted]

Use hydraulic fluid containing tricresyl phosphate
[illegible] uses.

were some presses at PW but oils did not contain PCB. Did contain some Cd, As, Pb

Used to store in rear yard (where plane crash now is). Drums in shed on pans.

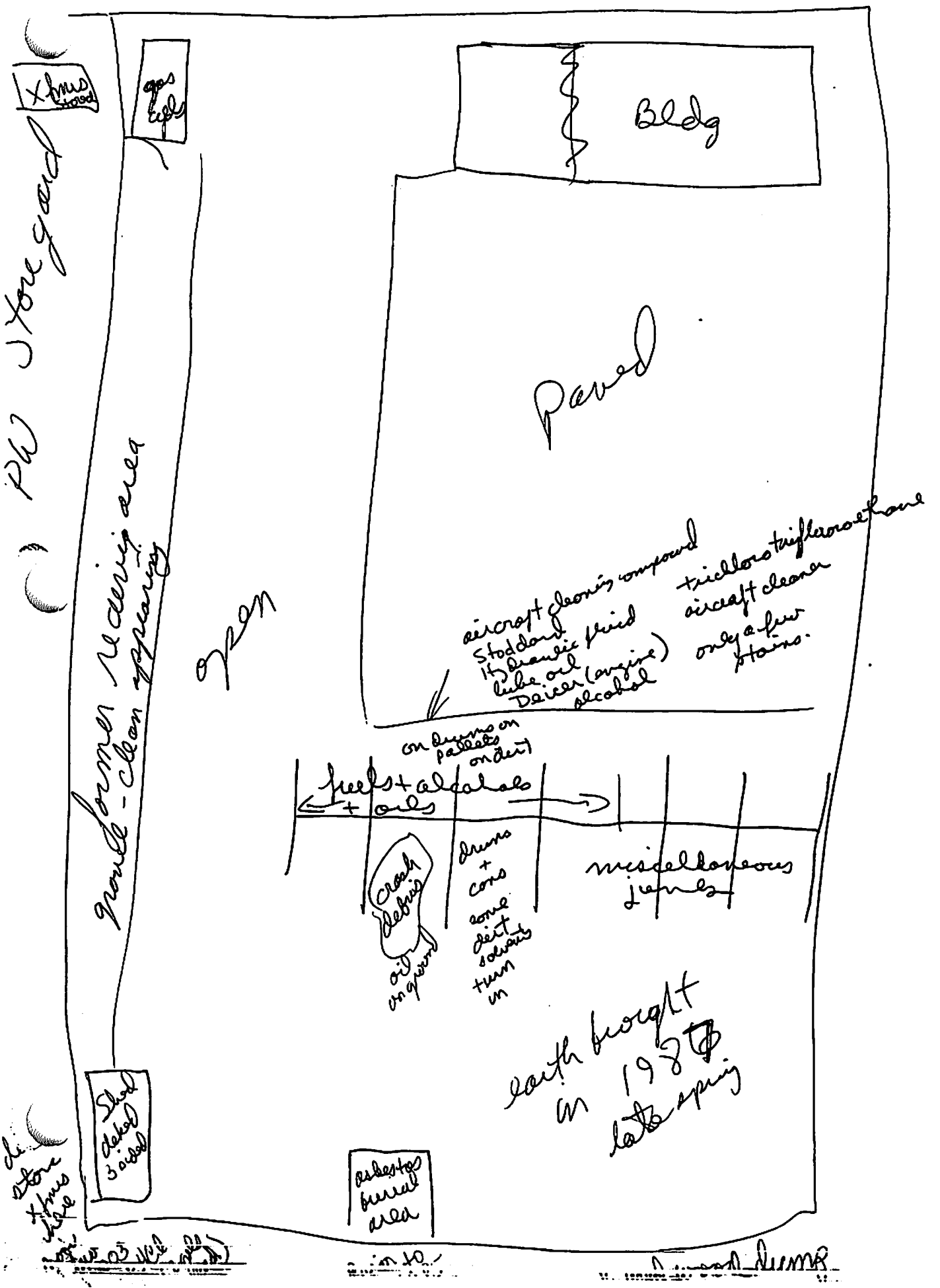
Gator area had old paints, oils etc. no PCBs some in PW some in rear yard.

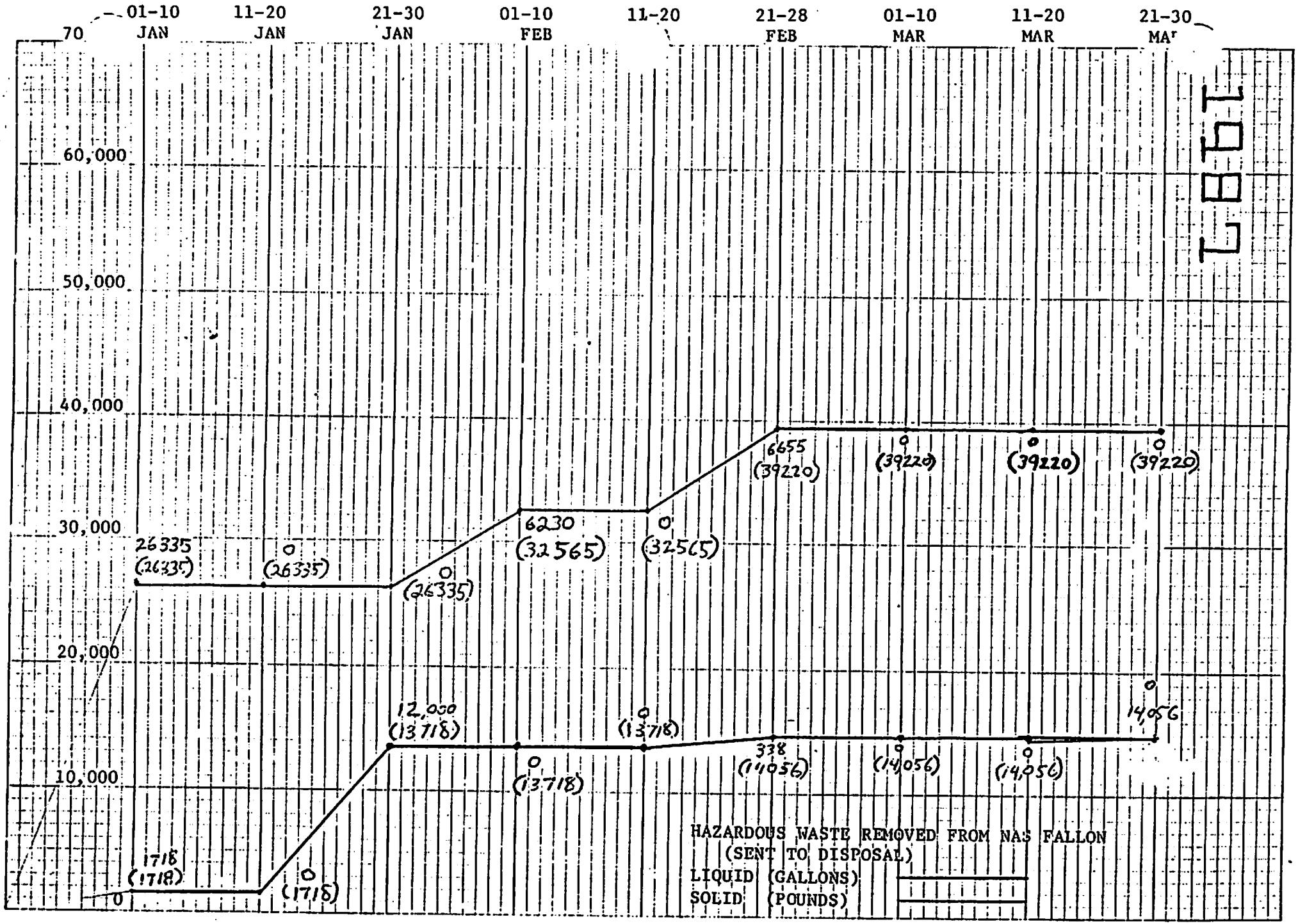
Did ship some capacitors but to recycle rather than disposal.

Was a DPDO yard here closed ~ 1979/80 probably at Shipping + Receiving - Galen Jones will know.

Was one spill at Hanger 4 about 40x40 ft. probably ~ 100 gal. JP-5 cleaned up + disposed through Jerry. Mar-Apr. 87. Never escaped the tarmac.

Fowler


PW Storegard
X fms stored
gas cyls
Bldg
Paved
open
aircraft cleaning compound
Stoddard
Hydraulic fluid
lube oil
Deicer (engine)
alcohol
trichloro trifluoroethane
aircraft cleaner
only a few stains.
on drums on pallets on dirt
fuels + alcohols + oils
crash debris
oil on ground
drums + cans
some dirt solvents turn in
miscellaneous junks
earth brought in 1987 late spring
Shed dated 3 sided
asbestos burial area
dumps


01-10 JAN
11-20 JAN
21-30 JAN
01-10 FEB
11-20 FEB
21-28 FEB
01-10 MAR
11-20 MAR
21-30 MAR
70
60,000
50,000
40,000
30,000
20,000
10,000
0
26335
(26335)
0
(26335)
0
(26335)
6230
(32565)
0
(32565)
6655
(39220)
0
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0
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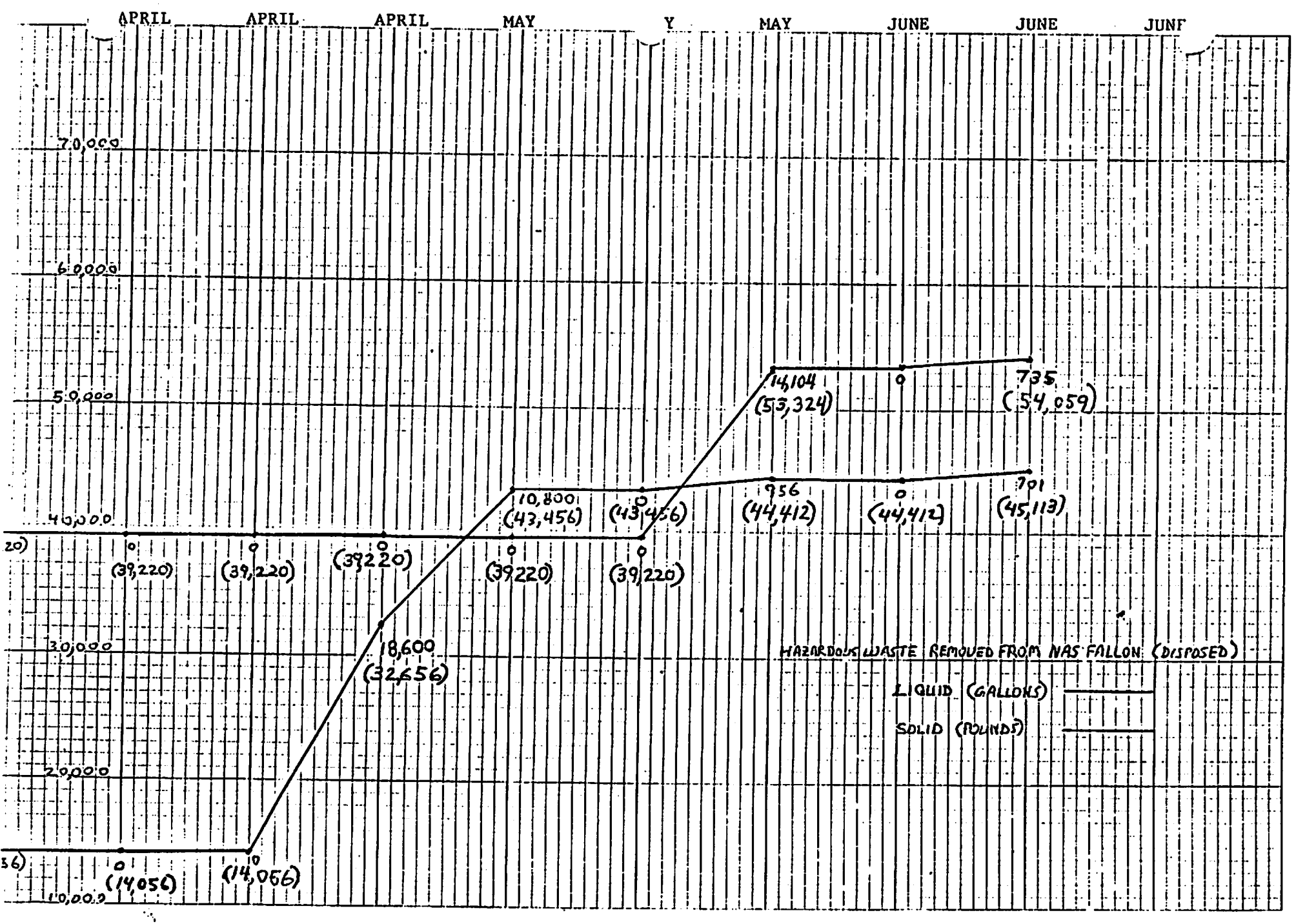
0
(39220)
1718
(1718)
0
(1718)
12,000
(13718)
0
(13718)
0
(13718)
338
(14056)
0
(14056)
0
(14056)
14,056
HAZARDOUS WASTE REMOVED FROM NAS FALLON
(SENT TO DISPOSAL)
LIQUID (GALLONS)
SOLID (POUNDS)


APRIL
APRIL
APRIL
MAY
Y
MAY
JUNE
JUNE
JUNF
70,000
60,000
50,000
40,000
30,000
20,000
10,000
20)
56)
0
(39,220)
0
(39,220)
0
(39220)
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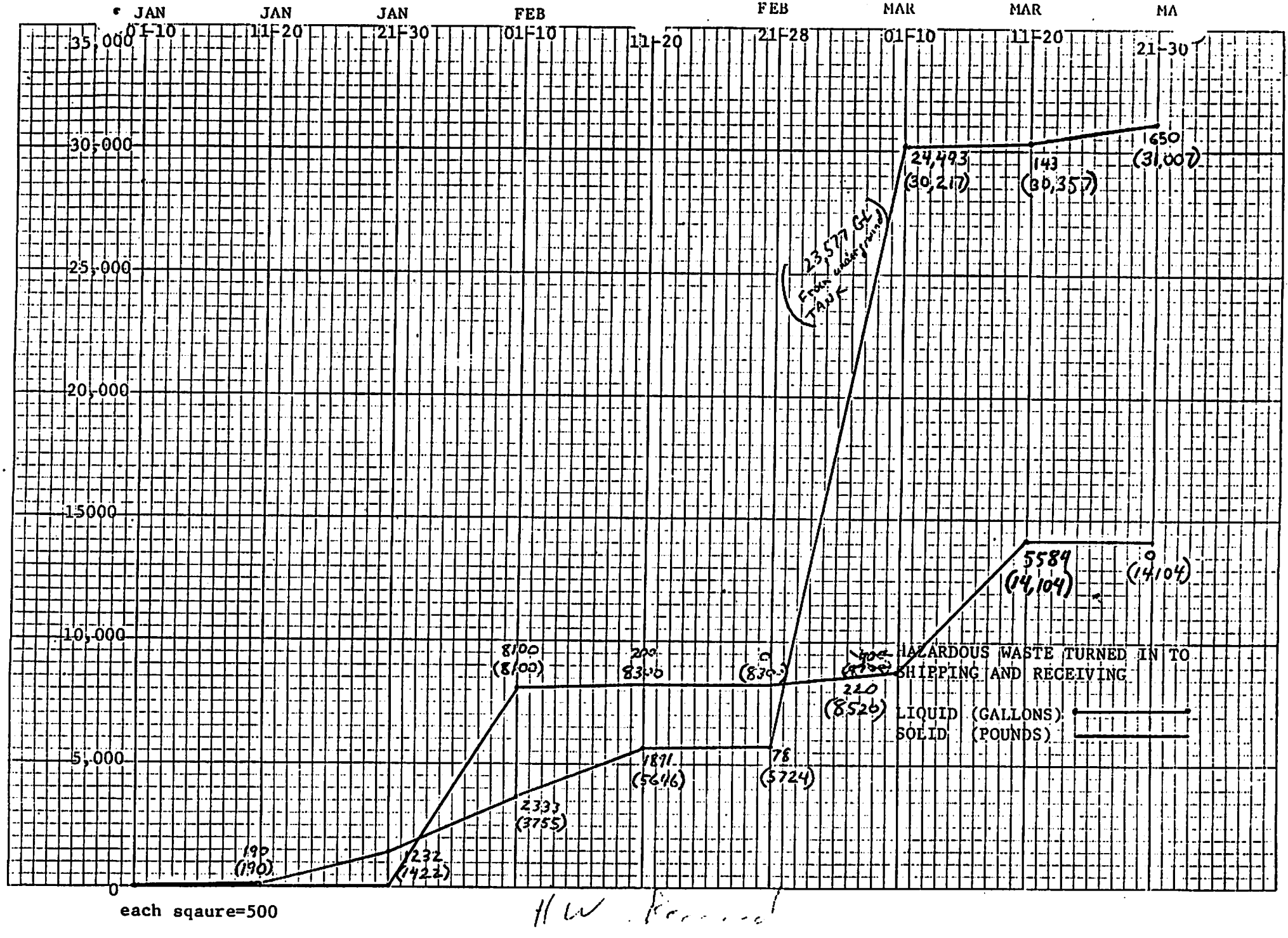
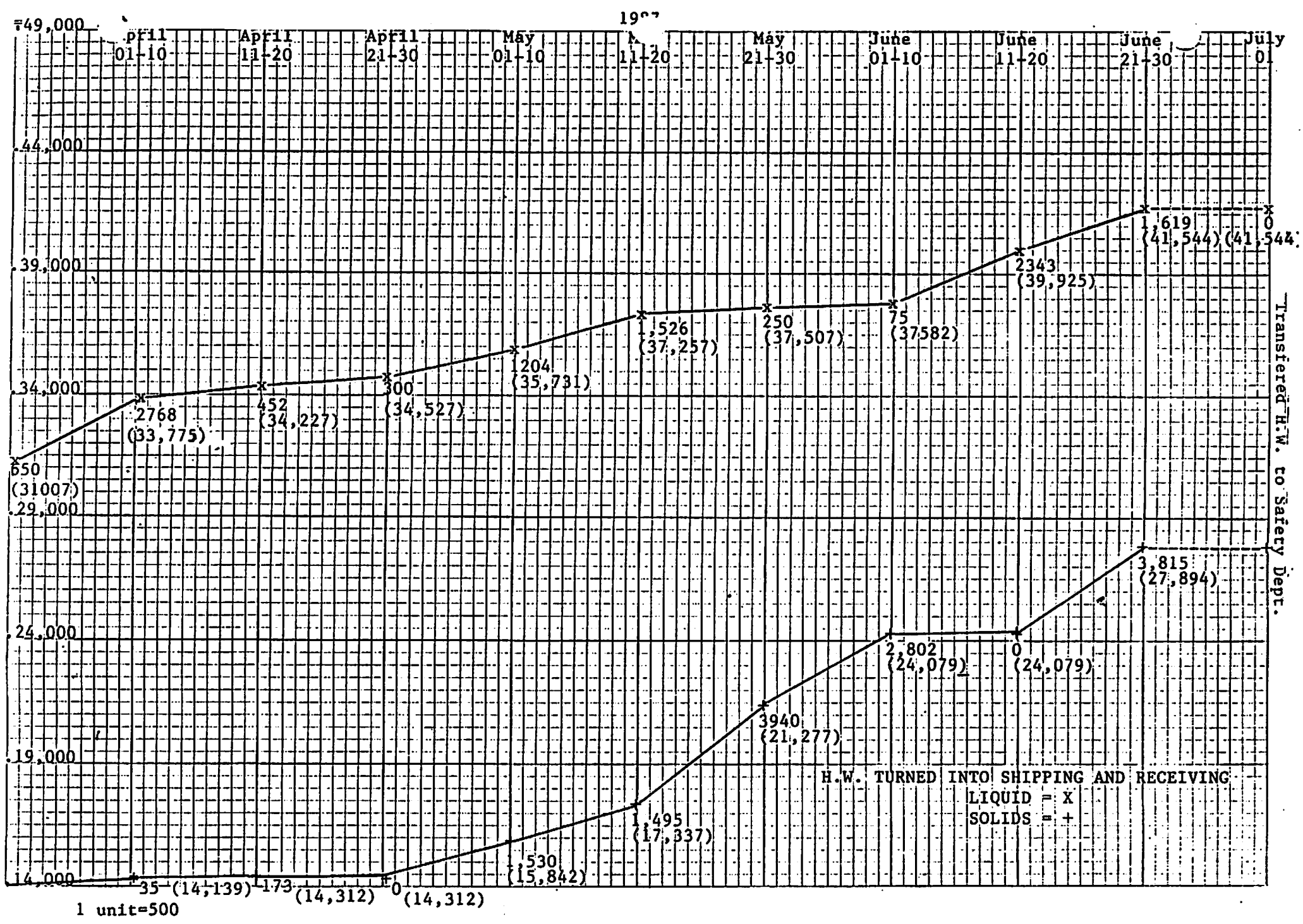
(39220)
0
(39,220)
10,800
(43,456)
0
(43,456)
14,104
(53,324)
0
956
(44,412)
0
(44,412)
735
(54,059)
701
(45,113)
18,600
(32,656)
0
(14,056)
0
(14,066)
HAZARDOUS WASTE REMOVED FROM NAS FALLON (DISPOSED)
LIQUID (GALLONS)
SOLID (POUNDS)
each Block = 1,000


JAN 01-10
JAN 11-20
JAN 21-30
FEB 01-10
FEB 11-20
FEB 21-28
MAR 01-10
MAR 11-20
MAR 21-30
MA
35,000
30,000
25,000
20,000
15000
10,000
5,000
0
each sqaure=500
190 (190)
1232 (1422)
2333 (3755)
1871 (5626)
78 (5724)
8100 (8100)
200 8300
(8300)
220 (8520)
24,493 (30,217)
143 (30,357)
1650 (31,007)
2357 GL (Frm TAU under ground)
5584 (14,104)
(14104)
HAZARDOUS WASTE TURNED IN TO SHIPPING AND RECEIVING
LIQUID (GALLONS)
SOLID (POUNDS)


49,000
44,000
39,000
34,000
29,000
24,000
19,000
14,000
April 01-10
April 11-20
April 21-30
May 01-10
May 11-20
May 21-30
June 01-10
June 11-20
June 21-30
July 01
650 (31007)
2768 (33,775)
452 (34,227)
300 (34,527)
1204 (35,731)
1,526 (37,257)
250 (37,507)
75 (37582)
2343 (39,925)
1,619 (41,544)
0 (41,544)
35 (14,139)
173 (14,312)
0 (14,312)
530 (15,842)
1,495 (17,337)
3940 (21,277)
2,802 (24,079)
0 (24,079)
3,815 (27,894)
H.W. TURNED INTO SHIPPING AND RECEIVING
LIQUID = X
SOLIDS = +
1 unit=500
Transfered H.W. to Safety Dept.

Fire

Email Interview Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer Robert G. Ingersoll III

Date 9/21/87

Interviewee Ray Banovich

Shop/Area Asst. Fire Chief

I. Present History

What were/are your duties or responsibilities at the activity?
Started as fireman, now assistant fire chief

In what operations were you involved?

Operation	Brief description	Dates
Hangar 300	washed material off the ramps before new ramps. 5-6 years ago this practice stopped, now mop everything up. 90% would be 10 gallons, 100-150 gal very rarely. Two or 3 wash downs a month. Hangar 4 minimal spills, 5 to 10 percent of Hangar 300	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) Dropped Fuel JP4 & JP5 from CC when he got here to 1971. Twice or once a month, 500-1500 gals a time. Doesn't know how long. Dropped by gun butts

radiological materials No acid spills, chemical spills

biological agents

2. Ordnance materials (e.g., explosives, propellants)

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.)

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity? Fuel trucks (de fuelers)

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to? Chief Inspector Patton Reagan, Chief Moore

Training pit put in the 50's, every weekend they have a fire. Used to be drums, hydraulic, oils, fuels, solvents, probably no paint. Stopped about 4 or 5 years ago.

Currently burn 600-700 to 1000 gallons. JP-5. Never cleaned sludge. About the same quantity & frequency in the past.

Used to dig berm with shovels. Fuel used to spill southward into swale.

Hydraulic fluids in there, doesn't know about PCBs. Did burn off napalm, 7 or 6 yrs ago. Excess from napalm production came over to burn pit.

* New fuel tank at new fuel farm recently. Fuel in the excavations when they were putting in the new installation. Safety disposed of it.

* No vehicles or bowser tip-overs on station.

* MSDS for A Foam

* No problems at pest control or boiler house.

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/21/87

Interviewee Ray Banovich

Shop/Area Fire
Asst. Fire Chief

I. Present History

What were/are your duties or responsibilities at the activity?
Since 1966 with Fire all the time

In what operations were you involved?

Operation	Brief description	Dates
Fire Dept.		1966- Present

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location
Aircraft Range (gun butts)

Disposal Method
defuel from aircraft deemp waste fuel on ground up till 1971-72. Once twice a month 500-1000gal each. JF some JP-4. Not back to Atsa days. Not su how far bac also burned off napalm

Off-site

Location

Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed? Hangar 300 - spills washed off ramp on to ground. Stopped ~ 1982. Now mopped off. Ave. 10-30gal. Very rarely 100gal. 2-3 occurances/month. Same at Hanger 4 ~ 10% of what occu at 300

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?
– Jim Regan

will get a MSDS for us (AFFF)

Past-Old foams now use light water A/C for fuel fires

- Fire training area installed late 1950s. Used almost every weekend. In the past burned solvents, oils, hydraulics also fuels. Stopped ≈1981-82. Will burn up to 1000gal (ave. 700-800gal per burn). Use about the same over time. Fuel would occasionally spill over berm to S and onto tarmac to N. & would have to put out fires outside the pit. Did burn napalm in the pit also (stopped ≈1980).

- Knows of much fuel on water in new fossil farm area when they installed new AG tanks. Fuel pumped from gw & disposed by Safety

- Knows of no incidents other than these.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Burn pit probably in early 1950's. Apparently only one area, Burn at least 4 times a month, burn anything. Sludge trucks, oils, fuels, grease, napalm. Hydraulic fluids in sludge trucks. Have to get rid of it.
6 or 7 napalm canister ~250 gal each.
No electrical equipment or transformer fluids that worker's aware of.

Hipowered Fuel used in pit. Couple of drums to burn in pit, overfillage of planes all the time. Hosed the spills off tarmacs. Doesn't recall when apron extending from Hanger 300 (73 or 74?)
Two major spills north aft Hangar 300, hundreds of gallons spilled, crash truck after crash used to wash down spill off tarmac.
Switched from mop washing to mopping '82, '83 a
Most spills 10-15 gal, 2 or 3 a week, washed off or spread with water.

Early on 6 months without a plane, then 2-3 weeks around the clock, 6 or 7 planes for maintenance

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/21/87

Interviewee Chief Charles Moore

Shop/Area Fire Dept.

I. Present History

What were/are your duties or responsibilities at the activity? C
Started 1966

In what operations were you involved?

Operation	Brief description	Dates
Fire Dept.		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

2nd Interview Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer Robert G. Ingersoll

Date 9/21/87

Interviewee Chuck Moore, Station Chief

Shop/Area Fire Station

I. Present History

What were/are your duties or responsibilities at the activity?
Came to work in 1966

In what operations were you involved?

Operation	Brief description	Dates
Dumping what they were taken off plane	everything off aircrafts, lubes, grease, hydraulics. 3 dumps a day 5,000 gal a shot, a times 15,000 gal a day, maybe 1800-2000 gal Average 5,000 gal per month over year (1966 – ?)	

Dump over the whole area, No burning of fuel. Fuel before the dump.

Napalm dumping pit in same area. Used to burn it. Would escort vehicles w/ napalm convey to pit. (1960 late to early 1970s) Napalm one area only, North of gun but area, east of runway. South of Ponderosa.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) No spills other than fuel.

radiological materials _____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

Doesn't know of any problems w/ pest control

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location

2-3 incidents per year. Avg. 5000gal. per month. doesn't remember when stopped.

Disposal Method

Defuels from planes use 5000gal. defuel truck. Would be up to 3 loads/day peak. Dispos to landfill areas on E of runway. Were doing it when ~~they~~ started. In same area as current dump. Didn burn off. Did dump ~~a~~ napalm in the same general area. Did burn off thinks mostly burne

<u>Off-site</u>

Location

Disposal Method

Fire would only escort load to pit. Late 60's - early 70's. Napalm used one discreet area N of gun butt. and east of runw

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

- Fire Training Area opened in 50's known of no other areas used prior but should have trained since base opened. In old days would burn anything test would burn incl. napalm. Oil, grease, mogas JP, hydraulics. JP had to be disposed some day mixed May have burned 6-7 tanks of 250 gal each at a time Doesn't recall burning transformer oil but could have been
- Did used to burn SR-71 starter fuel. That burns automatically when mixed with air. Once or twice (complete
- Fuel responses only twice he knows of. No other chems.
- Fuel spills on aprons quite common. Approximately 1973 when apron near Hangar 300 extended. Remembers 2 major spills of several hundred gallons on apron north of H. 300. Switched from washing off to mopping up ≈ 1982-83. 10-15 gal spill, 2-3/wk smaller spills would be spread around + evaporate Larger spills were hosed off edge, knows of only 2 incidents but some smaller spills washed off edge.
- Some off-spec fuel is being used for boiler feed.
- [illegible]

2nd Interview Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer Robert K. Ingersoll

Date 9/21/87

Interviewee Capt. Davenport

Shop/Area Fire Department

I. Present History

What were/are your duties or responsibilities at the activity?

Bob Larsen would know

In what operations were you involved? 1971 at fuel farm.
Bill Delaney supervisor in Oregon

Operation	Brief description	Dates
Bermed up area when they burned napalm. at least three sides.		

They weren't dumping in desert in 1972. Capt Davenport ~~transported~~ drove fuel trucks in 1972 - 1974. Gave to Boiler House, burn pit, Air Force Bldg. Generator 806 (Checker Board Bldg.)

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Doesn't know of any breaks on lines. Top off racks, no major spills, trucks overflow occasionally. Metering, gauges, sticking of tanks,

Years ago JP fuel stored in old concrete tanks in 1973 war/energy crisis. Normal tank cleaning procedures, contractors did tank cleaning.

Truck spilled by service by Bldg. 307, not much of spill (less than 100 gallons)

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to? Bob Lawson at Fuel Farm may help with fuel disposal areas.

- Mix powder with avgas, mogas or JP-5 to make Napalm. Excess napalm disposed to pit in old landfill area. Did burn off.
- Stopped prior to 1971 was active 1966.
- Were spills at top off rack area. Once in awhile were overfills of trucks.
- Doesn't recall leaks from tanks. In 1973 when fuel prices went up. dumped a lot of JP5 fuel into old tanks all over base. Incl. Old fuel farm.
- Used a contractor to clean tanks doesn't remember where bottoms went.
- Doesn't recall other spills or incidents. One spill along access road to H. 300 (truck tip over) spill < 100 gal.

SITE SURVEY QUESTIONNAIRE

back in 1984
Ret in 1982
present from 1978

Interviewer MCG
Date 9/21 (15:45) -
Interviewee Jim Patton
Shop/Area Fire Inspector

I. Present History

What were/are your duties or responsibilities at the activity?

Ordanceman

In what operations were you involved?

Operation	Brief description	Dates
Storage of weapons	Storage and transport	
Delivery of raw materials to make Napalm		1978-1982

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) Napalm - (6% gas) 94% other) / 1978 when Jim here all Napalm used / ~~1980's~~ it was boxed if leftover / no idea on quality or frequency before he got here

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity? Napalm in by truck first to receiving, then by back gate to magazines by ordnance office, inventory checked

Were they transported from place to place on-site? If so, how? trucked to assembly areas (down in Powderhorn area special bldgs), on trailers to line

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Mr.
Napalm - John Giltner (~~Duty Service~~ in Ordnance)
Herman Dixon (Civilian Ordnance)
Mark Glass "

Mayle?

Not in training

another pit for Napalm
Northeast area doesn't know exactly where
Quit in late 1960's
~~[redacted]~~
doesn't know when started

1. See Chief Charley Moore
Inspector Patton

a) Pit area –

Assembly of Rocket and bombs / no hazards
Parachute flares

b) Ordnance past expiration date or dud
taken to range and blown up by EOD (Qualified
personnel
or shipped)

c) very long time ago (prob in 1950's or early 1960's)
a dud bomb –
cement filled – but he thinks it was
found and that how he knows about it
but by weapons doesn't know when

Operations

2nd & 3rd Interview Records Attached

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/23

Interviewee Terry Hering

Shop/Area Fleet Liason

I. Present History

What were/are your duties or responsibilities at the activity? Since July, 1992.

In what operations were you involved?

Operation	Brief description	Dates
	Practice was into bowser to boiler room. If the boiler was full, JP and hydraulic, lubes, some solvent PD-680, trico, used to dump by canal next to hangar. Practice from 1982-1984. Assumed it happened from 1976, before that GSE handled.	
	Ordinance buried by weapons.	
	GSE used to have barrels next to hangar by air start building, used to get stuff on ground. Used to throw over the fence.	
	A CAG will generate ~~1600~~ 1600 gals of JP. Bowser would be emptied twice a month, 600 gal in bowser.	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Bowsers used for waste, taken to Bowsers
oil and Hydraulic, JP, lube oil, some solvent
PB-680, Turcol, dra
↓
to drain w/o separator
Separator

Reports ordnance buried @ Ordnance.

Bowsers — in practice when he arrived in 1982
Practice of dumping stopped in 1984

Fleet Liason operational since ~1976
Prior to that it was GSE

GSE — had collection barrels next to Hangar

Generated 1600 g/JP w/ a KAG
Bowsers emptied 2 times/month ~~emptied~~ 600 gal/Bowser
Probably 6-8000 gallons emptied

Ramp drainage, Hangar 300 drainage goes into a separator
↓

Hangar 100 has separator but is not operational (doesn't work
Built w/ Hangar in 1984
Fleet Liason operated Hangar 100 until 6 months ago

Overflows into surface drainage into a grass area

1 wash rack on south side Hangar 100
PB-680, Turcol, wash into the separator tank.
Tank periodically pumped out, but overflow goes to [illegible]
Itch

Old wash rack (see map)
used to collect wash water etc.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Honey bucket ([redacted] dumped in desert)
from commercial airlines, ~2 times in last 5 years.

Deicer fluid included,

Liason is independent of GE uses Hangar 300 (built 1950)
Lube oil from turbines.
Hydraulic fluid
JP from drop tanks
one defuel truck, hard to get, so JP drained from pencil drains

* Hangar 100
OIC - Lt Commander Long 105
" Curtis 106
" Collins VFA 127

* Hangar 4 Lt Simsack OIC
Chief Ruda - arresting gear is glycol
* Strike - ?

Old wash rack on Northwest corner of Hangar 300
drains to separator off concrete adjacent to irrigation ditch off apron to Northwest
Separator has thick (at least .25") oily material on surface. Adjacent ditch has minor sheen in among cattails

Area of Bowser disposal was off apron to north adjacent to ditch. Minor amount of staining on field area.
Field is graveled

Jerry doesn't recommend anybody @ GE who will know anything

Hangar 100 (Built 1982
All tank and floor drains go to separator

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/23

Interviewee Jerry Hering (since 1982)

Shop/Area Fleet Liason TJ 2508

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Separator located on Southwest side of Bldg
under a manhole, much oil stains of
ground in area,
pumped ~ 1/3 months

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Hangar 300 Ramp & Hangar 300 drainage goes to oil seperator/vault in the area where they used to dump bowsers.

Hangar 100, has oil seperator, doesnt work. Collects in tanks, overflows (8 yrs operational) to drainage ditch and to grassy area. PW pumps tank.

Aircraft wash rack is a Hangar 100 — PD-680, terco, scuzz off plane goes to non working oil seperator to tank.

Used to have hot ~~water~~ water cleaner, steam line, used to aircraft wash area. Used to drain to little vault.

Hangar 400 honeybuckets dumped in desert, not often.

Deicer fluids in honeybuckets.

squadrons generate
— Lube oils, hydraulics, JP drop tanks. Use pencil draining, JP goes to buckets.

— Fleet Liason Controls — Hangar 300
— Squandrons control — Hangar 100 — OIC Long, Curtis, Collins,
— Air Terminal, Operations, OMD, Strike University — Hangar 4 — 1330 Simsack, Chief Anda* (3449) (3443) 3477 Hangar, side w Ramp Topside
—

Floor drains in Hangar 300 go to ~~vault~~ drain to maybe goes to ⊗ irrigation ditch

Steam cleaner NW corner of Hanger 300, 6" drain in concrete tarmac probably drains to concrete vault, also hangar deck, ramps & tarmac drain here. This starts the ditch. Figure 8 dumping along the ditch on the tarmac side of ditch.

- GSE used to dump stuff off the concrete pad right by where we enter. Since 1982 been storage area, probably been here for a long time. Lots of stained soils..

Hangar 100 - Floor drains & tanks drain to oil separator

Aircraft wash rack south side of Hangar 100. Same area as oil separator. Two drums of aircraft cleaning compound (Turco) NSN-6850-01-045-7931.
Staining on dirt next to wash rack.

SP-5

HYD FLUID

PAINT

LACQUER THINNER NITRO

POLY PAINT + THINNER

METH KEYTONE

GREASE MOLY + A/C INST.

ISOPROPAL ALCHOL

PD 680 / DRY CLEANING SOL

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Tyrrell

Date 9/29/87

Interviewee Lt. Simcsak

Shop/Area Hangar 4

I. Present History

What were/are your duties or responsibilities at the activity? Here since Dec. 85,

In what operations were you involved?

Operation	Brief description	Dates
*	Switched soap - used to use turco, now used B&B 14. Switched last 3 or 4 months	
Old Fuel Farm	- Public works said they leaked so they wouldn't put in steam clean	
*	Defuel into buckets or defuel trucks, avg 2x month, 50 gals max.	
*	Fleet Liason used to have a bower, drained bower at the dirt step up area into cans, spillage maybe a couple gallons.	
*	Once a bucket of oil into desert by tarmac.	
*	Organizational maintenance, change engines, waste oils, hydraulics, etc. into 55 gallon drums.	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Hangar 4 since early 50's, late 40's. Hangar 3 burnt then blown down. Guy here, off & on. Master Chief Crawford.

- No floor drains in Hangar 3.
- Small quantity of PD-680.
- Spent cans, into dumpster.

Chief Anda - worked here

Lt. Commdr Stacer - 3922 Upstairs.

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/24/87

Interviewee Chief Anda

Shop/Area Field Service

I. Present History

What were/are your duties or responsibilities at the activity? March 85 -

In what operations were you involved?

Operation	Brief description	Dates
Arresting gear – Antifreeze – Make emergency landings	10-15 gals a month, sample fluid, if bad drain 400 gals tank to 55 gal drums → S&R.	
PD-680 used for parts (bucket, clean in bucket → haz waste drum)		
Guy that Anda relieved → T.J. Hesing.		
Drainage from hanger goes to asphalt tarmac then to roadway, ponds in that area.		
Spills 1-25 gallons, fuel hoses break.		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

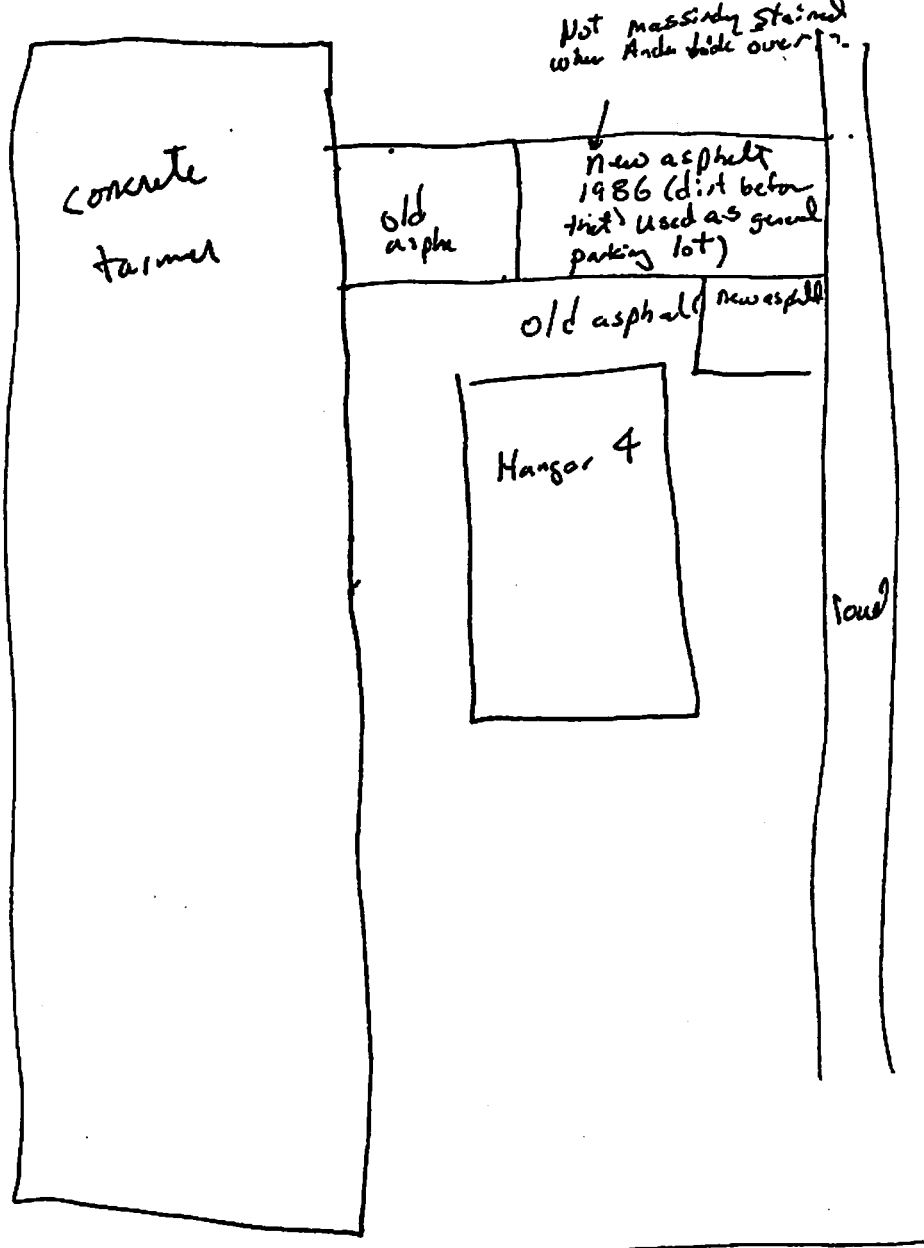
VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

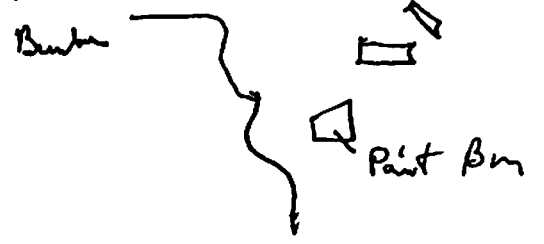
Ken Winders
Engineering-Draftsman.

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?



Aerial photo see shows a facility - West of Paint Shop



SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/24/87

Interviewee Master Chief Crawford

Shop/Area Hangar 4

I. Present History

What were/are your duties or responsibilities at the activity? Hangar 4 - 13 months

Coming Here since 66 w/ squadrons

In what operations were you involved?

Operation	Brief description	Dates
CAG	Operations at Hangar 300 pretty sloppy	
→ Fill up drum others 2 - 3 month		
hangar 4 → Fill up drum JP 2 weeks		
hangar 300 → Detachments → everything into drain system.		
→ Hanger 100 screwed up the trap about 2 or 3 years ago.		
→ Some of soaps weren't biodegradable		
→ Both sides of Hangar 4 drain to street.		
→ ~~was~~ Civilians washing w/ Turco at east end of hangar.		

Navy
Used Turco ~~only~~ until about a year ago.
Simsack.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

AV gas had high octane — very high lead

SPADs from WWII to '68.

All the stuff went to 300.

Transit & helo's at 4.

- Found live 50 caliber were the new runway is.
- Lots of stuff at edge of tarmacs at Hangar 300.
- Washed planes at west end of Hanger 300, steam cleaned there, used lots of turco
- Used to drain drop tanks at edge of the west concrete tarmac, to bomb ~~dirty~~ built up area. Drop tank racks there.
- West edge of Concrete tarmac at Hangar 300 is the same edge, not ~~on~~ moved toward LOX bldg.
- Drainages have changed over time.

2nd Interview Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/24/87

Interviewee OSCM Huber

Shop/Area Range (Checkerboard)

I. Present History

What were/are your duties or responsibilities at the activity?
2½ years also Dec. 77 - Dec. 79.
In what operations were you involved?

Operation	Brief description	Dates
	Was in charge of range maintenance - Target prep on ranges. Now contract (since early 87) he manages the contract.	

Ranges

Used to retrograde explosives in range impact areas. Use EOD to do blowing up. Used to use vehicles as targets that still had fuel and fluids in them + then bomb them.
PW took care of generator maint on bomb ranges, EOD by military. No leaks he knows of. Thinks they may have dumped oils on ground. Knows of no other disposal operations at ranges.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Checkerboard

PW does maint. is one gen. belongs to FAA

Believes the generators are to be deactivated

use the AG tanks for fuel not sure if ug tanks present

Mock Up Targets made by Range personnel started 1986.

Painting done at range. Take paint out + paint

Cleanups at site + ~~clean~~ clean up materials disposed

Done at B.17 + B.19 at any of the impacts

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

* No burn pits at the ranges.
* At centroid, large surface impoundment, ascetic valve, thinner in when transferred. (No process water).
* May have oil the main access roads to ranges before asphalt, (Never saw oiling, blacktopping when he was here).
* No major spills at generators on range.
* All facilities at ranges on septic systems. Potable water only at centroid, well at the centroid probably since early 60's. Well at Frenchman station; now capped.
*

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/29/87

Interviewee Master Chief Huber

Shop/Area Range Dept.

I. Present History

What were/are your duties or responsibilities at the activity? with Range 2½ yrs
Range also 12/77 - 12/79, 1

In what operations were you involved? Range Maintenance before contract. UXB Know does maintenance (starting in Feb, 87), still AQ for UXB

Operation	Brief description	Dates
*	Only area is retrograde ordinance. Blown up damaged bombs, laying on site blow up (EOD blowe up).	
*	Used for targets, trucks, tanks, still had fuel in them (local spills) mostly.	

Interrupted Interview

Back Paint cleanups dumped at target to be bombed. Using water based paint, cleanup mostly water (some thinner). Ranges 19 & 17.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

SITE SURVEY QUESTIONNAIRE

Interviewer GAIt ~~Gene Hall~~

Date 9/24/87

Interviewee ~~Gene~~ Gene Hall

Shop/Area Ford Aerospace (Rouges) (9-426-2747)

I. Present History

What were/are your duties or responsibilities at the activity?
Started Jan. 87 took over from Navy

In what operations were you involved?

Operation	Brief description	Dates
Will be at Checkerboard Fri 800 am.		
Impoundment - part of septic system which, 18-PICS currently + in past (8) allot EW		
Glen Shaw - Operates Navy gens. (2 Operational Gens. Diesel fired all tanks AG some have self contained 50gal cap.		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?
(back of sheet 1st)

Other concerns

- Oil stains on ground around generators
- No other spillage or leakage he knows of.
- Don't use chems.
- Mostly sub contract out for maintenance
- AG. tanks diked. Most on concrete pad or on stand AG. No significant containing

range from
[illegible] 250 gal – 1500 gal all AG (on concrete or stands
Number of generators 7 or 8 large gens. – Ford at EW

B[illegible], Security (at Centroid) – Navy Gens.

Gens. used to be at almost every remote site used as backup at all sites except one.

Range Dept. at Base – at Checkerboard

Maint. – ≈ 45 day intervals vols. of ~~gens~~ oils
varies 2-4 gals/gen
oil put into 5 gal containers taken to Shipping + Receiving
were storing + Navy got rid of Mar. 87
L since 84 12-55 gal. drums.

Commercial fuel delivery – no leaks. Doesn't know of any major fuel spills occurring
Centroid, PIC-30 some spillage on ground.
(10'x10'x1' deep)

Use cleaning solvent bought at store in town
10 gals. stored used at centroid.
Steam Cleaner to ~~[illegible]~~ clean gens. use about 7-8 times per year for generators.
and general cleaning on vehicles or trailers about weekly at Centroid

Vehicles – oil changes + minor maint. at Centroid 8 vr b
fluids collected + sent to base.
No significant spillage but some stains on ground
(go to inside)

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/24/87

Interviewee ATCS Lavin

Shop/Area AIMD / GSE

I. Present History

What were/are your duties or responsibilities at the activity?

Since Dec. 86 also 77-80 & 70-73 - with avionics LOMD provided sqds. with a place to repair electrical equip. in H.300

In what operations were you involved?

Operation	Brief description	Dates
AIMD new GSE part of.		

Do some basic type of work as in past. Do scheduled and unscheduled. Full service work done. Hose parts cleaning tanks do use PD-680 as primary. Waste fluids go to Quonset since has been here. In past did use benzene. Thinks it was burned (through PWD). Not sure if GSE uses oil/water separator. Washing down now water only. Deck is concrete. Swabbed off + to deep sink to San. Sewer.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Remembers oiling of roads but not dumping on the ground. Doesn't ~~~~ remember dumping around the base.

Remembers washing helos at H.4 on tarmac to ground used Turco.

Is a drain in front of avionics that gets a lot of "mop" water.

Have occasionally used a paint stripper but waste goes to drums.

1

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/24

Interviewee Chief Hernandez

Shop/Area GSE

I. Present History

What were/are your duties or responsibilities at the activity? 8 months at Fallon, division chief for support equipment. At Fallon in 1969 visiting for 3 weeks with squadron.

In what operations were you involved? In charge of yellow fleet.

Operation	Brief description	Dates
Chief Schrader was here in 1960s. Heard that squadron used to dump hydraulics in the hanger drains, really no information on past practices.		
Mess Cook at Galley in 69, doesn't recall GSE ops. QA Chief for GSE.		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/24/87

Interviewee P.O. ~~Reid~~ Reidl

Shop/Area OPs/GE

I. Present History

What were/are your duties or responsibilities at the activity? At Fallon since march, 1987.

In what operations were you involved? Electronic Technician / Haz Waste Rep for Ground Electronics.

Operation	Brief description	Dates
* Currently deal with spray (couple) paint	5-gallon drums of Stoddards, standard lube, hydraulics.	
* Use isopropyl alcohol, use Stoddard		

No problems since Reidl been here.

No body in Ground Electronics thats been here long.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/24/87

Interviewee SC Ryan

Shop/Area VFA-106

I. Present History

What were/are your duties or responsibilities at the activity?

2 yrs. has been here several times in the past with CA 6s

In what operations were you involved?

Operation	Brief description	Dates
Cags do some maintenance on aircraft vehicle like H-300 will even pull engines.		
VFA-106 - do operate aircraft but not permanently assigned.		
use buckets for cleaning - stored in locker outside use drums for disposal prior to drums used disposal stations (pits) to separator to ground.	dry cleaning solvent - 2-3 gal freon Turco - 5 gal PD-680 - 1 case	store in locker outside hangar

II. Operations Data

Don't do aircraft painting. Once in a great while (freq.?) NARF will come in + do some painting but they bring their staff with them + take it away

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) fuel

radiological materials No

biological agents No

2. Ordnance materials (e.g., explosives, propellants) No

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.)

No

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

oil separator + tanks
2 tanks outside of bldg. Were getting water in tanks about 10 months ago (leaks) pipes leaks Think tanks not used. ~~at~~ anymore.

Are some fuel dumps from aircraft. (not maint)
picked up or washed off.
Probably spill Turco on wash rack sometimes

No major spills in shop.

Knows of no other incidents.

aircraft waste fluids
Did used to dump 1 off north end of apron at H. 300 (remembers seeing)

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/24/87

Interviewee SC Parr

Shop/Area VFA-125 (Lemoore)

I. Present History

What were/are your duties or responsibilities at the activity?
July. 86 has been here several times with CAGs.
In what operations were you involved?

Operation	Brief description	Dates
Maintenance done here. No painting. Replace engi		

Don't normally do cleaning usually actually do replacements. Use spray cans (Turco). Rags go to drums all waste fluids to drums. Used to use 55-gal drums stenciled as to type would have Supply remove. Then went to colored drums. No major spills at anything since he's been here except fuel spills on apron. Mopped up + disposed.

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

In old days would have Fire come on + wash off stopped hosing ≈ '84-'85 (he thinks)

Use Turco for washing aircraft on ramp. Wash racks drains to a separator at S end of Bldg.

Did have a holding tank that the deep sink in hanger drained to. Now sealed off.

Did see napalm mixing at H. 300 but not more of details.

Used to use bowzers several years ago but doesn't remember any dumping. Everything went to bowzers

use trichlorotrifluoroethane at times for hydraulic samples.

Knows of no other incidents

Do get some illegal disposal to dumpster. When CA6 are on station probably get more illegal disposal.

Ordnance

2nd Interview Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/23/87

Interviewee Mark Glass

Shop/Area Ordnance

I. Present History

What were/are your duties or responsibilities at the activity?
1974 Been at ordnance entire time.

In what operations were you involved?

Operation	Brief description	Dates
	Was an irrigation ditch in Ordnance in 50's + 60's. would dispose inert pallets, metal pallets, boxes, inert 20mm, cons. + covered with dirt Probably finished by end of 60's. Utility work area along north end was all cleaned out ~1985. Removed about 3-4 five ton flatbeds full. Was some old 20mm ordnance in area. Cleaned out entire area. Went down to about 5 feet.	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Ordnance area was a dairy farm. Pit was in barnyard area. Pit dug ≈1979 filled up with @ junk no ordnance to his knowledge. Also old canal in same area filled canal with junk also.

Ordnance taken to B-19 & EOD from Hawthorne would blow it. Now have EOD here. Doesn't know when moved EOD here. Now goes to B-17

Did do napalm mixing but don't any more

Don't have any napalm mixing stock any more. Turned over to shipping + receiving ≈1980 40 drums turned over to DPDO who got a buyer to come in & remove. John @ Gildner worked in that area.

Did have a napalm burn pit in landfill area but doesn't know where

Use some PD-680 for cleaning. Have a parts washer amount?

Was a shed used for trailer maintenance south of new bldg. South of that was a repetment area where ordnance was stored awaiting EOD disposal.

in late 50's worked on checkerboard SW corner landfill not in use

No rubble or trash encountered at runway extension (but he didn't work on earthmoving.

Never saw any outside dumping near ordnance area

PD-680 tools in bldg. east of office

old office bldg (gone) was built on old asphalt rubble fill. moved mid-late 700 from old area. Thanks bldg was day care center previously. Torn down in summer 87 bldg. moved, foundation removed.

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

EOD – SC Sporer x3402

Do you know any other shop workers we should talk to?

Were old dumps in east central area north of road worked East → West then crossed to South of road and moved from W → E to existing.

Burned excess napalm in a pit north of road would dump off of trailers into pit which was about 20 feet N of road. Would ax open tanks, pour ~5 gal. diesel + burn. Come back next day + put container in landfill. Napalm burns down to nothing.

Older M-2 Napalm mix looked like speedidry. Type of detergent + mixed with JP-5

79-81 ↓

newer A + B mix was

No napalm since 1985

Did have a napalm mixing pad near Hanger 300 that they used. Used hydraulic fluid to wash mixer before + after mixing. Put excess A + B, residue mix and hydraulic fluid put in drums + sent to Shipping + Receiving for disposal

Did napalm many years ago. Avgas, JP4 then JP5 mixed with pellets then A+B. New type underdevelopment much easier to use

Boresite range then rifle + pistol range. Skeet range built 73-74.

Ordnance built ≈ 1950 prior to that? our maps show near old area.

Were still oiling [illegible] stopped about

Generator Shop by Checkerboard - used to have a drum storage area there.
Was an old housing area called Shangri La in old area that was removed. Demod + removed.

Napalm burning stopped about 1983. All tanks dropped in flight since then.
Ordnance bldg. is heated with defuel.
He never ~~[illegible]~~ saw the defueler dumping.
10-20 burns/year. Number of cylinders varied from couple - 20 max.
Cannister ~ 6' long by 2-3' diameter ~~[illegible]~~ 75-100 gal. each.

All bldgs on different septic systems
B. 245, 246, 252
Leach bed at B.245 works poorly. part under parking area.
now percs up through surface
Old geothermal well under B. 245 - destroyed.
did hit good hot boiling water. Drilled for several weeks
installed late 70s.

B. 398 - 2 10gal cleaning for parts cleaning
draining to 55-gal drum Then to ~~[illegible]~~ safety.
PD-680 keep about 100gal on hand
Prior to safety - ? doesn't know. No spills or leaks
minor ~~[illegible]~~ spills but never got out of bldg.

~~[illegible]~~ Guy at Supply - Bill Graff in B. 12. Servmart Supply Warehouse

SITE SURVEY QUESTIONNAIRE

Interviewer MC6

Date 9/29

Interviewee Steve Spoerer

Shop/Area EOD

I. Present History

What were/are your duties or responsibilities at the activity? Exp. ordnance disposal

In what operations were you involved?

Operation	Brief description	Dates
		2 years here then in 1985

Over

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

* Master Chief Chuck Huber - @ Range #2608
Range ~~Chief~~ Maintainance -

Generators - B-17 by Center tower
south of road - may be a generator

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

John @1 2790 worked in napalm mixing. Napalm mixing is not done, not for quite a few years. ~40 Drums of napalm to S & R ≃ 1980 ~~7 DPDO?~~ buyer. maybe Forest Service.

* Napalm burning pit by the old landfill not sure.
* Vehicle maintenance at PW, they use PD-680 for cleaning, parts washer.
* Used to do trailer ~~befo~~ maintenance until ≃ 1975, south of that pivotment for ordinance storage.
* 1958 - 1960 worked on checkerboard, landfill SW corner not being used.
* Worked on concrete, not earthwork on runway extension.
* No dumping or fuel trucks up by the ordinance.
* Old offin bldg was when they placed asphalt rubble & frll on top of asphalt rubble, old offin building used to be day care bldg. moved, kiddie pictures on walls, late 70's. Torn down the last couple months. New Bldg. only a couple months old.

SITE SURVEY QUESTIONNAIRE

Interviewer Robert G Ingersoll

Date 9/23

Interviewee Vicki Pugsley

Shop/Area Ceramic

I. Present History

What were/are your duties or responsibilities at the activity?
1983–1987, part time

In what operations were you involved?

Operation	Brief description	Dates
	Empty jars of glazes, paints to the garbage. Customers take paint home if half a jar left.	
	Ceramic Shop started in 1971. The ceramic shop moved at least five times. Head paints up to about 1980. Cast clay material, mix four bags of clay and chemicals	
	Never thrown barium carbonate away.	
	100 to 200 2 oz jars of paint per year (currently). Cleaned building after fire, also did area test for asbestos from asbestos in the clay.	
	Empty containers thrown in trash.	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/23/87

Interviewee Herman Dixon

Shop/Area Ordinance

I. Present History

What were/are your duties or responsibilities at the activity? At ordinance April, 1974. Warehouseman in 1974, still at warehouse

In what operations were you involved?

Operation	Brief description	Dates
Doesn't recall any trash or ordinance at new bldg., nothing buried west of fence. Geothermal well drilled in 1985. Buried 22 & some shell in area, apparently there for years & years in boxes couple years ago. Disposed of only material found in trench.		
* Pit dug with cat, ≈100 feet long, buried inert material (metal & pallets), dug about 1979, doesn't know about quantity, to a couple feet of surface.		
Old ordinance, waste - meet EOD team at Bravo 19 bombing range. Currently ordinance waste goes to Bravo 17. Doesn't know of any ordinance uncovered other than the 22 millimeter shells.		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

2nd Interview Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer - GAH

Date 9/23/87

Interviewee Herman Dixon

Shop/Area Ordnance

I. Present History

What were/are your duties or responsibilities at the activity?
1984

In what operations were you involved?

Operation	Brief description	Dates
Warehouseman		1984 – Present.

Doesn't remember encountering any ordnance or trash when new bldg. built. Did encounter live 20mm shells along north boundary to E. of new bldg: only material in trench disposed may be more present

use septic tank/leach field

Geothermal well installed ~1983 near new bldg. Had dug a big trench 10' deep, 10' wide, 100' long used to dispose rubble boxes, pallets etc

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

EOD – Senior Chief Spoore 3402

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

→ A or B extra ~~&~~ residue hydraulic flush into drums to S&R.

→ M-2 to A&B mixing in ~~1980~~ 1979/1980

First M-2 was pellets & AV gas, then pellets & JP. Did napalm at Fallon for years.

→ Skeet range in 1973 – 1974, Cpt. Mansey.

Current Ordinance built in ~~1960~~ early 1950's.

? Stopped oiling roads about a yr. after he got here.

* Generator shop by checkerboard w/ waste drums.
* Shangri-La Housing SW of Air Force housing → sold some houses, demolished, took houses off.
* Stopped burning napalm about 1983.
* Some of defuel used for heating bldg., including ordinance bldg.
* Never saw defuel trucks dumping, mostly sailors did the napalm burning.
* Average 10 to 20 burns a year, couple to 20 canisters a burn ≈ ~~150–150~~ 75-100 gal / canister.
* All ordinance bldg. on septic systems.
* This bldg. tile field is where the dirt extension of the parking lot is now. Action upward percolation.

geothermal well is under Bldg. 295, destroyed. Boiling water in well. Drilled in late 70's.

* 2 Parts Cleaner in Bldg. 398. Drain to 55 gal drum.
Keep 2 drums of PD-680 on hand, Doesn't know what happened to waste before drum system. ~~Not~~ No spills to ground

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

SITE SURVEY QUESTIONNAIRE

Interviewer Mark

Date 9/23/87

Interviewee Mark Glass

Shop/Area Ordinance

I. Present History

What were/are your duties or responsibilities at the activity? started 1974

In what operations were you involved?

Operation	Brief description	Dates
*	Old irrigation ditch, 50's & 60's dumped cans & inert stuff, bomb pellets, shipping containers, empty 20 mm shells, Covered when Mark got here, Open section in 1960's.	
*	Cleaned out area, Bld 398, cleaned out about 1984 1985. Pulled out about 3 or 4 flatbed trucks of inert material, old 20 millimeter shells. Cleaned the whole area.	
*	Napalm disposal burn pit. Right off road. Burn, throw away the containers in dump. Burns to nothing, looked like Kitty litter or speed dri mixed w JP 5. New - A & B burned nothing left. No A & B for couple yrs, since 1985. Mixing pad by Hangar 300. New pad never used.	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.). _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Miscellaneous

SITE SURVEY QUESTIONNAIRE

Any actions Nuclear Site History dates

Include Base History

Interviewer GAH

Date 9/24/87

Interviewee Col. Briggs

Shop/Area PAO

X2880

I. Present History

What were/are your duties or responsibilities at the activity?

1986

In what operations were you involved?

Operation	Brief description	Dates
Actions	Not sure check OSH. No suits filed he knows of. Knows that some actions were headed off in 1985 by agreeing to do some actions.	
Nuclear Detonation	1963 at B-19 10,000' deep hole sealed. UN-Reno ran tests for years. No radioactivity measured. Is open to public. Was part of program for seismic detection of nuclear tests	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Command History - ~~[illegible]~~ copy attached

Doesn't know of any other incidents at the base.

HISTORY/MISSION OF NAS FALLON

Naval Air Station, Fallon traces its origins to 1942, when the Civil Aviation Administration and the Army Air Corps began construction of four airfields in the Nevada desert. As part of the Western Defense Program, initiated to repel an expected Japanese attack on the West Coast, runways and lighting systems were built in Winnemucca, Minden, Lovelock and Fallon.

As the war in the Pacific began to develop, the Navy recognized a need to train its pilots in a realistic environment using all the tactics and weapons being developed in the fight against America's enemies. Fallon was the Navy's choice and, in 1943, the Navy assumed control of the two 5,200-foot runways. Construction soon began on barracks, hangars, air traffic control facilities and target ranges. Finally, on June 10, 1944, Naval Auxiliary Air Station, Fallon was commissioned.

The mission of the newly-commissioned NAAS was to provide training, servicing and support to air groups deploying here for combat training. This mission, although worded defferently over the next 41 years, has remained basically unchanged. The station sported a torpedo bombing range at Sutcliffe near Pyramid Lake and operated three satellite fields. Soon after taking in its first customers, it was realized that two more free gunnery ranges were needed as well as rocket bombing and ground-strafing targets, including the Lone Rock range (Bravo-20), established in 1943.

Training operations at NAAS Fallon reached a peak between April and September 1945. Each month, an average of 21,000 take-offs and landings were recorded at the airfield and more than 12,000 flight hours logged. Ironically, just as construction of the initial airfield project was completed and the training program going full gear, the Japanese surrendered and brought an untimely end to NAAS Fallon. Eight months after the completion of a new 24-unit housing project was completed, five months after the new gym was built, and only three months following the opening of a new Commissary Store, NAAS Fallon was placed in a 'reduced operation status.' One month later, on February 1, 1946, the Fallon facility was further reduced to a 'maintenance status' and, on June 1, to a 'caretaker status' and the official designation of Naval Auxiliary Air Station removed.

For the next five years, the facility was turned over to the Bureau of Indian Service. Buildings once used by pilots preparing to meet the challenge from the deck of a pitching aircraft carrier in the South Pacific disappeared. The swimming pool, once the scene of sailors attempting to escape the heat of a Nevada summer, became the home for pigs.

Korea brought new life to the small desert installation. Once gain, the Navy found reason to train pilots in the new sophisticated jet aircraft. In 1951, Fallon became an Auxiliary Landing Field for NAS Alameda (California). Then, on October 1, 1953, NAAS Fallon was re-established by order of the Secretary of the Navy. The present Bravo-16, 17 and 19 bombing ranges were also created that year.

become one of the premier training sites for Navy and Marine Corps pilots and ground crews. New hangars, ramps, housing and other facilities sprung up to give the installation new and greater capabilities.

The Air Force came to Fallon in 1956 with the establishment of the 858th Air Defense Group, part of the country's early warning radar system. For the next 19 years, the Air Force command provided vital assistance in America's national security.

The airfield became known as Van Voorhis Field in 1958, named for Lt. Cmdr. Bruce A. Van Voorhis, a Fallon native who received the Medal of Honor posthumously after sacrificing his life in the South Pacific during World War II.

The air station's most sophisticated and unique range, the Electronic Warfare Range, was established in 1967.

On January 1, 1972, the Navy recognized Fallon's importance to naval aviation and upgraded the facility to a major command - Naval Air Station, Fallon was commissioned.

Today, the air station operates and maintains four bombing ranges and electronic warfare range, which contains three Tactical Aircrew Combat Training System (TACTS) ranges -- Red, Gold and Silver, as well as a complete airfield facility to provide visiting squadrons and air wings with ordnance, fuel, air traffic control, maintenance space, berthing and all the other aspects which are necessary for accomplishing the vital training conducted here.

During the period of 1982 to the present, the air station has experienced its most dramatic era. In addition to the construction of a new hangar and the installation of state-of-the-art air traffic control, the facility has played a role in some of the most crucial military exercises since the end of the Vietnam Conflict. It was the training accomplished both at their home base and at NAS Fallon which accounted for the success of the mission which resulted in the downing of two Libyan jets in the Gulf of Sindra; the attack and occupation of Grenada; the mission to destroy the bases of militant factions in Lebanon; the interception of an Egyptian airliner carrying Palestinian terrorists in the Mediterranean, and the most recent Libyan operation.

In 1985, Fallon received a new tool to aid in its training of aircrews. The Tactical Aircrew Combat Training System now provides squadrons, carrier air wings, and students from the Naval Strike Warfare Center with visual, graphic display of their missions - eliminating guess work and giving aircrews the chance to truly be the best in the world.

NAS Fallon has, in recent years, achieved an operational tempo heretofore rarely imagined. 1984-85 saw 18 carrier air wing deployments to the station along with over 160 individual squadron deployments. The total transient personnel to visit Fallon in FY85 alone was 19,745. NAS Fallon now sees 11 air wings per year and over 20,000 transient personnel each year. This figure, combined with an increase in each deployment period from two weeks to three weeks, has eliminated the slack times previously experienced throughout the year.

with new facilities and new challenges. Throughout its history, NAS Fallon has followed the path laid by many Nevada towns: From bustling boom town to a quite ghost town, awaiting the reawakened need of its services. Today those services are needed more than ever as the air station is once again a scene of high tempo operations and training -- all in the name of our country's defense.

ORGANIZATION

Facilities: The air station's facilities include:

* 3 aircraft hangars and associated aprons
* 2 runways
* Berthing facilities
* Galley
* Recreational facilities
* Radar air traffic control
* 4 bombing ranges (3 electronically scored)
* An electronic warfare range
* Range Operations Center (including Weapons Impact Scoring System and the Tactical Aircrew Combat Training System)

Tenant Commands/Activities:

* Naval Strike Warfare Center
* Strike Fighter Squadron 125 Detachment
* Strike Fighter Squadron 106 Detachment
* Personnel Support Detachment
* Explosive Ordnance Disposal Detachment
* Navy Exchange/Commissary
* Pacific Fleet Audiovisual Detachment
* Naval Oceanography Command Detachment
* Branch Medical/Dental Clinic
* Resident Officer in Charge of Construction
* Civilian Personnel Office

Contractors: The following contractors maintain offices/facilities within the NAS Fallon weapons training complex:

* Ford Aerospace: Maintain and operate equipment associated with the Electronic Warfare Range.

* Cubic Corporation: Installation and initial operation and maintenance of the Tactical Aircrew Combat Training System (TACTS).

* Frontier Engineering: Operation of the Range Operations Center, including the operation of the Weapons Impact Scoring System.

* Spectra Research systems

range instrumentation and range development.

* Allen Corporation: Provides educational and graphic support for Naval Strike Warfare Center.

* Lear-Siegler: Provides organizational level maintenance on Naval Strike Warfare Center aircraft.

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/22/87

Interviewee P.O. Carter

Shop/Area Print Shop.

I. Present History

What were/are your duties or responsibilities at the activity?

June 1985 never previously

In what operations were you involved?

Operation	Brief description	Dates
Print Shop	14 yrs in Navy	
Barracks.		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) Blanket Roller Wash (degreaser)

radiological materials degreasing solution

biological agents

2. Ordnance materials (e.g., explosives, propellants)

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.)

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

SITE SURVEY QUESTIONNAIRE

Interviewer NJD

Date 9/22/87

Interviewee Alex Rochells (PH1), Jim Ricks (civ)

Shop/Area Photo Labs (x2732)

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
AR:	processing, maintenance, training, safety, aerial camera man	3/85 — present
JR:	processing, bookkeeping	1974 — present

II. Operations Data quantities

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) fixer: acetic acid (removes Ag salts from film); developer: Na or K hydroxide, Na-K or ammonium ferrocyanide; developing agents: metol (generic name), hydroquinone; non-toxic buffers: Na sulfate, $CaCO_3$

radiological materials

biological agents

2. Ordnance materials (e.g., explosives, propellants) Developer – pH = 3, Stop bath or fixer pH = 12.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) film: contains Ag salts

4. Containers

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

truck. Kodak - prepackaged. Get chemicals through Navy supply system.

Were they transported from place to place on-site? If so, how?

carried down hall

IV. Waste Disposal

What waste products were generated from these operations?

Same as those listed under II.

How were these wastes stored prior to disposal?

Not stored

How were these wastes disposed?

On-site

Location	Disposal Method
print rooms	pour down sink — now, and always in past

Off-site

Location	Disposal Method
~~Name of Waste Hauler~~ Print rooms	pipes go to sewage treatment

practice since at least 3/85 since AR started

Ag gets collected by electroplating fixer solution prior to pouring down sink.

Solid Ag (98% pure) sent to DPDO.

Used filament pops also saved and sent back to DPDO for recycling due to Ag content.

Collected 74 oz. Ag in Fiscal 1987 from electroplating

Herlong, CA

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

minor spillages of developer, fixer.

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

N/A

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Other:

AR is crash site photographer. Now wear environmental protective gear at crash sites, due to presence of Beryllium, ~~and~~ graphite composite, asbestos from planes at sites. Used to wear just street clothes. ~~Several~~ Most planes & debris get removed if feasible. 3 or 4 all out there because impractical to remove e.g. in mtns. One near Hawthorne - still there. ~10,000 ft elev.

Dixie Valley - at one crash site, plane dove straight down into sand ~45 ft. Removed.

Pipes to sewer system probably lined w/ Ag. Possibly several 100 lbs. AR estimate. Ag is in form of very small particles when poured down sink (prior to electroplating) and will adhere to pipes.

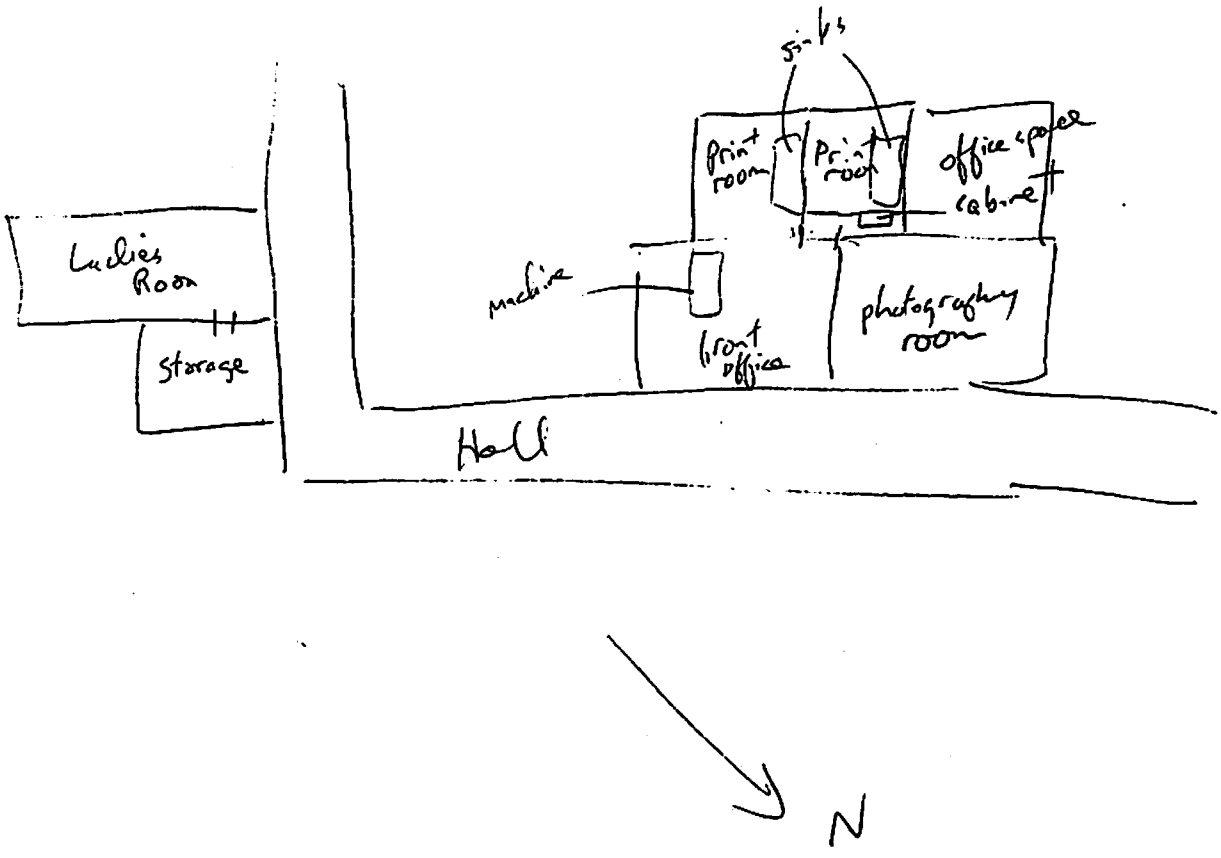
Present storage of chemicals:

@ Ladies room down hall: ~18 gal Kodak processing kit. Home package inserts.
2-5 gal buckets paint
solid developer for B+W
↓ includes fixer, bleach, developer, etc.

(b) (South) main print room 2 - 30 gal plastic tanks - developer + fixer above sink
- 20 qts dev + fix - other kind - more hz.

(c) North print room (doesn't look used) - 10 - 5 gal containers fix. + dev.
- 5 gal alcohol
1 gal Na hydroxide

(d) cabinet: 1 gal oil for maintenance
minor mt alcohol c/ng soln.



quantities

X 2432

87.8
13.5
74.2

Alan Rochells, PH1 — Jim Ricks
~~Prints~~ Photo Lab — 13½ yrs.

all production, planned maintenance, training safety

all since 3/1985 ~~physical fitness~~
aerial camera man — in planes
crash photographers

film

fixers, acetic acid — removes Ag + Salts fr. film

developers: sodium or potassium hydroxide
usually

metol, hydroquinon = devec. agents

generic name

sodium sulfate } non toxic buffers
calc. carb. }

Na ferrocyanide }
K " } acid + alkali
Ammonium " }

JR
small lab — processing mixing chemistry, bookkeeping

AR: crash site Be, F-18 - graphite composite like fiberglass.
Asbestos

aircraft still out there

F-14 towards Hawthorne. Impractical to remove
several still

Dixie Valley - plane dove straight down - to sd
45 down - removed.

get chem. turn Navy supply system. truck.

down the sink

alkaline pH 3 developer
stop bath " 12 fixer

same practice always

Ag salt = film — almost at least since AR started 2 yrs ago dumped down drain, too.

Fixer right into electroplating system
→ Electroplating process pulls Ag out - Right here

pure silver pulled out. (Prob. Ag lined pipes fr. before
98% pure metal solid goes to supply & they ship out

filament paper shipped back to DPDO. Hz when burned
→ Herlong, CA DPDO
because recyclable

~~74~~ oz. $7.00/oz
in F87

74
7
168

Ag will adhere ~

Storage in Lady's Bathroom

(Temporary storage in print room)
~10 gal dev. + fixer.

Solid acetic acid - makes 10 gal
2 5 gal buckets paint
4 qts. fixer
2 qts bleach
5 qts. developer
Solid developer

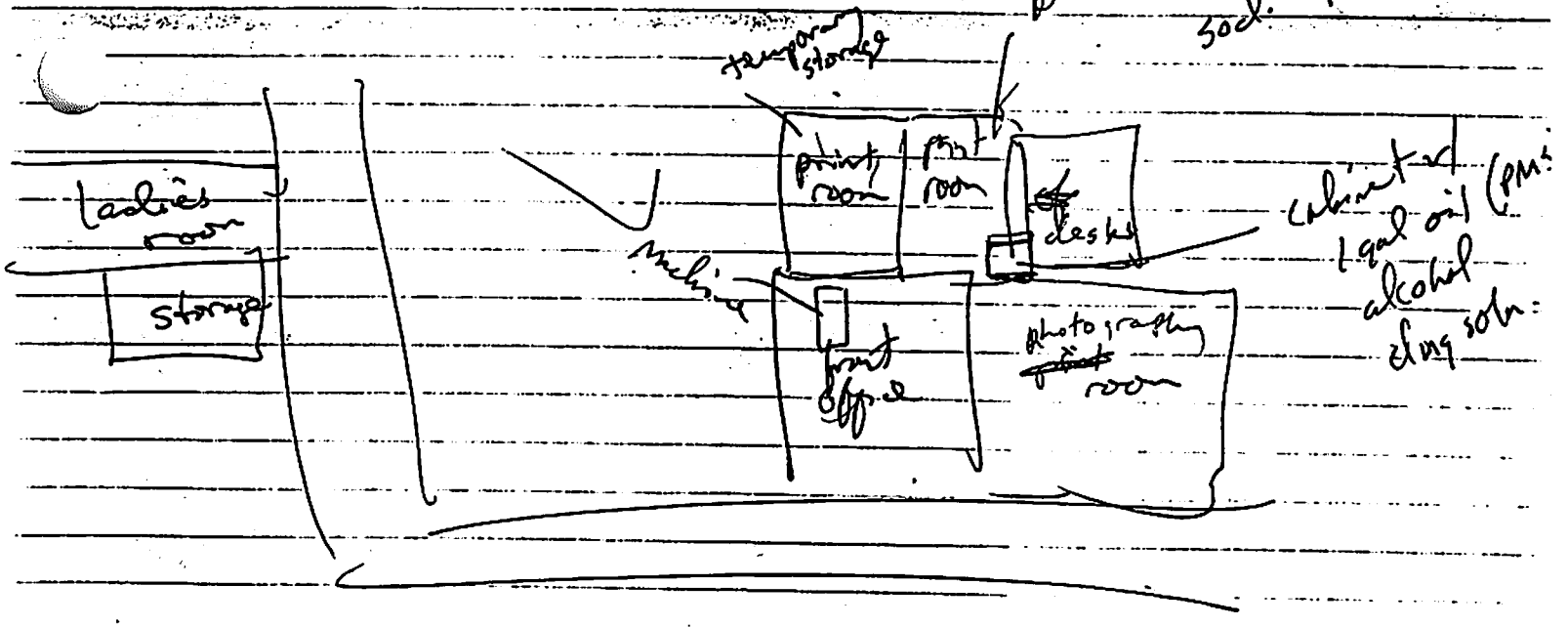
2-30 gal plastic tanks dev + fixer above sink

~20 qts dev. + fixer below machine

Kodak 18 gal process,
includes:
k hydroquinone monosulfate
4-N-etc
etc. formaldehyde
got insert from box
~~stabilizer (formaldehyde pain~~

minor spills of fixer on floor.

when plate built or began in



Div	Bldg	Stock Number	MSDS	HMIS	Material Name
FOTO	300	6750-00-048-4672		NO	ACTIVATOR AND STOP BATH, KODAK ROYAL
		6750-00-141-6558	GE327	YES	ACID, ACETIC GLACIAL, PHOTOGRAPHIC
		6850-00-148-7161	GE314	YES	CLEANING COMP, AVIONIC, TRICHLOROTRIFLUOROETHANE
		9150-00-149-1593		YES	GREASE, BALL AND ROLLER BEARING
		6750-00-151-6135		NO	HUNT AEROFLO E-R
		6750-00-153-8907		YES	DEVELOPER, PHOTOGRAPHIC
		6750-00-153-8909		YES	DEVELOPER, PHOTOGRAPHIC
		6750-00-153-8911		YES	DEVELOPER, PHOTOGRAPHIC
		8030-00-213-3279	GE1030	YES	CORROSION PREVENTIVE COMPOUND
		6850-00-227-1887		YES	CLEANING COMPOUND, OPTICAL LENS
		6750-00-249-7468		YES	DEVELOPER, PHOTOGRAPHIC
		9150-00-263-3490		YES	LUBRICATING OIL, GENERAL PURPOSE
		9150-00-273-2389		YES	LUBRICATING OIL, GENERAL PURPOSE
		6850-00-274-5421	GE334A	YES	SOLVENT, DRY CLEANING PD680 TYPE II
		6810-00-286-5435	GE324	YES	ALCOHOL, ISOPROPYL TECHNICAL
		7390-00-357-7586		NO	DETERGENT, GENERAL PURPOSE
		6750-00-498-2257		NO	REPLENISHER PHOTOGRAPHIC KODAK D-76
		6810-00-753-4993	GE324	YES	ALCOHOL, ISOPROPYL TECHNICAL
		6850-00-754-2672		YES	ANTIFOGGING COMPOUND
		6750-00-782-3851		YES	DEVELOPER, PHOTOGRAPHIC
		6750-00-802-5471		YES	FIXING BATH, PHOTOGRAPHIC
		6750-00-817-1364		YES	DEVELOPER, PHOTOGRAPHIC
		6750-00-837-7257		YES	DEVELOPER, PHOTOGRAPHIC
		7930-00-901-2089		YES	GLASS CLEANER
		6750-00-929-8101		YES	FIXING BATH, PHOTOGRAPHIC KIT
		8010-00-935-7064		YES	LACQUER, ACRYLIC, AEROSOL
		8040-00-938-6860		YES	ADHESIVE, AEROSOL
		9150-00-985-7316		YES	GREASE, GENERAL PURPOSE
		6750-01-042-0873		NO	DEVELOPER, FIXER, KODAK
		9150-01-054-6453		YES	CLEANER, LUBRICANT AND PRESERVATIVE
		6750-01-057-7994		YES	DEVELOPER, PHOTOGRAPHIC COLOR

KP 78a36a

KODAK TECHNIDOL LC DEVELOPER

To Make 1 U.S. Pint (473 mL) of solution

Liquid volumes are given in U.S. and metric systems.

NOTICE: Observe precautionary information on the packet. For best results read and follow these instructions carefully.

KODAK TECHNIDOL LC Developer has been devised specifically for KODAK Technical Pan Film 2415 when used for pictorial photography and completes the range of contrasts that are available for 2415 film. This developer will produce a pictorial range of Contrast Index (CI) values from a normal of 0.56 to a range of 0.40 to 0.70. Other developers are available which will extend the CI value up to 2.50.

This powder is intended to be mixed as a "one-shot" solution that is used within 24 hours and then discarded. Always use fresh developer, unacceptable results will be obtained with used developer. This developer has a very stable shelf life when it is in the original sealed packet and is a compensating-type developer which enables obtaining pictorial contrast from an inherently high-contrast film. It also enhances edge effects and increases apparent sharpness. With KODAK Technical Pan Film 2415, this developer produces extremely fine grain and resolution of 400 lines/mm.

TO PREPARE A WORKING SOLUTION:

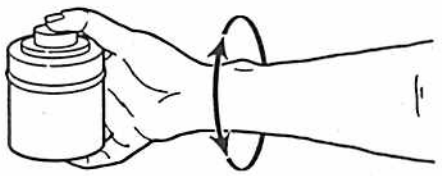
1. Start with this amount of water at 125°F (52°C):	16 oz. tank (473 mL)	use	14 fl. oz. (414 mL)	20 oz. tank (591 mL)	use	17 fl. oz. (502 mL)
2. Slowly pour the contents of one packet into the water, and stir with enough agitation to keep the chemicals suspended until they are dissolved completely.						
3. Add water to bring the total volume to this amount:			16 fl. oz. (473 mL)			20 fl. oz. (591 mL)
4. Stir until mixed completely.						
5. Cool to desired temperature and use immediately (within 24 hours).						

SMALL TANK PROCESSING

This film can be processed in small 16 oz. stainless steel or 20 oz. plastic tanks with spiral reels using the information given below. The same amount of dry chemicals is used in both cases. Note that in some cases, particularly when processing with spiral reels, the 2415 Film may be susceptible to nonuniform processing effects if the technique is not perfected and carefully controlled. Nonuniform processing effects may be caused by pouring the developer on the dry film through the light trap in the tank top or by improper agitation techniques. Agitation should consist of rotating (inverting) the tank around a fixed point (your wrist); do not move the tank laterally. Follow the agitation instructions carefully.

Overagitation caused by vigorous shaking within the first 30 seconds of development usually causes nonuniform development, especially adjacent to sprocket holes. On the other hand, insufficient agitation during this critical film-wetting period will also cause development nonuniformity because of uneven initial development. Because everyone's agitation style is slightly different, even when using same directions, it is difficult to give definite instructions. Bearing this in mind, we present the following instructions for reel-type developer tanks:

1. Fill the tank with developer.
2. In the dark, drop the loaded reel into the solution smoothly and without hesitation.
3. Attach the tank top to the tank. Then, to dislodge any air bells from the film, promptly tap the bottom of the tank against the table or other work surface from a height of approximately 1 inch.
4. Use initial agitation of up to 4 inversion cycles (down, up) depending upon your results. (Steps 2–4 will take from 7 to 20 seconds depending upon your type of tank.)



Extend your arm and agitate the tank 180° at the wrist with no lateral arm movement.

Punched to fit the KODAK Photographic Notebook (AW-22), sold by photo dealers (also fits the W-4 Binder).

(over)

KP 78435c

MAJOR REVISION 7-85

How to Process *Kodak Ektachrome* Film Using Process E-6 (1-gallon kit)

GENERAL INFORMATION

READ THE WARNING NOTICES

Read the warnings that appear on the individual units of this kit.

If the solutions (especially developers or developing agents) come in contact with the skin, wash at once with an acid-type hand cleaner and rinse with plenty of water. Use clean rubber gloves, especially when mixing or pouring solutions and cleaning the darkroom. Before you remove the gloves, rinse the outer surfaces with an acid-type hand cleaner and water. Wear eye protection. Keep all working surfaces (bench tops, trays, tanks, and containers) clean.

For information on preventing contact dermatitis, see KODAK Publication PIB-J4S. Ordering information is given on the last page.

Keep all chemicals out of the reach of children.

PROCESSING CHEMICALS

This 1-gallon kit contains one bottle of each of these chemical solutions as liquid concentrates:

KODAK First Developer, Process E-6
KODAK Reversal Bath, Process E-6
KODAK Color Developer, Process E-6, Part A
KODAK Color Developer, Process E-6, Part B
KODAK Conditioner, Process E-6
KODAK Bleach, Process E-6, Part A
KODAK Bleach, Process E-6, Part B
KODAK Fixer, Process E-6
KODAK Stabilizer, Process E-6

FILMS PROCESSED IN THESE CHEMICALS

KODAK EKTACHROME 50 Professional Film (Tungsten)
KODAK EKTACHROME 50 Professional Film 5018 (Tungsten)
KODAK EKTACHROME 64 Professional Film (Daylight)
KODAK EKTACHROME 64 Professional Film 6117 (Daylight)
KODAK EKTACHROME 100 Film (Daylight)
KODAK EKTACHROME 100 Professional Film 6122 (Daylight)
KODAK EKTACHROME 100 Professional Film (Daylight)
KODAK EKTACHROME 160 Film (Tungsten)
KODAK EKTACHROME 160 Professional Film (Tungsten)
KODAK EKTACHROME 200 Film (Daylight)
KODAK EKTACHROME 200 Professional Film (Daylight)
KODAK EKTACHROME 200 Professional Film 6176 (Daylight)
KODAK EKTACHROME 400 Film (Daylight)
KODAK EKTACHROME P800/1600 Professional Film (Daylight)
KODAK EKTACHROME Professional Film 6118 (Tungsten)
KODAK EKTACHROME Duplicating Film 6121 (Process E-6)
KODAK EKTACHROME Slide Duplicating Film 5071/7071 (Process E-6)

MIXING YOUR SOLUTIONS

Instructions for mixing these solutions are on the individual containers. Follow the instructions carefully.

The cleanliness of the mixing and storage equipment affect the photographic quality and life of the processing solutions. Contamination of the other solutions by minute amounts of fixer will cause large processing variations. Always mix fixers in separate equipment, and wash all equipment thoroughly after each use.

For best results, mix the solutions to their full volume, and use them in a short period of time. If you cannot use them in a short period of time, mix smaller amounts from the concentrates rather than use old solutions. To make 1 gallon, follow the instructions on the individual containers. To make 1-pint or 1-litre amounts, follow the instructions in the table below. Measure the amounts carefully with accurate 10, 250, and 1000 mL graduates.

Do not store unused concentrates in the original containers; air in the container will cause them to deteriorate rapidly. Store them in flexible containers so that you can press out the air and adjust the container to fit the amount of concentrate.

TO MAKE 1 LITRE:

Solution	Start with water (40 to 110°F) [4.5 to 43.5°C]	add	While stirring then add	add water to make
First Developer	500 mL	183 mL	—	1 L
Reversal Bath	500 mL	62 mL	—	1 L
Color Developer	500 mL	183 mL Part A	62 mL Part B	1 L
Conditioner	500 mL	179 mL	—	1 L
Bleach	250 mL	500 mL Part A	16 mL Part B	1 L
Fixer	500 mL	125 mL	—	1 L
Stabilizer	500 mL	8 mL	—	1 L

TO MAKE 1 PINT:

Solution	Start with water (40 to 110°F) [4.5 to 43.5°C]	add	While stirring then add	add water to make
First Developer	250 mL	87 mL	—	473 mL
Reversal Bath	250 mL	30 mL	—	473 mL
Color Developer	250 mL	87 mL Part A	29 mL Part B	473 mL
Conditioner	250 mL	85 mL	—	473 mL
Bleach	125 mL	237 mL Part A	7.5 mL Part B	473 mL
Fixer	250 mL	59 mL	—	473 mL
Stabilizer	250 mL	3.8 mL	—	473 mL

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/25

Interviewee Lloyd Brewer (by phone)

Shop/Area Director of Housing

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Dental used mercury but "fixed" HgX mixture
and dispose in garbage

Yearly water analysis
Biological - any tap (min 2/month)
chemical yearly - from well heads
* Del Purcell has results

* Dick Lane in ROICC
hit something (garbage dump)

GSE - dumped oils solvents, prior to 1980, quantities
waste 50-100 gal/qtr. Ex. Hydraulic fluids
possibly lead paint sand blasting
* Senior Chief Lavin AIMD
may have more info

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Industrial Hygiene Surveys - Since 1978-1979
↳ all shops yearly report

Asbestos on base - and Ranges
@ clinic has boilers w/ known asbestos
Safety office - has List
Chief Peterson
Fuel dumped near Hanger 400? old area before mat built
55 gals JP-5 per quarter prior to 1979-190

Pest Control - old dump near current Bldg
* call 3499 Dave Radai
mound of dirt -
"Love Canal"
Since 1940s

Most Asbestos - left in place
NAVFAC will fund clean up in 1993
Paint Booth - dismantled 1986 - disconnected the paint booth bldg still the used since 1950s
PW booth - enamels, alkyloids,
vechicle paints, fuels, oil
probably down 2' into soil (based on amount of time
Solvents - laquer thinners
Now PD-680
old tetra chloroform

* Dan Prockish (Mechanic, PWD) might know about paint booth

Medical clinic - take bio waste to Fallon since last 6 mont
prior burned onsite in drum since late 1970s prior to that
probably sent to land fills
[illegible] in Safety (not to work in clinic) here next week

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Mostly concerned w/ Ranges
primarily w unexploded ordance

UXB - Range Maintainance Contract
is doing clearing of ranges
clear debris
since last 8 months
1,5 years to get all metal objects
off range >6"
Still use Napalm sporadically
designated site on B-17 for disposal
of napalm - Marines

On base
Responsibility is for flightline
emergency

Area in weapons hit 20mm
old irrigation canal w/ scrap metal
some cans of 20mm w/ powder
Rounds were disposed off base
Not allowed to dispose of on range
anymore. Practice stopped ~1983

Napalm - soap and something else

Store acids - but no spills reported
No drones used here

Contractor stockpiles - not being hauled now -
waiting to see how much there and what to
do

SITE SURVEY QUESTIONNAIRE

Interviewer Mark G.

Date 9/12

Interviewee Steve Opdycke

Shop/Area Industrial Hygiene

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates
OMD - Industrial Hygeine	Monitor Hazardous materials, Occupational Health	1978-1983

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Lloyd has worked in Housing 12 years
began as a maintainance worker

Housing consists of 301 units in 5 areas
K-Park (mid 60's)
Turnkey (1971–1972) (has asbestos tile, presently or shortly will be removed)
Sage brush (70 units 1981)
Air Force (mid 60's)
May Ranch (40's)

Garbage Contracted since 1960's
Disposed on station until 1979 they moved off station

Present housing garbage is 2 32 gal cans every 2 weeks for 301 units
Doesn't know weights

Housing Maintance
3 people on permanent loan from PW
Located in shop #95 Bldg. 409 (old Air Force Ga
7 years in this location.
Previous location was Bldg. 15

Presently use:
Latex paint 100 gals/month (shared in ~~work~~ shop)
Used Latex for last 9 years (since 1978)
previously used oil base and thinners (2 gals/month) (same amount as latex)
B+B Sewer Solvent (for 8-10 years) ~~used~~ ~~4~~
1 40 lb can/month caustic
Wood stain (not used for 2 years)
minor amounts used to be used
Vinyl adhesive NASCO #500 (open purchase)
2 gals/month for last 10-12 years
PVC primer ½ pint/month
Solvent "

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

ABS solvent 1/2 pint/month
Cement 1"

Soldering flox 1/2 pint/month
#3439-00-255-9935

Old containers to landfill

Past use:
Bad or off spec to landfill
empty cans to landfill
either by dumpster or Haring would dump them directly

No reported spills or problems in past

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

He has been there 1.5 years
Track is 2 years old

They use → 10-40 synthetic oil
8-9 qts month
Grease (reg bearing grease)
3 cans year
Reg or unleaded
gas - 3/5 gal cans week

Some very minor spillage on asphalt when filling tank

Waste oil to auto hobby shop

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/22/87

Interviewee PO Freeman

Shop/Area Medical
X Ray Tech.

I. Present History

What were/are your duties or responsibilities at the activity?
here 2yrs 2months Branch of Treasure Island

In what operations were you involved?

Operation	Brief description	Dates
X Ray Tech		

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

DT1 Steine

In the past used to pump wastes down drain

2½gal Hypo Fixer Solutions - Spent fixer to Ag recovery unit

2½gal Developer Solutions - Also goes to Ag. recovery

Machine holds 10gals

Plastic bottles in postured - 5gal. containers recycled to supplier.

Civilian contractor supplies

Waste - films, Ag filtrate + effluent ~~accepted~~ shipped to NAS Alameda

As far back as he knows have always shipped spent chems. off base.

We screen cleaner which is glass cleaner

Don't use Hg at med. since he's been here.

Lab uses alcohol 4-5gal/quarter waste down drain

Pharmaceuticals turned into supply with biohazard disposed to hospital in Reno where its incinerated. Do only minor treatment.

Last 15-20 years automatic developing. Prior probably dumped chems. Probable 2½ gal develop every 2½ gal fixer 2 months.

Cindy Mason

Worked at Medical from early 1977 to April 1987. Prior to 1985 Biohazard waste was burned in a handmade incinerator in back of the clinic. Sine 1985 hauled to Fallon in special locked boxes.

Pharmaceuticals are flushed.

Virus's sent off with biohazards

SITE SURVEY QUESTIONNAIRE

Interviewer Tom Olson

Date 23 September 1987

Interviewee Commander Earl Eschata

Shop/Area Dental Clinic

I. Present History

What were/are your duties or responsibilities at the activity?

Director of the Dental Clinic.

In what operations were you involved?

Operation	Brief description	Dates
Dental Clinic	Director of operations	7/86 to present

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) Mercury, silver, gold, alloy, composite, porcelain, rubber, irreversible hydrochlorite, zinc orphosphat (powdered, mixed w/ 50% phosphoric acid)

radiological materials X-ray film

biological agents

2. Ordnance materials (e.g., explosives, propellants)

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.)

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity? All through Naval supply, from Treasure Island USA UPS.

Were they transported from place to place on-site? If so, how?
From store room to offices. Hand transport.

IV. Waste Disposal

What waste products were generated from these operations?
Spent mercury capsules (amalgams). Double heat-sealed, then into trash. Xrays (mistakes only) - into trash. Not sealed.
Small amounts of the remainder on pg. 1

How were these wastes stored prior to disposal?
Mercury capsules picked up in offices once/wk, then disposed. All others - not stored. Disposed of as used.

How were these wastes disposed?
Mercury - see above. X-rays - see above. Silver alloy, gold, composite, polysulf rubber, irrev. hydrocholite, zinc oxyphosphate, phosphoric acid - small amounts into waste water. Amounts unknown. ~~X-rays~~.

On-site

Location	Disposal Method
Mercury - used containers → 15/day. Volume of mercury/capsules small, but unknown. Small amounts of ~~[illegible]~~ unused merc. into HGX ~~[illegible]~~ (buffer liquid) then into trash. All waste products into landfill or sewage treatment.	

Off-site

Location	Disposal Method
Other than used mercury capsules and some x-ray film, very little waste. X-rays: 10-15/day. Of that, unknown % are mistakes and/or bad exposures (which are disposed - landfill on base).	

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?
No

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?
No

VI. Site-Specific Areas of Concern

N/A

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

None

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

No

Do you know any other shop workers we should talk to?

No

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/24/87

Interviewee Mr. Metzger

Shop/Area Branch Exchange Manager

I. Present History

What were/are your duties or responsibilities at the activity? At Fallon 1 yr

In what operations were you involved? Running Exchange since Ernest Morgan — Master Chief Christiansen

MC

Operation	Brief description	Dates
Master Chief Williams — also at interview		
	3 gas tanks 10,000 ea., doesn't know material (2 older, 1 newer, dates)	
	service station at location at least 5 yrs.	
	Figures balance very closely	
*	Underground waste oil tank, maybe 500 gal, pumped out 5 months ago, drained once to since he's been here	
	Tanks → 9/63 two old ones, nothing about type.	
*	Water into waste oil tank, tank overflowed a little bit. The oil (10-15 gallons that overflowed tank on ground. Not picked up. Stain around nozzle of tank any way ≈ 5 ft around.	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

1500 tuneups, tires, lube, is big month.

2nd Interview Record Attached

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/23/87

Interviewee Vicki Pugsley

Shop/Area Ceramics Shop

I. Present History

What were/are your duties or responsibilities at the activity?

1983 At base - 1971 shop moved at least 5 times

In what operations were you involved? no one knows where

Operation	Brief description	Dates
	⌐ water base glazes, and paints come in small jars ↳ contains Fritted lead. Empties are covered + tossed to trash	
	Most of the waste is taken home.	
	Did use lead paints until ~1980	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

SITE SURVEY QUESTIONNAIRE

Interviewer Robert Ingersoll

Date 9/23/87

Interviewee Petty Office Don Bunch

Shop/Area Auto Hobby

I. Present History

What were/are your duties or responsibilities at the activity? Used to run Auto Hobby Shop since Nov. 93, now short term
CMC Benson ran before Bunch, transferred
In what operations were you involved?

Operation	Brief description	Dates
1983-	Combined transmission, oils, lubes for vehicles into drums. Transfer from drums to P.W. bowser. Doesn't know where the bowser when. When PW lost bowser, drums went to S&R.	
1986-	Went to private contractor to siphon off your drums.	

As far as P.O., drums → PW bowsers, Benson ran a good shop.

No underground tank at hobby shop. ~~Probably~~ waste oil UST at Exchange Service Station.

- Supply only gear lube, grease, everything else is brought by the customer

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

PD-680 supply from private contractor. Customers use for cleaning parts in parts cleaner only, Private contractor removes the dirty PD-680.

The old lift was cable electric w/ no hydraulic. 1 yr old hydraulic lift, no problems.

Very Small spill of motor oil (4 gallons), dug up dirt and disposed through safety (1985) at the auto hobby shop.

Welding shop at Auto Hobby - Easy Arc 6013 rods, Scrap metal barrel gets ~~rod~~ scraps, rods are used up. Short rod gets spot use. 3 customers for welding a month is all.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Clay base mixed but restock one batch every 2 weeks. once every 3 months ≈ 10-12 batches year.

1-50 lb bag P.V. Clay
2 50 lb bags Kentucky Ball Clays
3 50 lb bags California Talc.
16-17 gal water
3 oz Barium Carbonate
3 oz Soda Ash
6-12 oz fluid Sodium silicate

All chems. kept in locked cabinet + never disposed.

Currently closed because old clay contained asbestos did a complete clean out of bldg. Passed OK
100-200 2 oz jars of paint

8 ovens electric fired.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Do have to soak materials in blanket roller but strain roller + reuse. In 5gal. can cans disposed when empty - allow can to stand open when done. 2-3 gal/month.

Degloser - 1 gal can contains methylene chloride ½ cup/month

Blanket Fix - ½ pint glass bottles containing me. cl. 1 bottle/month

Black Inks - Vanson rubber base ink do get some jobs need oil base ink. 5 lbs/month rubber 1 lbs/month oil

---

Electrostatic Solution - acid sol. used to wet down plates.

Have problems with ventilation have living quarters above the shop. Not sprinklered

---

Original supply delivered to Hangar 4. Small spill 1 asphalt mine to ground 1 5 gal. can blanket roller in Feb. 87 Parking area W of hangar.

All empties to trash never fills to trash

Developer + fixer for graphic photography

Developer - ~~AMB~~ A + B type litholine type

Fixer - 2 part acetic acid.

used - once/month make up 1 gal. each. store fixer + dispose developer (3 oz. A + 3 oz B)

32 oz fix + 3 oz acid - stored up to 2 months. supposed to take to photo to Ag recovery. Dispose ~ 35 oz every other month.

Disposed to sink with warm water at least 100 gals.

Historically use the same types of chemicals over last 15 yrs. ~~[illegible]~~ Same volumes

---

Shop operated 4 yrs military
5 yrs civilian

same location
similar chems
similar vols.

Knows of no print shop prior to this. Prior done other Navy bases or in town

---

Used to have a blue line machine in print shop used ammonia sulfite. Was stored in shop and one 1 gal bottle broke + had to be cleaned up. Thrown to trash. July 87.

Knows of no problems elsewhere

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/25

Interviewee F.C.2 Ford

Shop/Area Go kart track

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates

Over

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location Disposal Method

<u>Off-site</u>

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

Off Base People

Primary training facility. Basic primary no ranges at Fallon

SITE SURVEY QUESTIONNAIRE

Hangers, ~~top~~ torpedo shop, tower were permanent + retained and reverted to Churchill County. Temporary bldgs to Indian Service

Interviewer GAH

Date 9/24/87

Interviewee Barney Fritz

Shop/Area Retiree - ~~[illegible]~~ worked at base 1947-49

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates

He was there Dec. 47 — Jan 49 (14 months) Used two types of cleaners "Gunk" + "mineral Cleaning Fluid". Was an incinerator 1/4 mi SE of E hanger was a hole there where things were dumped + burned

Reconditioned DC-3 engines did about 300 engin was a private contractor (Nevada Airways)

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) _____

radiological materials _____

_____

biological agents _____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Recommissioned base in 1949 had a few people on base in 1948 The ~~[illegible]~~ temporary [illegible] Indian Service + Indian

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

RECORD OF TELEPHONE CONVERSATION

DATE 9/24 JOB NO.: _____

RECORDED BY: MCG OWNER/CLIENT: NEESA

TALKED WITH: Alene Coulson OF State Dept of

NATURE OF CALL: INCOMING ☐ OUTGOING ☐ Cons: + Nat Res,

ROUTE TO: INFORMATION ACTION

885-4670

MAIN SUBJECT OF CALL: _____

ITEMS DISCUSSED:

Asked Alan Biaggi

Alan - is in Reno

She will call back

last 1.5 years is Alan Biaggi

Prior to that: Doug Marten

Called Alene (9/25/87

Alan Biaggi does not know about the land farm well

Alene will continue to try Doug Marten

I will call back next week

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

John was chief geologist associated w/ project

Report on test is available from Nevada Bureau of Mines and Geology
"Geologic info of Shoal Site"

Purpose of test
Look at seismic profile of a A-bomb in a seismicly active area. Could Russians hide test in an active area.

Bomb profile was distinctive

Grid pattern was for detailed mapping

Bomb off at 1000' deep
Shaft vertical 1000' w/ drift to east 1000'
Bomb at end of Drift.
(thats what tailings pile is)

Explosion lifted ground 45 feet, puffed a little sand out of shaft (sand bags had been laid in

1 test only criteria were granite (homogeneous) in active seismic area

Project was very fast tract (4 months)

Monument at mouth to shaft

Site was always open

No Radioactivity leaked

Site was drilled, cavity left w/ molten rock in bottom.

For more info DOE in vegas.

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/25/87

Interviewee John Shilling

Shop/Area Formerly of Nevada Bureau of Mines and Geology

747-3385

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

Operation	Brief description	Dates

OVCR

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

Very fast interview as Museum was closed and Sharon was leaving

1. Shoal Test

   1 nuclear explosive ug test conducted by AEC in 1963

2. A report exists on the test Sharon has seen it, but she believes it is classified and would not disclose where she got it. She also thinks that by now the freedom of info act should cover it and maybe it is public.

3. For more info she said to contact John Shilling director of Nev. Bureau of Mines @ UNR

4. She thinks there is a brass above ground marker

784-6691 Shilling is retired

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity?

Were they transported from place to place on-site? If so, how?

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

On-site

Location Disposal Method

Off-site

Location Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed?

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?

VI. Site-Specific Areas of Concern

SITE SURVEY QUESTIONNAIRE

Interviewer MCG

Date 9/24/87

Interviewee Sharon Taylor

Shop/Area Churchill County Museum

I. Present History

What were/are your duties or responsibilities at the activity?

In what operations were you involved?

OVER

Operation	Brief description	Dates

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives)_____

radiological materials _____

_____

biological agents_____.

2. Ordnance materials (e.g., explosives, propellants) _____

_____.

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) _____

_____

_____.

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

There was cosmoline on the engines Bought in Sacramento McClellan + trucked in. No fluids in the engines.

---

800 - 1000 gals were dumped in pits but not burned. Used degreaser tank.

Incinerator was a trash incinerator

Much other staff buried junk + trash not sure about liquids - anything they ~~did~~ didn't want.

Pits were trenches ~ 100' long
15' wide
8-10' deep.

right next to and W of incinerator (100')

~~Knows but not sure~~

Knows fuel farm was there but didn't use he used trucks. No one else used them when he was there.

Knows of no WWTP thinks there was septic. No dumping down toilets

---

No other knowledge at base

Safety

SITE SURVEY QUESTIONNAIRE

Interviewer GAH

Date 9/21/87

Interviewee UTC Peterson

Shop/Area OSH

I. Present History

What were/are your duties or responsibilities at the activity?
at NAS 9 Mos HW disposal program mgr. all 9 mos.

In what operations were you involved?
HW facs. + collection + disposal of colored drums
others

Operation	Brief description	Dates
	Fuel Farm gw contam.	Apr 87 - Pres.
	Borrow Pit gw contam.	Aug. 87
	How to handle abandoned tanks	all 9 months
	Spill reporting + cleanup	
	Hazmat response	

II. Operations Data

What materials were used in the operations described above?

1. Industrial chemicals (solvents, oils, hydraulic fluids, paint thinners, acides, bases, preservatives) JP-5, lubes, hydraulics, solvents (PD-680 Type 2, TCA, MEK,) alcohols, Turco etc. strategic paint, paint thinners, adhesives, stains, most paint water base but some oil paint

1986-1985 higher than average 20,000-5000 gal/yr most POL most JP

radiological materials - exit lights only, or medical and dental - do their own.

biological agents - Biowaste from medical only.

2. Ordnance materials (e.g., explosives, propellants) None through PW EOD disposes dud stuff on range, ordnance area stuff not sure

3. Pesticides (e.g. Herbicides, insecticides, rodenticides etc.) used up, containers emptied to trash

III. Transport/Storage of Hazardous Materials

How were the materials listed on the previous page transported to the activity? used old cans (5 gal, 2 1/2 plastic buckets) day can in shop. wing tank dregs to barrels.

from generator to holding facs.

Were they transported from place to place on-site? If so, how?
Physically move drums want to go to pumpout + move liquids. New facility in planning (2 yrs). Used to use bowzers probably back to beginning Did

IV. Waste Disposal

What waste products were generated from these operations?

How were these wastes stored prior to disposal?

How were these wastes disposed?

<u>On-site</u>

Location
did some road oiling

Disposal Method

<u>Off-site</u>

Location
in old days most waste went to DRMO some sold off base outside DRMO contractor removed off station.

Disposal Method

Name of Waste Hauler

V. Accidents/Incidents

Did any accidents or incidents occur during the operations previously discussed? Holding facs. - none, main fac. - none.
Aircraft spills - once/quarter < 100 gals. onto apron, cleaned up
Fuel Farm - overfill trucks periodically

Are you aware of any accidents or incidents which occurred during the transport or disposal of raw materials or waste products?
Doesn't know of aircraft overfills.
Spills a bowser in Dixie valley - cleaned up.

state poc. 50 gal and/or seen w/or contam. 10 yr soil

VI. Site-Specific Areas of Concern

Knowledge of any other waste disposal operations within activity boundaries or in the immediate area?

Have you observed any other signs which seem to point to possible environmental contamination resulting from disposed wastes?

Do you know any other shop workers we should talk to?

As far as he knows never had active squadrons stationed here.

Doesn't think that much landfilling of HW has occurred but some undoubtedly did.

Base policy not to landfill HW since about 1980.

INITIAL VISIT - NAS FALLON
8/26 + 8/27/87

Photo Shop in Hanger 300 has aerials 1977 + 1960 which we can look at while onsite.

Larry Jones - Nat. Resources ~~up to~~ 1975-1985 was pest control

Forrest ~~[illegible]~~ Kinkade - Maint. Cont. Dir.

Jim Regan - Asst. P.W. Dir. old timer very knowledgeable. started as a painter in 1950.

Del Pursel - PW Engr. director

Jeffs Office Supply in Fallon on Main St.

Da[illegible]
Fallon 15 - Fallon 7½ S of Fallon Salt Cave
Carson Lake - Grimes Point Lahonton Mtn.
Stillwater

Some of needed USGS Quads

Ranges
Frenchman
Drum Summit
~~Bell~~ Bell Canyon
Chubar Canyon

Base Reactivated ≈ 1950

Abandoned fuel farm (Jim Regan) somewhere on base
Used to (up to early) 80's apply waste oil to roads for dust control - all types of oil used.

Cdr. Briggs - PAO - Plans to issue a press release to local papers at the time we are onsite to describe what we will be doing. The base paper will also have an article the week before we arrive. It will inform everyone when we will be there and what we will be doing and encouraging cooperation with our work.

Base Tour with Chief Peterson (Red notes from Ron Nygren in office

(1) PW Transportation - Vehicle maintenance area, govt. vehicle gas station. Two ug tanks (diesel + unleaded gas), Also vehicle wash area that is a concrete slab with a drain to the ground. Also do light vehicle maintenance. Some type of pit or sump behind dispatch bldg.

* Fuel Farm - There are a number of gw monitoring wells in the area. Had dug a hole and found fuel on the gw. Used to dump fuel on the ground. gw is 8' deep, hole was 10' deep. Tank bottoms removed and put on the ground - the implication is that this is water and some fuel (not sure about sludge bottoms). After dumped on ground ran to a drainage swale to the north to the main drainage to the E then off station. Overflow from separator (?) at top off facility goes to a septic system then leach bed. Have 2 AG tanks (both JP) and 5 UG tanks (3 JP, 2 Avgas) for JP-5 + Avgas. Roadways paved with asphalt other areas unpaved. No visible containment. Ron believes that gw flow is to the E. Facilities opened ≈ 1965.

Tank Bottoms organic lead ?

(3) Weapons Safety Bldg + HELP area (High Explosives

where loaded previously

Loading Pad) used to load aircraft with ordnance. Area was an alfalfa field until 1985. Opened 1986.

④ Hot Refuel Pits - used for refueling aircraft while still running. Fuel delivered directly from fuel farm to fuel nipples via ug pipes. Previous uses (actually current use because facility isn't quite operational) is to use refueler trucks filled at fuel farm and fuel planes on tarmac. Facility is brand new and not yet operational.

NOTE: JMB Mountains to ENE of base are the Stillwater Range, the near side base of which is the Stillwater Refuge. Runoff from the Sierras runs into the Lahontan Valley and Carson River then to Carson Sink.

NOTE: TEO ESI did mention that Peregrine Falcon and Southern Bald Eagles nest in the refuge + mountain area and hunt at NAS. Contact Larry Jones for environmental resources info.

⑤ (also 35) Ordnance Area - Admin. area in NW corner. There were also a number of old bldgs. in the area that have been recently removed. Some of the magazines at S end of area are being relocated for the new runway. Contains small arms armory also.

NOTE: For transformer info. + PCB info. contact Jim Whitmer in PW Electric Shop.

NOTE: New runway under construction parallel to and NE of existing main 11,000 foot runway. About 100 yards away. Scheduled completion 1988, hope for Nov 87. Still filling and grading.

(6) Receiver Site - Being moved to new (6). Possible PCB transformer and generator. Cable trench open between old (6) and new (6). Almost the entire length of the trench shows trash for almost its entire length at depths of only 2' to 3' deep. Much of the trash appears to be fairly new, less than 10 years old.

(7) Former Landfill Sites - Several areas used for landfills over time. Many of these areas exhibit rubble or trash on the surface.

- World War II - along S end of main runway. Most likely mostly obliterated when runway was built.
- Korean War Era - off E end of original E-W runway. Area now being moved for construction of new runway.
- Post Korea Era - in SW area of base.
- Newer Landfills - in E Central area. Actual locations and chronology of sites unsure but 7A, 7B, 7C, 7D seem to be the order then to (8) (current landfill). Each site apparently was used for about 1½ years. Area flat with shallow (8') gw yields little capacity per site. Some fuels may have been moved from (2) to the XXX areas in 7D (not sure). Also napalm wastes were also reportedly disposed at (34) which is in or adjacent to 7D. The exact location of (34) is not clear and it may be more on the SW side of 7D rather

than where shown (SE area of 7D). There has also been some Haz. Waste disposal to dumpster and thence to the landfills, including ⑧, but landfill operators try to remove containers that are suspicious so there may be Haz. Waste in any of the landfills. Area in SW corner of base may or may not have been used - Ron has seen plans but not sure as to use.

⑧ Current Landfill - Pit type operation but shallow due to gw. No liners used. Shallow gw and sandy soil could yield leachate problems in future. (Same for all landfills at Fallon). Do try to control industrial waste disposal to the landfill. Equipment operators are told to remove containers if observed. Cover daily

⑨ Radar Tower - Possible electrical equipment and generator at this site.

⑩ Transmitter Site - Being moved to new ⑩ site to allow for new runway construction. Electrical equipment and generator likely present.

⑪ Drainage Ditch - Area of base exit. Enters, passes through base and exits base at south end of main runway. Water quality appeared good, good plant growth (including Typha spp.) in and along the ditch. Several ducks swimming in the water and some fish observed. No sheens or obvious contamination observed.

TEO

⑫ Waste Water Treatment Plant - Have had problems in the past meeting discharge limits.

⑬ Supply Shipping and Receiving - Received Haz Materials and handled Haz Wastes in this area until June 1987. Asbestos burial site along S fence line. Material double bagged and crated prior

buried then signed. Swale running S along E fence that has had high Pb levels detected in its soils.

(14) Fire Fighting Training Area - Unlined earth burn pit fed by two AG tanks and UG piping. Area in and immediately around burn pit are heavily stained. Some runoff to S has also stained soils for ≈ 100 feet. Tanks are about 30 yds from pit and are elevated and are not in a lined or contained area. Also two small soil piles about 100 yds. SW of the burn pit. Per the Chief, soil piles are used for rebuilding dikes of burn pit and he thinks they may consist of contaminated soils. Ron doesn't believe that the soils in the piles are contaminated.

(15) Electronics Area - Used for electronics warfare simulations. Contains an emergency generator shack and do some overhauls in the area. There are also UG and AG tanks in this area.

(16) Former DEX Gas Station - The UG tanks (removal not known) are still in the ground and their content volumes are not known. It is possible that there still is fuel in the tanks.

LOST ?

(17) Paint Storage Magazine - Used by PW Paint Shop to store paints. Somewhere in this area is the former vehicle repair shop that was moved to (1) in the late 1960s.

(18) Haz Waste Storage Area - Operated by OSH to hold haz waste drums. Several others scattered around all the industrial area. Use different color

drums to help in segregation of different types of wastes.

(19) Hanger 4 - Original air station hanger (adjacent hanger torn down). Wash aircraft on tarmac on both sides of the hanger use standard soaps and solvents (including Turco) Tarmac is asphalt but not contained. Runoff is to soil on S of tarmac.

(20) Engine Waste Disposal Area - After World War II the Hanger 4 area was used for the over-hauling of DC-3 engines wastes from engines and cleaning solvents were dumped on the ground north of the tarmac. Reportedly about one engine per day for two years were overhauled. Local retiree Barney Fritz did this work. Should interview.

(21) Industrial Area - Most PW shops are located in the area (metal, wood, carpenter, plumbing etc) plus pest control (see (24)) Each shop will need to be visited + old timers interviewed.

(22) Old Fuel Farm - Consists of four concrete UG tanks used at old airfield location. Closed in ≈1965 and moved to (2). Reportedly whenever they dig in this area they unearth fuel contamination. In 1981 they cleaned out the tanks and removed 75,000 to 100,000 gals total of JP-5, oil, No. 6 oil. Michelada knows about odors in the soils. Base is looking to LUST program for help in this area.

(23) Old Boiler Shop - Had a waste oil tank in the rear that had a ≈ 30,000 gal. capacity. Recently removed 23,000 gal. Think tank is empty but not sure. There are at least two maybe three UG tanks in the area. Knows of at least one several thousand gallon spill event. Knows that old waste oil went to the tank as recently as 1984-85.

LUST ?

(24) Pest Control Shop - Two-three quonset huts and one clapboard building. Thinks they may mix pesticides outside and no paving or containment. Drain in rear area, goes to ?

(25) Buildings 89-90 - Two Quonset huts used to store Haz. Materials. No outside containment

(26) Asbestos Burial Site - Asbestos double bagged and crated and buried and signed. Some settlement in pits area. In a fenced area.

(27) Temporary Hazardous Waste Storage Area - Drums on pallets. No paving or containment or cover area is fenced. So far State of Nevada has not complained. Only a holding facility since they are not a licensed TSD only a Generator.

NOTE: There are many contractors working on base, with much expansion going on, and the KOICC office will not allow OSH to interfere or control any wastes generated by the contractors and there is some concern as to proper waste management by the contractors.

(28) Wells Air Start Buildings - Used to generate compressed air for starting aircraft. Contain air compressors and high

pressure air systems. The new building (western one pres air tank) is three years old.

(29) Hanger 300 - Hanger used to repair aircraft. Also contains GSE and AIMD. AIMD is new, not even fully operational. GSE does maintenance on ground equipment. Prior to GSE the area was a propeller and torpedo shop. There are also wash racks for aircraft that finally drain to surface waters (similar to those at Hanger 4). Used to contain small arms armory.

NOTE: there is a print shop located in one of the four barracks buildings but not sure which one.

(30) NEX Gas Station and Auto Hobby Shop - Contain typical gas station fuel + repair facilities and UG fuel tanks. Hobby shop used for self-repairs of POVs. Contains typical cleaning solvents and waste oil tank. Been at this location since the mid-1960s.

ST

NOTE: * Not sure about other hobby shop locations. Need to follow up during onsite.

(31) Skeet Range - was used more heavily 10-15 years ago. Possible Pb contamination. Need to check with Bud as to their thoughts on ranges. →

(32) Engine Reeup Area - Aircraft have their engines reeup for test purposes in this area.

(33) Former Aircraft Gun Range - Range for firing aircraft guns. Butt most likely heavily contaminated with Pb slugs. Area reworked for new runway construction. Need to check with Bud as to their thoughts on ranges. →

(34) Napalm Disposal Area - Not sure about exact location. Some was burned and some buried.

(35) Ordnance Disposal Area - Several ordnance disposal sites within the ordnance area. Details are sketchy but should check with Mark Glass and Herman Dixon in Ordnance for details.

(36) Bureau of Reclamation Land - Portions of this property which is not actually part of the Base has been used by the base as a rubble disposal dump. Two separate areas used. Apparently received paint and adhesives wastes, but not sure. Need to check with Bud about this site.

(37) Aircraft Fuel Disposal Area - In the past, before the entire area was paved, aircraft fuel and other fluids were disposed off the edge of the original tarmac area. Also fuel spills on the tarmac were hosed off on to the ground. (Per Ron)

(38) Fuel Valve Area - Fuels for aircraft are delivered via underground pipe from Sierra Pacific Pipeline from Reno. Ron knows of some valve leaks. Vehicle fuels are delivered by truck.

(39) Waste Oil Disposal - All unpaved roads on base were used to receive all types of waste oil generated base wide - happened up to ~ 1983-84.

Questions for Ron + Chief Peterson:

How does fuel arrive on station — have been some valve leaks in past

(38) Sierra Pacific Pipelines - from Reno. ug. pipeline

5 ug. tanks, 2 Ag. → 3-JP5, 2-Avgas — Ag - 2 - JP5 — vehicle fuel brought in by truck.

- Use of bldgs. S. of hangar 300 hangers etc.

- Check shipping + receiving location on map. OK

- When did Ron take over HW + HM from supply
  Still have HM, HW - till June 87. all HW was at (13)

- Where were excess fuels from (2) dumped at (7) in XX areas.

Chronology for (7) areas?

- for (7) area at SW corner of base - check PW records not sure if plans were implemented.

- NE corner area - Jim Regan told ROICC to stay out of area - Something buried? ☒

on other map Site 1+2 ordnance disposal areas.

- Site 4 - dump - burn junk area - dashed area on map

entire back road was routinely oiled

Site 5 - probable WWTP sludge dump.
PW maint. utilities operates WWTP.

No intermediate aircraft maint. AIMD not operational yet. No jet test cells

trench with water - had water samples collected
results by early Sept

Housing Public Works Maint. does heavy maint.
Light Maint done by Housing. Shop is in (21)
area

B-16 et al Generator Site - fuel spills, oil disposal

PIC Sites at EW range generator areas, spills
etc. Centroid area dump waste oil
in low area E area. Fly N-S through to penetrate "enemy" EW defenses to bomb targets in B-17

B-17
Frenchmans Station on Hwy 50. Recent navy acquisition
back old motel, gas stn., cafe. Torn down + much waste
with oil disposal in past by private owners
Burd

Where were magazines in old days?

Landfill sites last 1-1½ years each

Believes Top Gun relocating here w/in 1-2 yrs

51 In prior to early 70's area used for oil + fuel
disposal. Defuel planes onto ground.

Supply may have records on turn in data

Public Works may have records on landfill opns.

Metal Recall on terminus of "junk"

Did have a DRMO at Fallon in the past. Thinks it left in early 1970's. Remembers there were a number of empty cans + drums in the ditch running along

(13)

His opinion that records availability at base is poor to non-existent. Some old records may be available at PW for buildings etc.

If we can find old GD maps + aerials for old.

Small arms armory was in B-300 now in Ordnance are.

Jim Gormley in Tool Room. still on site been here since mid 40's.

2436 office

GAH ONSITE MONDAY TOUR NOTES

Geolog - Alan Biaggia

Carson City — Base contact

r. Dept. of Cons. + Nat. Res., Div. of Env. Prot. - Alene Coulson

LUST - we will look at only clearly past ops Ug tanks. Anything current - leave to LUST program

BuRec Area - Bud will check on disposal here

Range Road - Discuss but may not be a site. (Check ROICC)

Ranges - EW is only one with Jaco. (Check Range Ops)
Ch. 4 - discuss ranges in less detail

Base handles waste oil as HW when its currently not regulated as such

erate several thousand gals./month waste JP

TOUR

- HW Storage Areas (6-8 Months old)

① LOX Plant

② PW Trans. Several ug tanks + vehicle maint.

③ Fuel Farm - Bob Lawson - Foreman (at fuel farm) 2 AG tanks 5 UG tanks
5-6" JP-5 floating on gw in the area

PW installs wells, Supply now Safety does monitoring. Supposed to measure + suck out product weekly. Topoff rack drains to a septic tank oil/water separator (2000 gal/yr.) then water es to soil. No formal order AG tanks contained Bottom skim tanks + used to pour on ground now to? Sludge bottoms?

④ HELP Pad. Bomb assy. + aircraft ordnance

5 HOT refuel area - ug pipes from fuel farm direct to aircraft. Not yet fully operational.

6 Runup area for aircraft.

7 Weapons + Weapons safety (B-245 admin.)
Has been some disposal in this area

8 Old land fills throughout rear area of base. PW maintains fill records. Several old sites

9 Borrow area - obviously never filled in past

10 WWTP - Sludge beds, water discharge to?

11 Old area - PW Shops, Boiler plant, Hangar

All waste liquids went to bowzers - dumped as dust suppression, burn area, recycled.

Fire Stn. Asst. Chief Randy Banovich

Old Kim Niel - Paint Shop / Carpenter Shop foreman
Trans. George Levitt
Elec Shop John Whitmer.
Metal Trades Dale Jensen
Supply Shop + Receiv Gale

(11) Shipping + Receiving - also had "scrap wood burn area"

(12) Boiler Plant - Several UG tanks No. 6, waste oil etc

(14) Pest Control - head guy is Burley - act as "NEESA" when talking to him.

(15) Sheet Range - Been around for several years but may be moved since 1985

(16) Elec. Welfare area - large generator building + shop AG fuel tanks. Wood target mockups made in this area - Maybe plastic molding

Pierre St. Amond at China Lake

JEE notes

Fallon

- SW corner landfill - found some uxb 20-mm shells, near elect. area along W. area. entire area looked like landfills - cut + fill + evid. of burning. etc.
- Some fusing + shops in ordnance area. ESI identified 3 "ordnance landfills" but no text. Need to follow up. Was ord. disposed to regular landfills
- Was an issue with ESI considering waste oils as HW. areas at PICS with generators. Should call it one site with several areas.
- Supply area in old area. Many changes over time. (Lump as one would be best). Very much varied storage throughout the area was an ug diesel tank at WWTP at one time. was a known leak
  Was DPDO at one time.
- Burn area was on concrete pad near the existing burn pit. Check on this. Used to be solvents burned but no more - so its a past op.
  Some paper bags of black powder along drainage way to the WSW of burn area.
- Somewhere in SE sector E of southend of runway was rumor of burn area.
- Problem for Hydrogeol. - there are canals + ditches on base. Drainage canals + irrigation ditches. Are they draining the gw or adding to it during periods of year. Try keep simple + be as accurate as possible are sites draining to gw etc. When are seasonal highs + lows in gw elev.
- Fuel farm [illegible] leak [illegible] used to spread fuels

around area for weed control
- Some old dumping along west border south of newer area. Much hummocy ground in area Rumor of fills in that area.

Bud

- LUST - only clearly past ops.

- Bu Rec area - Bud will think about it

- lead from ranges + skeet
- detail at ranges

Ranges (S. of EW Range)
- area south of EW range - ordnance disposal areas in eastern area of that range. Past ops? disposal ? ??
- Many abandoned vehicles stored + used as scrap target material. Much waste fluids in vehicles? what about it?
- JEE did not make EST give detailed biol + geohydro on ranges. - May want to give very brief opinion as to basins etc and species in the ranges.

Bud

Supplemental PA

July 1991

PUBLIC WORKS
NAS, FALLON
91 JUN 06 PM 2:55

3 June 1991

MEMORANDUM

From: OSH Manager
To: PW, Environmental Division (Code 187)

Subj: HAZARDOUS MATERIAL PRELIMINARY ASSESSMENT/SITE INSPECTION, SITE #15

Ref: (a) Mtg M. Glass, OSH/Mr. Gary Robertson, Mr. Bud Ford PW, Environmental of 24 May 1991

1. The subject dumpsite was identified during NAS Fallon's initial study as a potential hazardous site. At some time since, the site was dropped from the study for reasons unknown.

2. Request, from a safety and hazardous materials viewpoint, that the subject site be reconsidered as a site for clean-up per reference (a).

3. OSH POC is Mr. Mark Glass, X2442.

R G Nygren

R. G. NYGREN

Info on another ordnance site

Table 3, Ordnance Items Found at Waikane Valley Impact Area

Nomenclature	Quantity Found	Fuze and Booster* Compound	Quantity in each	Explosive* Compound	Quantity in each
37 mm High Explosive (HE) Projectile	1	black powder[1]	not specified	TNT or tetryl	0.14 lb
M9A1 High Explosive Anti-Tank (HEAT) Rifle Grenade	9	lead azide and tetryl (primer), tetryl (booster)	not specified not specified	TNT	4 oz
M28 HEAT Rifle Grenade	12	RDX, mercury fulminate	not specified	RDX (80%) TNT (20%)	10.6 oz (total)
2.36" HEAT Rocket	24	lead azide	not specified	pentolite[2]	0.5 lb
60 mm HE Mortar	9	tetryl or black powder	not specified	Composition B[3]	0.42 lb
75 mm HE projectile	32	tetryl or black powder	not specified	TNT or amotol[4]	1.49 lb
3.5" HEAT Rocket	146	black powder (fuze), tetryl (booster)	0.13 oz not specified	tetryl or Composition B[3]	0.17 oz or 1.88 lb
105 mm HE projectile	1	black powder (primer & booster) tetryl (booster)	0.00014 lb not specified	TNT or Composition B[3]	4.80 lb or 5.08 lb

* Fuze and Booster refers to the compound that undergoes deflagration and initiates detonation or propulsion of the projectile.

* Explosive compound refers to the compound that undergoes detonation.

[1] black powder is a mixture of potassium nitrate, sulfur and charcoal (75%, 10%, and 15% respectively).

[2] Pentolite is a mixture of TNT and PETN

[3] Composition B is a mixture of RDX and TNT

[4] amotol is a mixture of ammonium nitrate and TNT

Sources: USMC, 1988
Meyer, 1977

at the impact area may contain ordnance compounds. The metal casings for most of the ordnance items are thin, and therefore the potential exists for ordnance compounds to be released into the environment when the metal casing deteriorates. However, during the on-site survey for this Preliminary Assessment, no ordnance compounds were observed on the surface of the soil.

3.1.2.1 Expended Ordnance Compounds. The expended ordnance compounds such as RDX, TNT, tetryl, and black powder would have released gaseous components such as carbon monoxide, carbon

dioxide, water vapor, hydrogen, nitrogen, nitrous oxides, ammonia, hydrogen cyanide, C2N2, hydrogen sulfide, and various hydrocarbons. (NEESA, 1984)

Lead Azide ($Pb(N_3)_2$) is one of the detonation compounds listed in Table 3. It is estimated that at least 40% of the lead from propellants will become aloft in the combustion cloud and will be dispersed as aerosols. The remaining lead will condense out as cloud particles and will become airborne in the plume. The mechanisms of deposition on the burning grounds (detonation areas) may be mainly through impaction via atmospheric turbulence (high winds). (NEESA, 1984)

Mercury Fulminate ($Hg(CNO)_2$) is another detonation compound listed in Table 3. Because this compound is used to assist detonation, small amounts are added to the explosive. Probably only trace amounts of mercury compounds would exist near impact areas.

Mercury fulminate is considered toxic (Meyer, 1977).

3.1.2.2 Unexploded Ordnance Compounds. Unexploded ordnance compounds may release compounds that are toxic and extremely persistent in the environment.

Tetryl (trinitrophenylmethylnitramine, $(NO_2)_3C_6H_2N(NO_2)CH_3$) is highly resistant to transformation but is slowly degraded to picric acid.

TNT (2,4,6-trinitrotoluene, $CH_3C_6H_2(NO_2)_3$) is resistant to decomposition and may persist in the environment for years. Transformation and degradation processes of TNT are poorly known, and it is likely that toxic TNT transformation products are stable. (NCEL, 1989)

Transformation products of TNT include 2,4- and 2,6-Dinitrotoluene, aminonitrotoluenes (4-amino-2,6-dinitrotoluene, 2-amino-4,6-dinitrotoluene), nitrobenzene, dinitrobenzene, and trinitrobenzene. Ring cleavage and degradation of TNT has not been demonstrated. Colder and dryer soil conditions retard degradation of TNT and its associated products. Therefore, conditions at WVIA would enhance degradation of TNT. Photoloysis is the primary process for TNT degredation in the environment (NCEL, 1989).

TNT and RDX are classified by EPA as possible human carcinogens (EPA, 1990).

Black Powder reportedly degrades in the environment in a matter of days.

RDX (Cyclo-1,3,5-trimethylene-2,4,6-trinitramine, $N(NO_2)CH_2N(NO_2)CH_2$) may undergo photolysis or biotransformation. Biodegredation occurs through reduction of the nitro group in an

anaerobic environment. The products are mon-, di- and tri-nitroso derivatives. Under reducing conditions further reduction gives formaldehyde and methanol. RDX gives traces of hydrazine and dimethyl hydrazines. The hydrazines are biodegradable under aerobic and anaerobic conditions. Photolysis appears to rapidly degrade this compound. RDX is not hydrolyzed under acidic conditions but in a conducted study 27% of it was hydrolyzed under basic conditions. (OESO, 1988)

TNT and RDX are classified by EPA as possible human carcinogens (EPA, 1990).

Lead Azide ($Pb(N_3)_2$) is toxic to humans. No data on the toxicity of lead azide to aquatic organisms, microorganisms or plants are available. Toxicity of lead azide must be inferred from available data on lead and the azide anion or hydrazoic acid. (OESO, 1988)

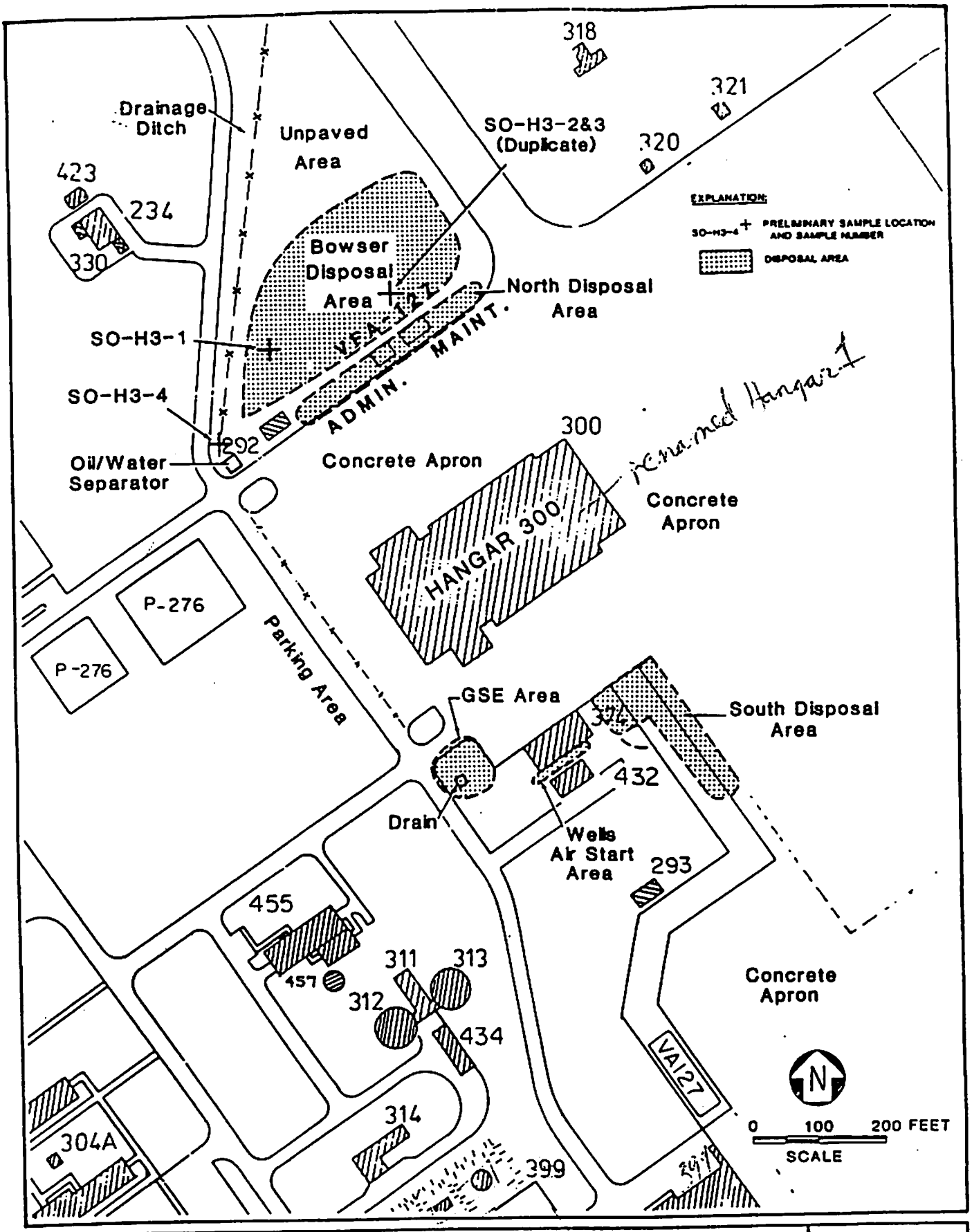
PETN (pentaerythritol tetranitrate, $C(CH_2ONO_2)_4$). This ester would be expected to undergo sequential hydrolysis in water. But the experimental data are not directly applicable to assessment hydrolysis in natural waters. Studies show that nitrate is the product of biodegredation. (OESO, 1988)

3.1.2.3 Migration and Fate. Several studies have been conducted in an effort to determine and evaluate the parameters affecting contaminant migration in soils. In a recent study, an evaluation of critical parameters affecting contaminant migration through soils was conducted. It was found that such migration is controlled by the rate of water movement and the tendency of contaminants to adsorb to soil, diffuse, volatilize, and degrade. The rate of water movement through soils is controlled by climate, soil permeability, and topography.

Studies on the fate and movement of TNT, RDX, and HMX in aquatic systems indicate that long distance transportation (over 20KM) of the munitions and their degradation products is not highly probable. Once in the water column photolytic degradation of the compounds proceeds fairly rapidly and limits the persistence of the munitions in the water. However, microbial degradation does not proceed rapidly, especially for RDX, and longer persistence in sediments is a distinct possibility. (NCEL, 1989)

3.1.3 Groundwater Pathway. According to the Honolulu Board of Water Supply, drinking water for public utilities in the Waikane area is imported from the Kahana Valley and the Punaluu Valley northwest of WVIA. This water is isolated from the ground water beneath WVIA geologically by diking and by intervening valleys.

Individual households, particularly in agricultural areas, may have their own sources of water. According to the National Ground Water Information Center on-line computer data base there are eight households reporting the use of drilled wells as a drinking water



PRELIMINARY ASSESSMENT/ SITE INSPECTION NAS Fallon, Nevada	SITE 3 HANGAR 300 AREA	FIGURE 8-4

To: Sherry Van Duyn

August 13, 1991

From: Michael Sullivan MJS

Subj.: Investigation of Additional PA Sites at NAS Fallon

This memo summarizes the results of our investigations of two potentially contaminated areas at NAS Fallon, (1) the alleged #6 oil pit near the boiler building and (2) the ordnance disposal area/former irrigation trench on the north end of the base.

We have been unable to confirm the reported disposal of #6 oil sludge from the former tank to the ground underneath the existing parking lot. Only one person recalls such an event, and many individuals (at least 7) who would be aware of such a pit knew nothing about it. Additionally, the alleged contaminant of concern, #6 oil, is of lesser concern than many contaminants since it does not move in the absence of heat and would probably be a relatively hard tar-like material buried 4 to 6 feet beneath the surface at this time. Based on the results of this investigation so far and on the nature of the contaminant, I recommend not pursuing this matter further.

Very little additional information has been gained through the investigation of the ordnance disposal area and former irrigation ditch that was not obtained for the original PA/SI. The ditch area was filled in with inert material such as metals and wood scrap, along dirt and manure from the landfill and neighboring farm, respectively. It is possible some ordnance was thrown into the ditch, but no one could confirm such disposal. However, the ordnance disposal area, near building 398 and the paved area in front of this building, may still contain some ordnance materials. Some 20 mm. shells (reportedly several hundred rounds in boxes), which were reportedly not inert but rather contained some ordnance material that allows the shells to be fired for target practice, were unearthed in 1986. As in the original PA/SI, "it is recommended that the site be annotated on NAS Fallon development maps in order to plan future excavation in this area." The site may be appropriate for referral to the appropriate Navy ordnance investigation department. Otherwise, there are no materials hazardous to human health or the environment known to be buried at the site and no further action is necessary.

I have attached to this memo my notes from our interviews, and a map of the ordnance disposal area showing four previously unidentified disposal areas in the ordnance area, one of which was reportedly cleaned out by the ordnance staff once public works found out about it. No hazardous materials are known to reside in any of these areas, but they should also be noted on NAS Fallon development maps. We should probably forward this map to the Fallon environmental staff or public works department. Finally, I am returning all your other notes and background materials such as aerial photos and old site plans for these two areas in the folder labeled "Fallon NAS - PA Investigation".

Interviews for Potential Sites at NAS Fallon - Supplementary PA

Potential Fuel Spill - Boiler Tanks

Interviewees:

Mr. Charlie Driver (7/9/91). Mr. Driver worked at the boilers from Oct. '68 to September 1987. He recalled two tank installations. One was the installation of an 8,000 gal JP-5 tank in the mid 1970's either '75 or '76. The first tank was there since 1957 he believed, which corresponds to the dates on the plans in engineering. The two fuel oil tanks on either side of the JP-5 tank were torn down in the last few years. The only other tank he remembers being put in was a tank the Seabees installed around 1972 or '73. This tank was filled with water, froze overnight, cracked open and was abandoned. This is probably the tank labeled abandoned in a 1978 plan. He did remember trying to clean out the original fuel oil tank once in the 1970's but the thick fuel oil would not move and they stopped trying. He said they may have removed a small amount of fuel but nothing significant. He did not remember any spill or disposal on the soil of any meaningful size at that time. He said there was some boiler cleaning solvent and associated carbon that was thrown out on the ground on rare occasions and in small amounts, after the old checkerboard landfill was closed. Prior to the landfill closing, this cleaning solvent/residue was sent to the landfill, in quantities of 1 barrel per year. He said any fuel oil #6 thrown out in small quantities is a thick substance that hardened right on the surface like tar. A steam line was put in when the hangar area was worked on in 1981-82 time frame. He did not see any oil in the the soil when they put in this line, which agrees with what Dick Lane in engineering and Dale Jensen in public works saw during this work. Mr. Lane was in ROICC at the time of the steam line installation and they oversaw the work. He knew of no contamination in that area. Mr. Driver indicated that as of the 1970's very little jet defuel would have been dumped elsewhere on the base, since they used this fuel oil in the boilers. Finally, he said that Bob Miller was the brains behind getting the tanks and multiple fuels going. He left in 1976, and may be living in Sparks at this time.

Mr. Jim Regan (7/10/91). Mr. Regan can remember no major spills. He was here from 1959 until a couple years ago and worked for public works. He does remember a one-time cleaning they did. He does not know what they did with the stuff that was cleaned out. It was very hard and compacted like cement. He was not sure when it happened, his guess was 10-12 years ago. He said a bucket or two of cleaning fuel, diesel or JP-5 may have been tossed on the berm areas. He said any drips in the flanges near the tanks were quickly repaired. He said the boiler is still capable of firing either natural gas or JP-5/#6 oil.
(For the ordnance site, he recommended talking to John Giltner, who lives in Fallon. He echoed the story about diggin up 20 mm shells when they graded the paved area outside bldg 398. He said they once found ordnance dept. dumping stuff in the southeast corner of the ordnance area but made them clean it all out of

there and move it back to ordnance for proper disposal.)

Mr. Dick Lane (7/10/91). Mr. Lane works in engineering and saw the soils near the parking lot and the #6 oil tanks at lower grade before and while they were taken out. He saw no contamination in or on the soil.

Mr. Dale Jensen (7/10/91). He saw no contamination in the soils at the time of parking lot and HTW (steam) line installations. The steam lines are probably 3-4 feet below the surface and at that depth he saw no soil contamination. The parking lot itself is approximately 1 foot above original grade near the road end of the steam line and probably 2-3 feet higher half way across the parking lot which would have been the far end of any alleged pit. He has also been around since 1973 and can recall no spills or tank replacements in that area. He used to work in the boiler area.

Mr. Art Houston (7/3/91 and 7/10/91). I talked to Mr. Houston twice over the phone. He was a heavy equipment operator at the base. He could recall no removal of tanks in the boiler area and did not remember digging or seeing anyone did any ditches or pits in that area. He did not remember them even cleaning out the tanks. He was at the base from 1968 to 1978, the time period of concern, and probably would have seen any major cleaning or been aware of any diggin in that area. He saw nothing and remembers no spills.

Mr. Evert Kissic (7/10/91). — he drove a semi past the area often Mr. Kissic is our primary information source for the alleged pit disposal of fuel oil tank contents, but he is the only one that remembers anything like that occuring in the heating plant area. He said the civil service equipment operators dug out a pit with a bulldozer. He said Forrest Kinkaide and Kenny Townsend would be the people to talk to about it. Mr. Kissic said it took maybe a day to dig the pit. it was filled about half way and then covered with dirt. Based on what he saw driving by in his trailer truck, the pit was supposedly about 20-30' wide and 40-60'long running east-west. It was about 4-5' deep. The pit was about 40' from the south edge of the tank and would be down about 5 to 10 feet from the current ground surface. He said another time the tank(s?) were cleaned out and the fuel placed in the old fuel farm tanks even though they knew they were not intact.
He also worked at the weapons dump site as a heavy equipment operator for 2 years in the 1970's, around 1975-6. He remembers burying transformers, empty fuel barrels, radiators and numerous other items. He said he has seen 20 mm and 50 caliber brass shells in the dump area, but he could not say if they were just expended shells or not. Mr. Kissic was surprised Art Houston did not know anything about a pit outside the heating plant.

Mr. Forrest Kinkade (7/10/91). Mr. Kinkade did not know of any pits near the heating plant or any tanks being emptied onto the ground there. He recommended some bore holes to find out if it's there. However, he did mention a pit area on the south side

of the base near the old fuel farm and Hangar #4. The fuel pits had #6 oil in them. These pits were used for temporary storage and are across from Bldg. 15. He mentioned Frank Shriver (who now works for MK in Planning and Estimating) as someone who worked at the boiler area at the time.

Mr. Kenny Townsend (7/11/91). I talked to Mr. Townsend at the heating plant. We walked around and he described the things he remembered there. He recalled a drainage ditch to the north of the tanks and running east-west, but he never saw anything in it and it is not in the area Mr. Kissic thinks a pit was dug. He remembers at the time the #6 oil tanks were removed, there was some dried up #6 oil on the ground, just like the stuff other described being thrown on the surface where it hardened. He could not remember any spills of #6 oil from the tanks. He does remember some JP-5 spills at the vents for that tank. He said that a small amount of overflow was how they knew the tank was full, which means JP-5 may have spilled fairly often (every time they added fuel to the tank). He saw 2 or 3 of these spills, about 25 gallons each. There may be a concrete pad beneath this tank that would contain the spills, but it could not be seen beneath the dirt under the tank. He said the two #6 oil tanks were taken out about 2 years ago. He remembers the abandoned tank on the west side of the heating plant, but it was never operable when he was there and was taken out around 1977 or '78 he thinks (he was not too sure of the date). Mr. Townsend started working at the base in 1974. Mr. Townsend is described as very knowledgable and honest by others on base. He seems credible to me since he volunteered information about spills and contamination elsewhere on base at the New Fuel Farm and Fire Training Area. Overall, based on his description and otners' descriptions, there may be some JP-5 in the soils and small quantities of dried up #6 oil, but only one person driving by the area remembers the sizable pit area.

Other Base Areas: Mr. Townsend did describe common practice at the New Fuel Farm as large scale dumping of JP-5 on the ground to kill weeds and just get rid of it. The perimeter area of the fuel farm received a lot of this spraying, ;but he seemed to indicate it was widespread. He also saw fuel on the groundwater near the fire training area. They dug up that area about 3 years ago when fixing a water line and he saw floating oil on the water.

Ordnance Disposal Area - Former Ditch

Interviewees:

Mr. Larry Little (7/9/91). Mr. Little was the weapons officer from September 1973 to 1975. He was stationed at Fallon for 6 months in 1962 with a squadron. He remembers EOD coming from Hawthorne to blow up any ordnance at the ranges. They came at least every other month and as frequently as twice a month. Ordnance was trucked in from Hawthorne, they never made bombs at Fallon and there were no industrial ordnance activities. Some Napalm was made at Fallon but they used it all up when they made it or it was burned off. Carl Roof worked out there twice as

weapons officer, just before and then after Mr. Little. Mark Glass, Herman Dixon, and John Giltner were all hired by Mr. Little, but they arrived after the ditch was filled in. A fourth person was also hired at that time but he is deceased. Mr. Little had a reputation as being in touch with what went on day-to-day at ordnance. He believes the ditch was filled around 1973-74. Lots of inert material was placed in the ditch, including old yellow ordnance handling equipment, old ammo cans. He said he would not be scared to dig out there. He said some 20 mm shells may be in there along with some CAD shells but duds were blown up by EOD and would not be in the ditch. While he was in touch with day-to-day, he was nevertheless in an office and may not know some things that were thrown in there. He had no recollection of a paved storage area near the inert storage bldg. which was itself made from old tin rocket boxes. He knows of no chemicals that were used in the ordnance area. There was a small amount of ordnance painting activity, so that they would know who's bomb hit the target, but this was small quantity marking with spray cans.

Mr. Carl Roof (telecon 7/9/91). He was in the ordnance area from 1970-73 and from 1978-80. He is aware of no disposal of ordnance in the area of concern. Retrograde ordnance material (packing material and metal pallets) and unserviceable/nonexploded ordnance was sent back to Hawthorne in Fallon's own trucks while he was there. EOD did not dispose of ordnance at the ranges as far as he knew. He knows of the landfill area just south of the weapons area. Anything dropped to the ranges was blown up there. There was also a battery charging station for the Pb-acid batteries they used for the electric forklifts inside the magazines. All maintenance and disposal of these batteries was performed by the transportation department in their area. Mr. Roof found belted 50 caliber ammunition in the fields at times. Mr. Roof was also here at Fallon in 1969 for a short time with a squadron. He said old metal frameworks, very old and obsolete equipment that no one would take back, was placed in the ditch when they got new handling equipment, esp. the multiple racks. Ordnance did not service their own vehicles. Concrete was also dumped in the ditch by public works along with wood pallets. Some people who may know about what went into the ditch were Chief Youngston (who I can not locate) and Master Chief Jim Patton who works in the fire department at the base now. Patton may know who to talk to, but was here after the burying stopped. By his second tour there were lots of regulations that required you to account for all materials, but at all times, assembly and disassembly of rockets was well monitored.

Mark Glass (7/9/91). I talked to Mark Glass and received a tour of the ordnance area, esp. the ditch. He knows some corroded but perhaps live 20 mm shells were dug up when the paved area to the south of Bldg. 398 was leveled off, as described in the original PA. This material was a surprise. As we walked over the filled in ditch, we saw old strapping material, and bomb fins sticking out. The filled area is a foot or two higher than the

surrounding land and is eroding. Much of the buried material is starting to stick out and will probably have to be recovered. He said Mr. Roof was not out at the site day-to-day but that Mr. Little was and should have a good idea what went on out there. Mr. Glass said Chief Youngston was according to legend involved in the burying of stuff in the ditch, but was a tough person to deal with. He thinks Jim Cook's refusal to talk to us means a lot.

Mr. Herman Dixon (7/10/91). Mr. Dixon has worked in weapons since 1974. He knows of only strapping, metal, and wood in the ditch. The other pit that Mark Glass showed us contains butt plates, metal pallets and rocket fins as far as he knows, but he didn't see the burying just like Mr. Glass. He did come up with an alternative explanation for why people were told not to walk over in the ditch area and field to the west. There were snakes over there and several nesting owls in the trees. The CO and others did not want them disturbed. He believes and seemed to know pretty definitively that EOD took unexploded ordnance to the ranges (esp. #'s 17 and 19) to be exploded and not to Hawthorne. He recommended we speak to a Mr. Ron Wilson who once lived on Pine Rd. in Fallon and may know what is in the ditch. He said they sent banding, pallets, wood, and boxes (all inert material) to the dump area they had. He mentioned some other ditches that have other inert materials in them running north-south on the west side of the ordnance area. He could shed no new light on what was dug up outside Bldg. 398. According to Mr. Dixon, 20 mm. shells that are dug up could be live in the charge (propelling) end but would have no explosive head on them.

Mr. John Giltner (7/10/91) He worked up in the ordnance area for only a year and a half. He never saw any ditches in the ordnance area filled in, nor did he see any ordnance disposed there or lying around. Essentially, he knew nothing Mark Glass and Herman Dixon hadn't already told us about.

Mr. Jim Patton (7/11/91) He first came to NAS Fallon in 1969-70 with AirPac's inspection staff and then 1971 and 1972 with air squadrons. He worked in the weapons area from 1978-82. He said all of their ordnance was either turned back in to Hawthorne for refurbishment or was blown up on the ranges. He knew nothing about what was in the ditch and didn't know of anyone in the area we could talk to. He suggested calling the Navy detailers or career counselors to see if they can look up who the ordnancemen were during the times of concern.

Additional Interviews

Mr. Frank Shriver (7/11/91 and 7/15/91). Mr. Shriver remembers that the #6 oil tank was cleaned once around the 1980-82 time frame. He said some sludge-like material was left over after they initially pumped out of the tank everything that would move. He said about 18" of sludge were left over, and while he said he wasn't exactly sure what they did with the sludge, he proceeded to describe the area and location of a hypothetical disposal area that basically matches the one Mr. Kissic described. He said he would look for the pit just south of where the old tank was. He did not work in the boiler area at the time of this cleaning, but he seemed to have a pretty good idea what happened. He "guesses" the sludge would be in an area about 20' by 30' or 30' by 30' and about 4' deep. He said this all very hypothetically but he described the area in pretty good detail like he knew. The dates Mr. Shriver ascribed to this cleaning match the time of a cleaning Mr. Regan recalled and given Mr. Kissic's problems with dates, I would say there is a fair likelihood these two men recall the same cleaning, if not the pit disposal. Also, Mr. Townsend asked a question that made me wonder if he knew the stuff was in the ground "well, that #6 isn't too hazardous is it?" When I talked to Mr. Shriver on 7/15/91, he said that he was not sure where the sludge from the tank was disposed. He said only that there was a possibility there was a pit and sludge was dumped in it. He said again that he would look for the pit just south of where the old #6 tank was. He left me with the impression that the site was worth investigating further, but more based on how he said things than on what he said.

Mr. Mike Rueda (7/11/91). He was public works general foreman and pipefitter at the base. He worked on the base from 1954 until about 1987. He does not remember anybody burying anything like sludge or any oil in the area under the existing parking lot. "By that time he was in management," so he may not have known this happened I think.

Oil Pit

Everett Kissic (7/11/91). I called back Mr. Kissic to talk about the dates of tank cleaning and pit disposal again. He said they drained the tank the last time in the late 80's and put the stuff in the old tanks on south side of the base (perhaps leaking?). He still thinks the cleaning in question at this site occurred earlier than 1980-82.

Oil Pit

Mr. George Levitt (7/16/91). Mr. Levitt called me back and like most other people familiar with the boiler area, he did not recall any disposal or spills of the heavy #6 oil in this area. He said any fuels that were pumped out of the #6 tanks was placed into containers and shipped out. He said he recall some small spills occasionally when they filled the JP-5 tank from tanker trucks. These small spills occurred near the roadway and were not significant quantities (a couple quarts or less). He said Kenny Townsend was most familiar with the boiler area and would have known about such a pit and disposal. He considers the boiler area to be one of the cleanest areas of the base.

Advance

Mr. Ron Wilson (7/11/91). Mr. Wilson was the Chief Petty

Officer at the ordnance area at the time the ditch was filled in and could describe what types of things went into the ditch. He said an old manure pile from the ranchhouse east of the ditch was pushed into the ditch. Dirt from the base dump just south of the ordnance area was also used to fill in the ditch. He said the ditch was about 1/8th mile long, 3' deep, and 3' across. He said the public works department filled it in, and he did not know they were going to fill it in until they showed up. He said PW had a big cat and 3 or 4 dump trucks (6 cu. yd. each) that they used to fill in the ditch. It took about 1 week to fill it in. He thinks there is very little chance something got tossed into the ditch. They had opening and closing inventories every day on ordnance materials, including even lug nuts. He said they kept track of even the inert stuff because it had some material in it that would produce red flashes and powder if used for practic on the ranges. He said it is possible a squadron came in and tossed small stuff in the ditch, but he considers the chances to be 1 in 200 that there is any ordnance material in the ditch. He said they never ran short of the parts they were keeping trace of and that they used even the rusty practice bombs that were around. He left ordnance in 1975 after 2 and a half years (from 1973-75). He said the ditch was filled in in late spring of 1974 but it was probably 1973 since it was before Messrs. Glass and Dixon started.

He said the old bomb trailers (which may be the yellow equipment others referred to) were too big to go in the ditch. He said the rocket fins we saw were probably "zuni fins" about 7" long and 1/2-3/4" thick and made of aluminum. Mr. Wilson works for UXB (unexploded ordnance) now and blows up ordnance at the ranges.

He was able to explain why the crew leveling the land near Bldg. 398 ran into 20 mm. shells. He said there was a 20 mm storage area right in that area, but that all the shells were inert rounds, three of which were put into the beginning of each ammunition belt. They were brown and completely inert, with wheat in the propellant area. He said these "browns" came in wood boxes and were stored in an open area in stacks about 4-5' high. He said the ground was very dusty in this area (bug dust, an alkali clay) and that it was easy to lose shells if you dropped them. He said the storage area was bout 100 ft west of the concrete flood gate at the head of the ditch. He said the wsay to confirm whether the rounds discovered were inert would be to have EOD come out there and open some up (which may have been done at the time). Live 20 mm rounds were stored far from this area, in the southwest corner of the magazine area, and so it is unlikely a large number of these rounds would be in the area of concern. His work phone # is 423-8812 if we have any more questions. He works at the ranges, but a secretary can get messages to him.

7/24/91 Mr. Gary Robertson (7/24/91). Mr. Robertson works for the base environmental staff in public works. He said a contractor, George Lopez, disposed of the tank that the alleged #6 oil sludge came from. The tank was dismantled and taken off site. Gary said the removal was a very clean job, "the best in the business." He said there were never any other contracts for cleaning out or disposal of tank liquids/tank bottoms from the base. Usual

practice according to him was to dump it on the ground. This however does not help in identifying whether or not in this case #6 oil sludge was placed in a pit.

Ordnance

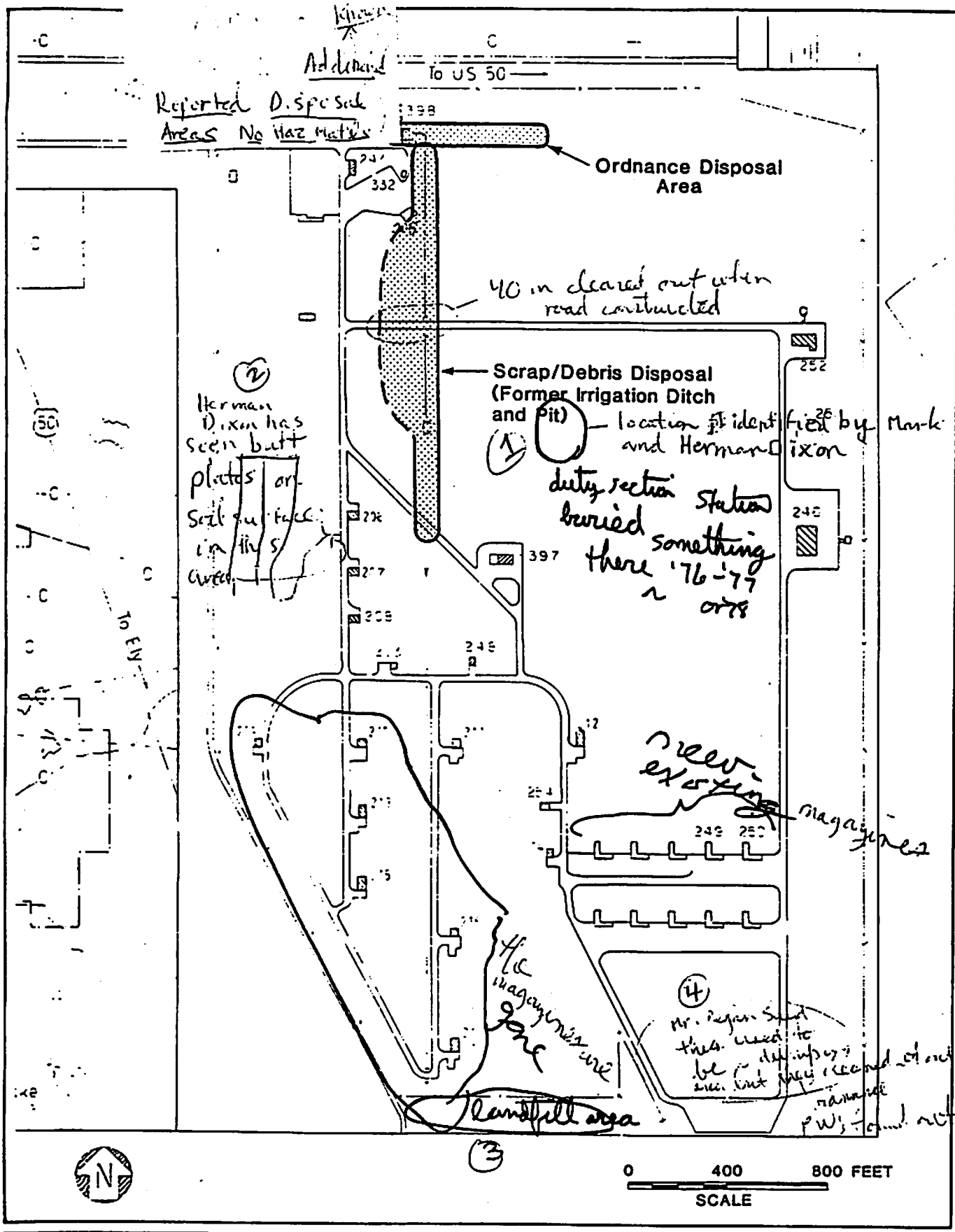
Mr. Chuck Lateulere (7/29/91). Mr. Lateulere called me back from OESO in Maryland and explained what he thought of the ordnance evidence we had to date. He said the color on the 20 mm rounds is very unreliable as an indicator of whether the rounds are inert or not. He said they may have been training rounds even if brown. He said totally inert rounds are very rare and that this was a special classification. He said it is possible the rounds buried in this area are dummy rounds but he didn't sound like he would count on that fact. Since some rounds were dug up, he said he would lean towards doing an SI on the area, but given the knowledge we have of extensive inert disposal in this area and the limited usefulness of GPR and magnetometer searches in such an environment, I (MSS) do not feel this position is necessarily correct. Noting and posting in appropriate places the locations of the disposal areas to prevent inadvertent disturbances, and recommendation to an ordnance investigation program (i.e. outside of the IR program) seems to be the best course of action.

Ordnance

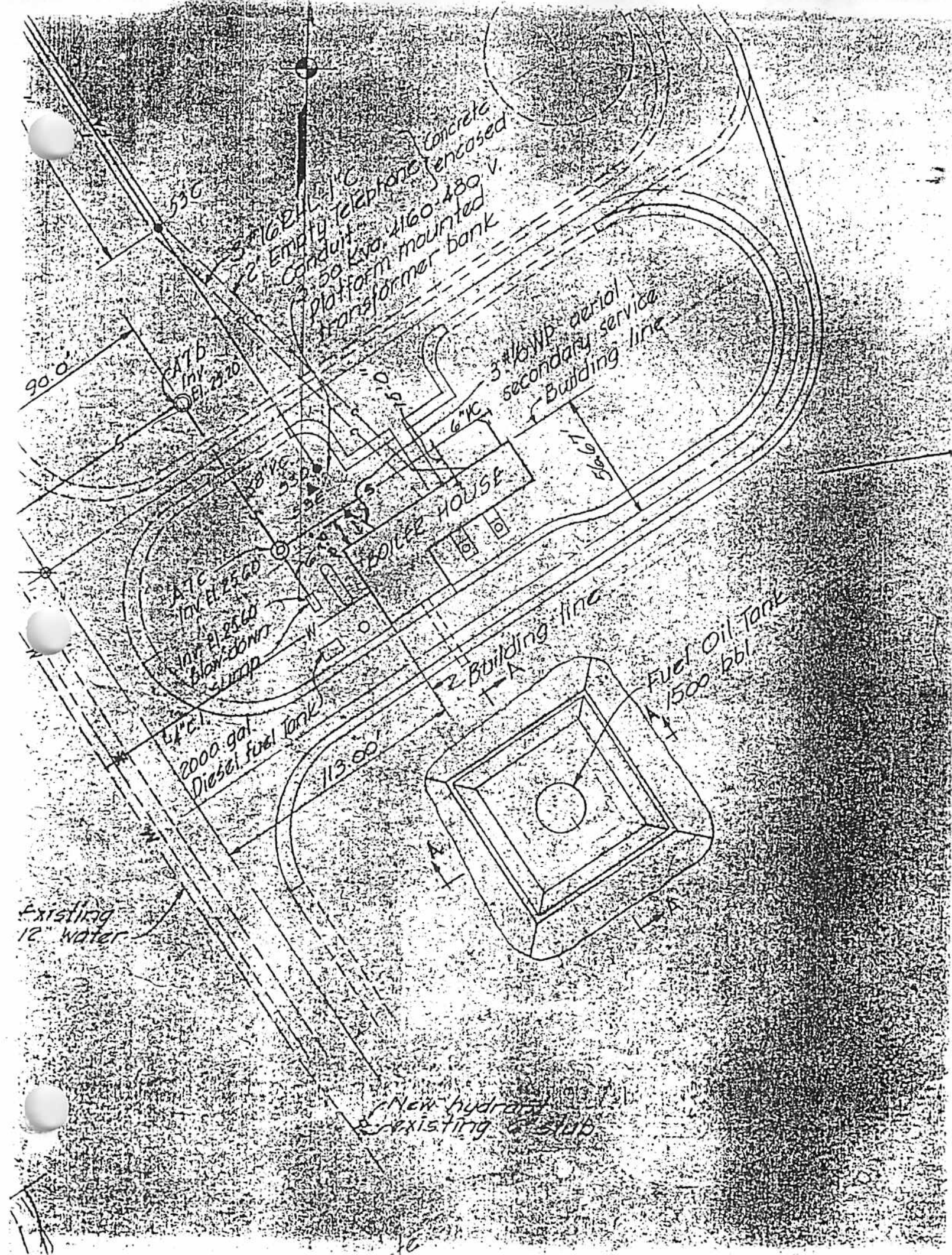
Mr. Mark Glass (7/29/91). Mr. Glass said that at the time 20 mm. rounds were dug up in the ordnance area, they were digging down about 2 1/2 to 3 feet. He said several hundred rounds were dug up and that they were "Mark 12" percussion style 20 mm shells, which have no electric fuse but rather a firing pin that makes them go off. He said they were dug up in boxes and were found to not be inert. He said some 2.75" rocket warheads were also dug up. These were inert, just steel. He said the 20 mm rounds may have been for target practice: the bullet still fires due to the presence of "smokeless powder" in the firing end. Mark said the primer has lead azide or mercury fulminate in it. These might be the chemicals of concern if there are just 20 mm shells around.

Ordnance

Mr. Larry Little (7/29/91). Mr. Little said Jim Cook, the person who would not speak with us about the ordnance area, told him that he knows of no live ordnance material buried in the ditch area. Mr. Little said Mr. Cook probably couldn't tell us any more than Mr. Little already did and that Mr. Cook still wasn't interested in talking to us.



PRELIMINARY ASSESSMENT/ SITE INSPECTION NAS Fallon, Nevada	SITE 5 ORDNANCE AREA	FIGURE 8-5



53C
3 #16 RHL 1"C
2' Empty Telephone Conduit
Concrete encased
3-50 Kva 4160-480 V.
Platform mounted transformer bank
90.0'
A7b Inv. El. 29.20
3 #1/0 WP aerial secondary service
Building line
6" VC
56.67'
BOILER HOUSE
A7c Inv. El. 25.60
Inv. El. 25.60
Blow-down sump
Building line
Fuel Oil Tank 1500 bbl
2000 gal. Diesel fuel Tank
113.00'
Existing 12" water
New hydrant
existing 6" stub

53B
3 #4 Bare aerial primary service
PUMP HOUSE
N
200'-0"
53C
3 #16 EHL-1C
2" Empty Telephone Conduit
Concrete encased
3-50 Kva. 4160-480 V.
Platform mounted transformer bank
3 #16 WP aerial secondary service
Building line
AMb
Inv. El. 23.10
90.0'
15'-0"
6" KC
BOILER HOUSE
56.67'
Service Road
Sta. 96+21.37
N 1,701,378.30
E 462,732.72
Inv. El. 25.60
Blow-down sump
W
2 Building line
Fuel
1500
2000 gal. Diesel fuel tank
113.00'
Existing
12" water

New pole [illegible]
Power pole and guy
New transformer bank
Underground conduit [illegible]
Aerial telephone [illegible]
Aerial fire alarm loop [illegible]
Existing roads and buildings
A. C. Pavement
Drainage
Finished grade elevation
P.C. concrete walk and slab

SHEET 1 OF 18
SEQUENCE 1812 DATED 2/1/58

As built Plans revised

DESCRIPTION	DATE	APPROVAL
	1/26/57	[illegible]

REVISIONS

TMENT OF THE NAVY
DISTRICT PUBLIC WORKS OFFICE
BUREAU OF YARDS & DOCKS
12TH N D SAN BRUNO, CALIF.
SVERDRUP & PARCEL, INC. CONSULTING ENGINEERS
220 BUSH ST., SAN FRANCISCO 4, CALIF.

Won
ED Laflin-Logie
[illegible]
ES. [illegible]
OFF. [illegible]
DRAWING NO
6023

NAVAL AUXILIARY AIR STATION
FALLON, NEVADA
ADDITIONAL AVIATION FACILITIES
CENTRAL HEATING SYSTEM
LAYOUT, GRADING AND UTILITIES PLAN

APPROVED _____ DATE _____
RESIDENT OFFICER IN CHARGE

OVED FOR BUREAU OF YARDS AND DOCKS
[illegible]
D.P.W.O. FOR CHIEF OF BUREAU
-27-56

SCALE As shown SHEET 1812/56
SHEET 1 OF 18 1812
& D DRAWING NO 64[illegible]

SCALE	
1"=30'	C-

RECORD

1 of 13

IF SHEET IS LESS THAN
28" X 40"
IT IS A REDUCED PRINT —
SCALE REDUCED ACCORDINGLY

RALPH T. JOECKEL
REGISTERED PROFESSIONAL ENGINEER - STATE OF NEVADA
ELECTRICAL
No. 691

C-1

A-E CONTRACT N62474-74 C-8BLT
JOECKEL, BARTLEY, & ASSOCIATES
1000 BIBLE WAY, SUITE 81
RENO NEVADA 89502

DEPARTMENT OF THE NAVY — NAVAL FACILITIES ENGINEERING COMMAND
WESTERN DIVISION
SAN BRUNO, CALIFORNIA

DSGN. W.S.R	DR. A.D.	CHK. W.S.F
SUPV. R.T.J.	CH. ENGR. R.T.J.	

SUBMITTED BY _____ DATE _____
FIRM MEMBER (TITLE)

E.I.C. _____ FIRE PROT. _____
BR. HD. _____ DIR. _____

SATISFACTORY TO _____ DATE _____
TITLE

APPROVED _____ DATE _____
E/O FOR COMMANDER NAVFAC

NAVAL AIR STATION FALLON, NEVADA
HEATING PLANT ADDITION
H.T.H.W. HEATING PLANT-314
UCON PROJECT P-085
VICINITY, LOCATION SITE PLAN, & DWG. SCH

SIZE	CODE IDENT. NO.	NAVFAC. DRAWING NO.
F	80091	6065164

CONST. CONTR. NO. N62474-75-C-0178

SCALE AS SHOWN | SPEC. 12-75-0178 | SHEET 1 OF

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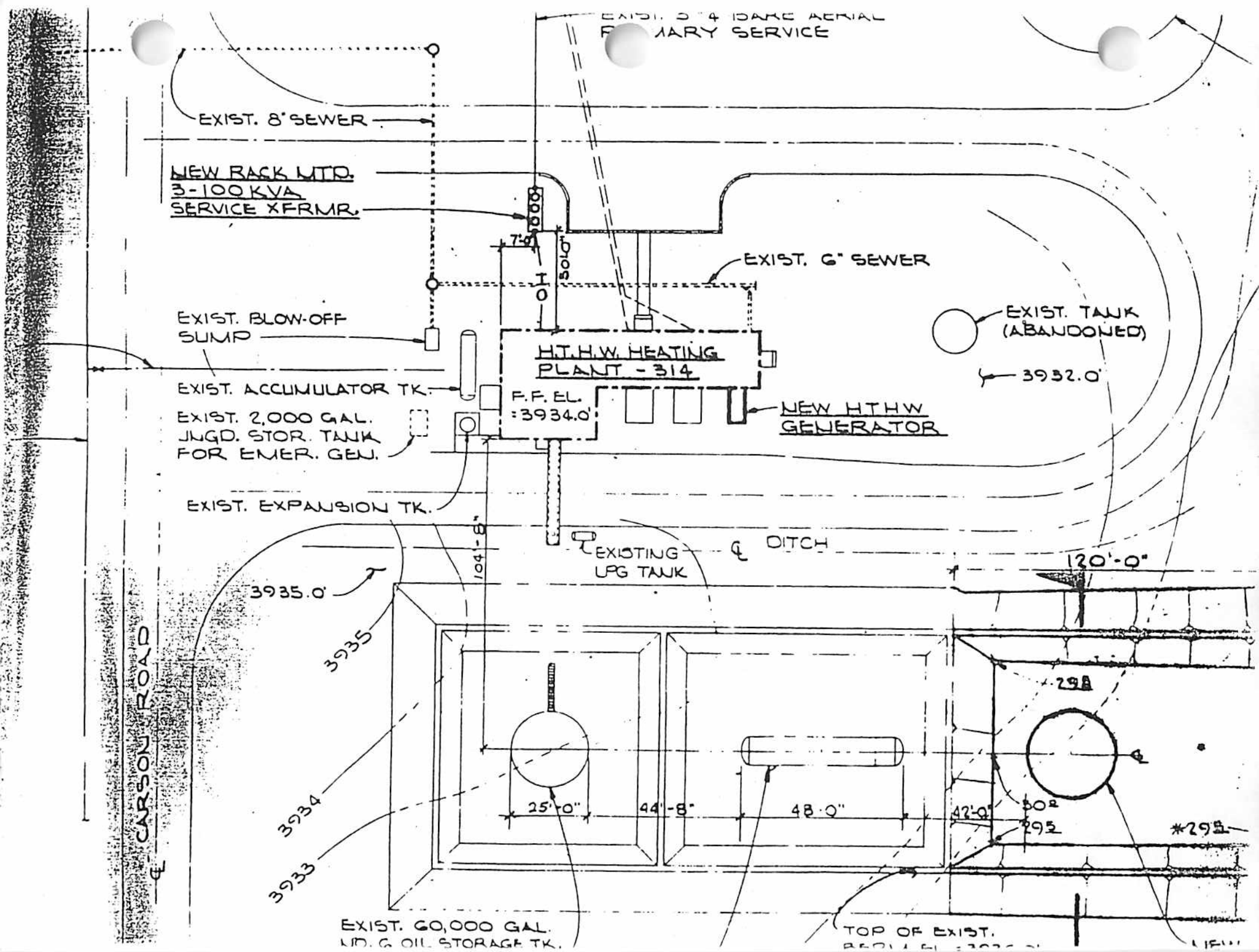
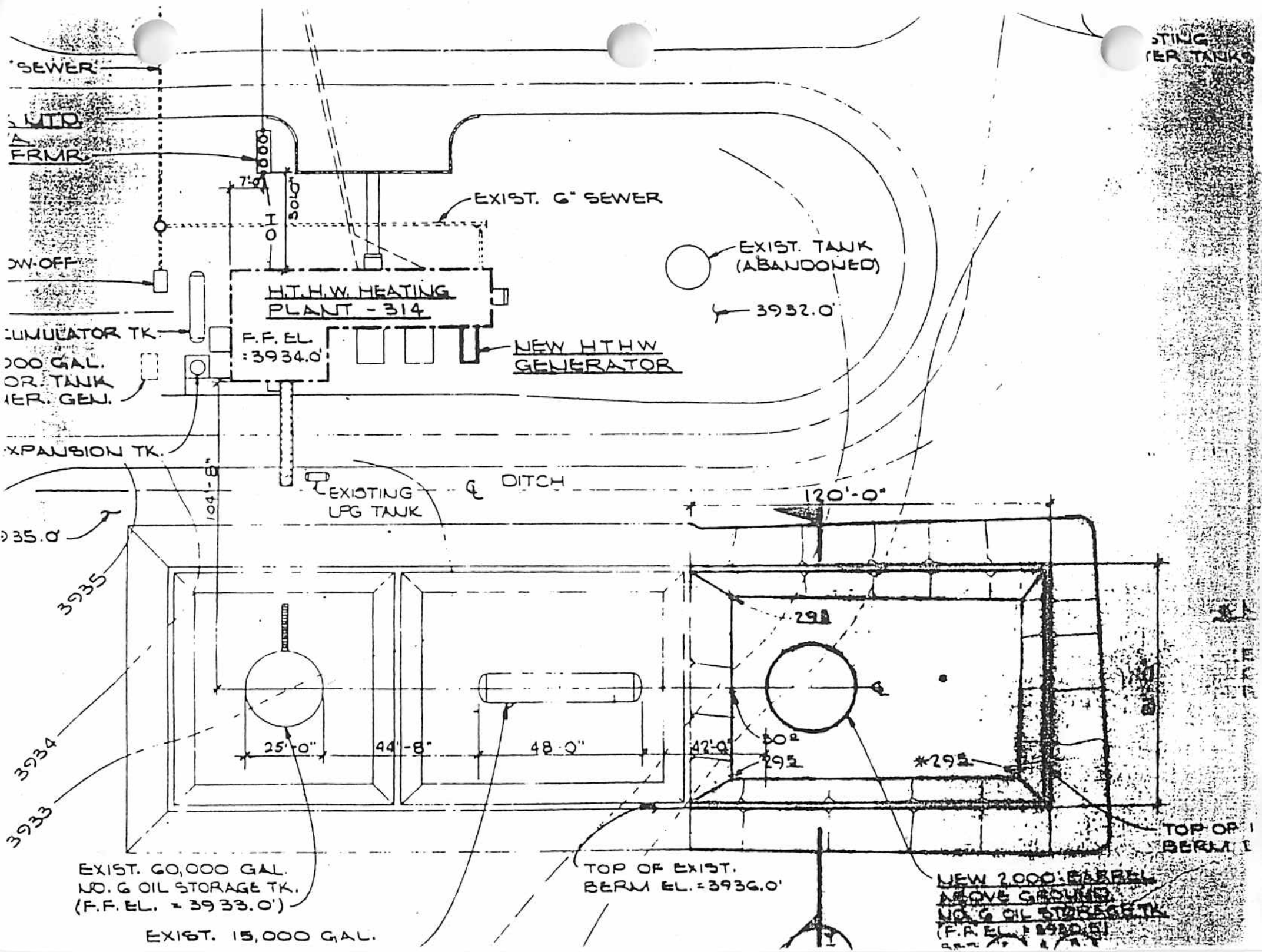
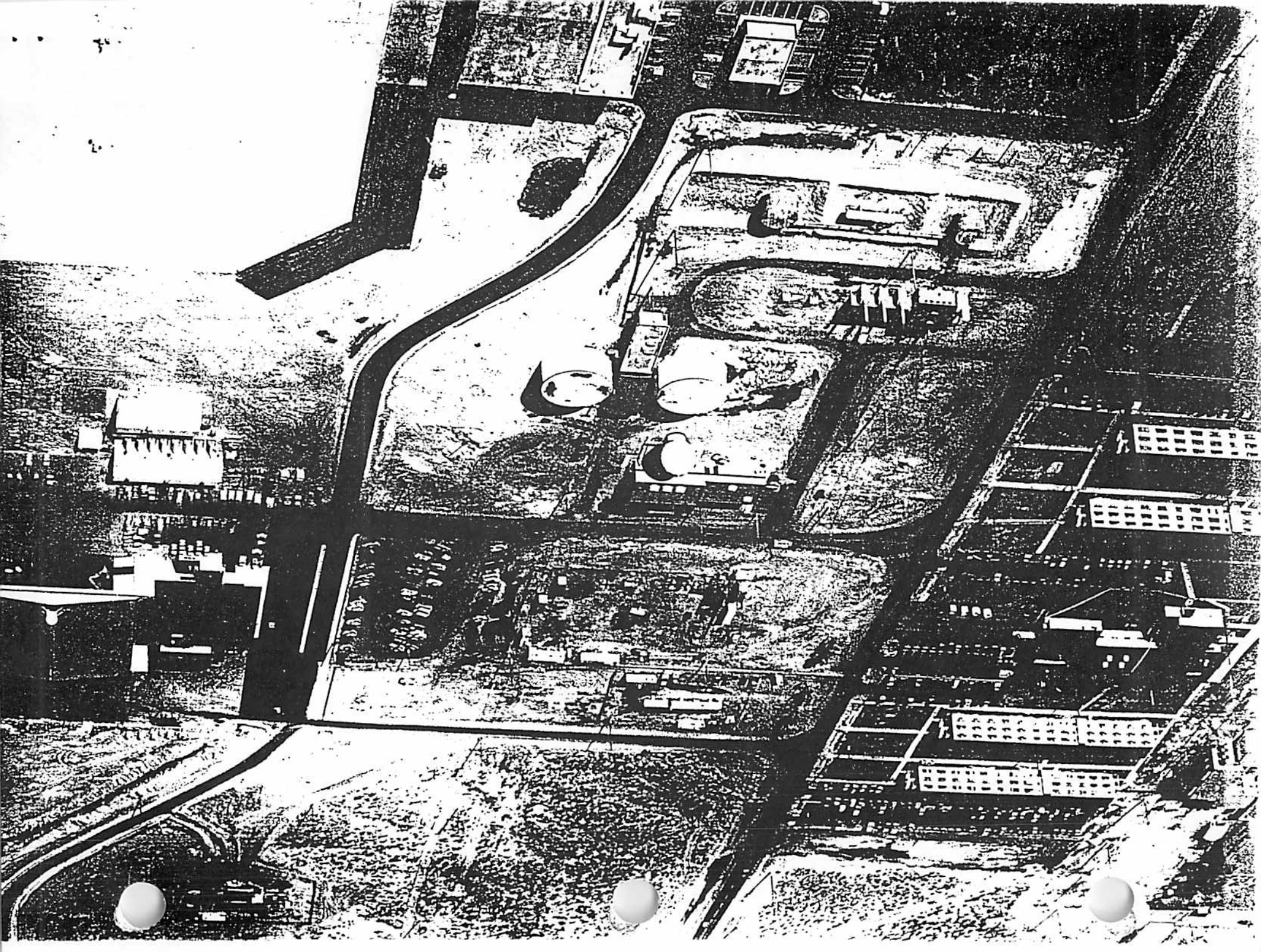
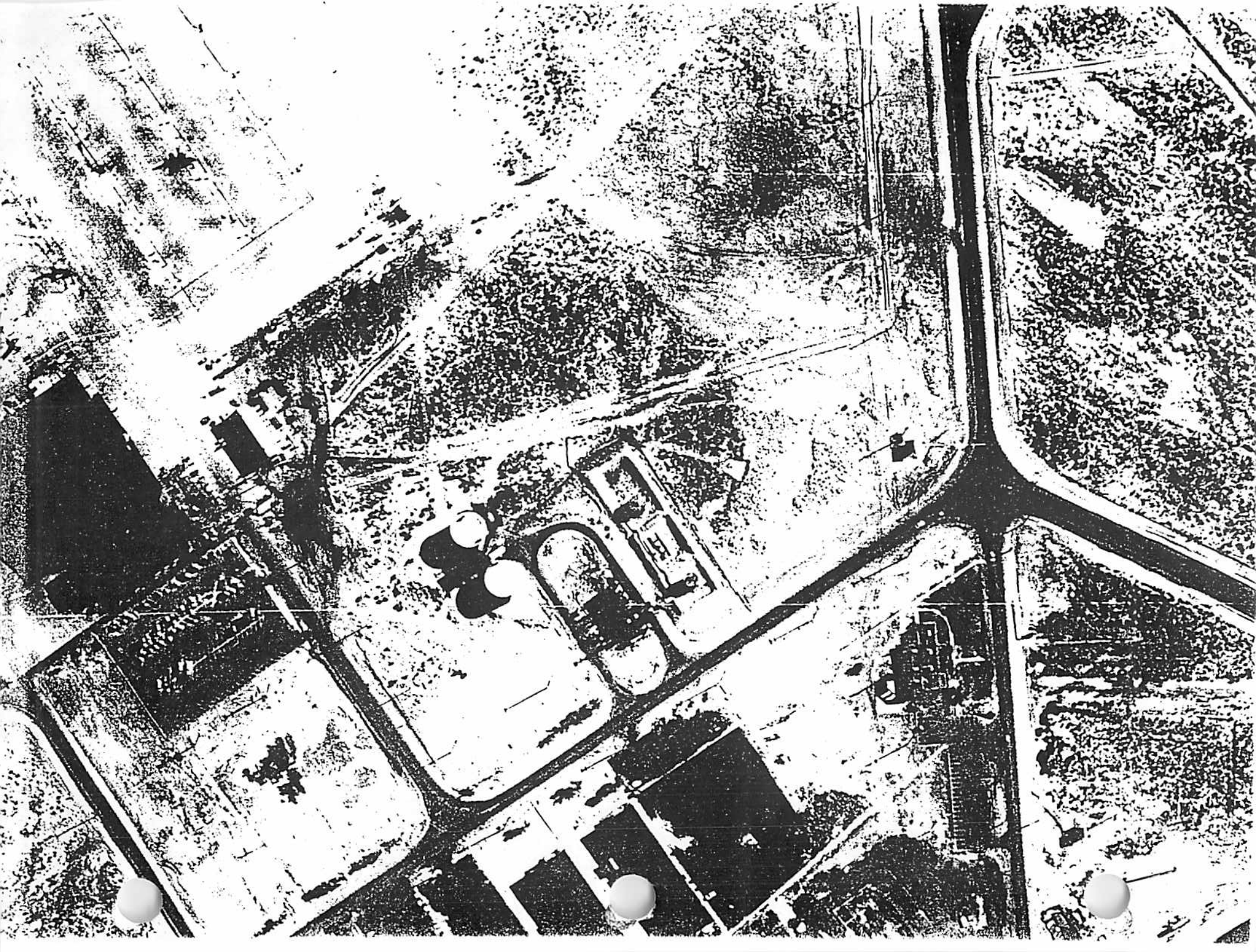
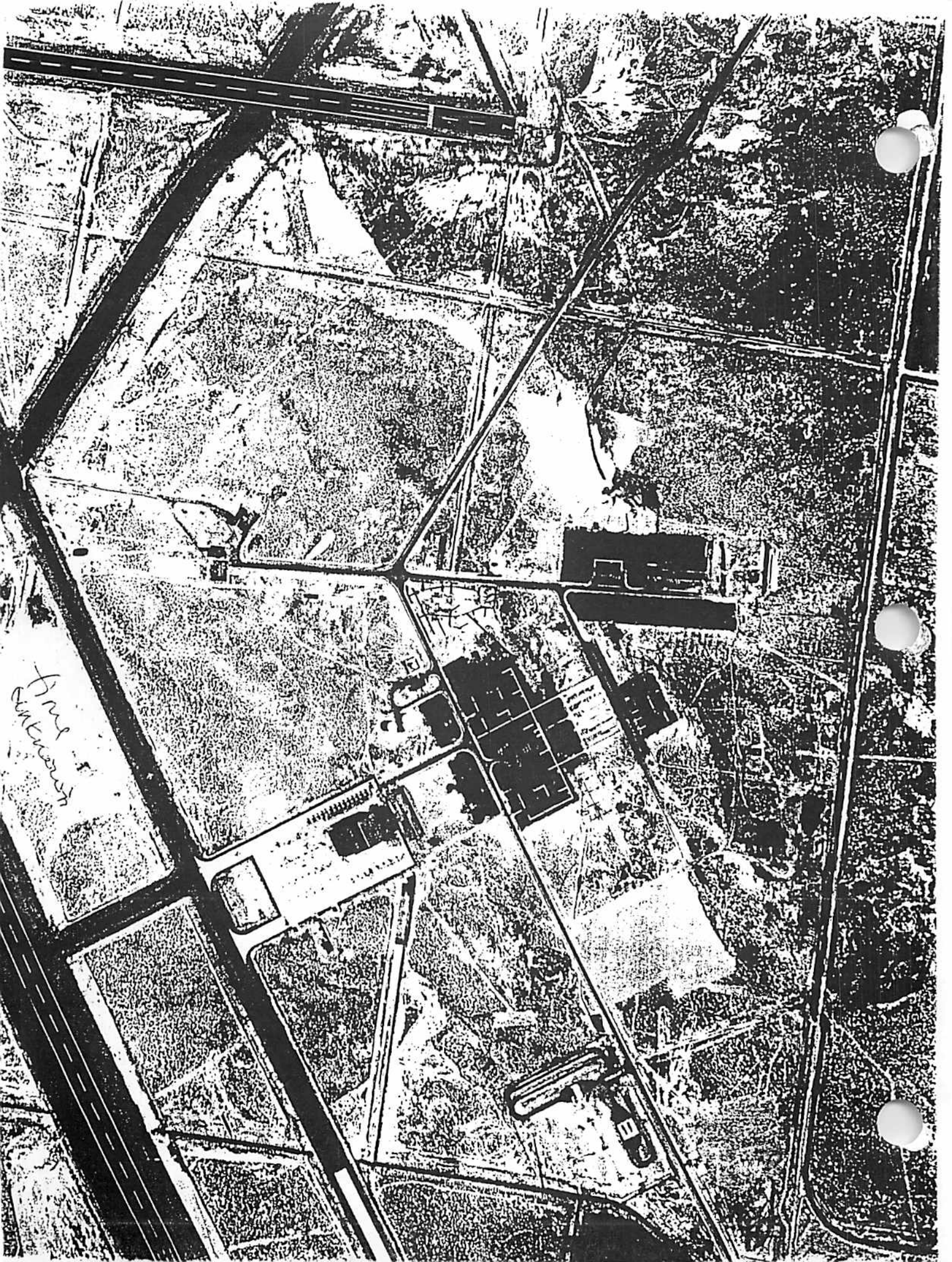


EXIST. 8" SEWER
NEW RACK MTD.
3-100 KVA
SERVICE XFRMR.
7'-0"
30'-0"
EXIST. 6" SEWER
EXIST. BLOW-OFF
SUMP
EXIST. TANK
(ABANDONED)
H.T.H.W. HEATING
PLANT - 314
3932.0'
EXIST. ACCUMULATOR TK.
F.F. EL.
=3934.0'
NEW HTHW
GENERATOR
EXIST. 2,000 GAL.
UNGD. STOR. TANK
FOR EMER. GEN.
EXIST. EXPANSION TK.
104'-8"
EXISTING
LPG TANK
℄ DITCH
120'-0"
3935.0'
3935
298
3934
25'-0"
44'-8"
48'-0"
42'-0"
30°
295
*295
3933
℄ CARSON ROAD
EXIST. 60,000 GAL.
ND. 6 OIL STORAGE TK.
TOP OF EXIST.

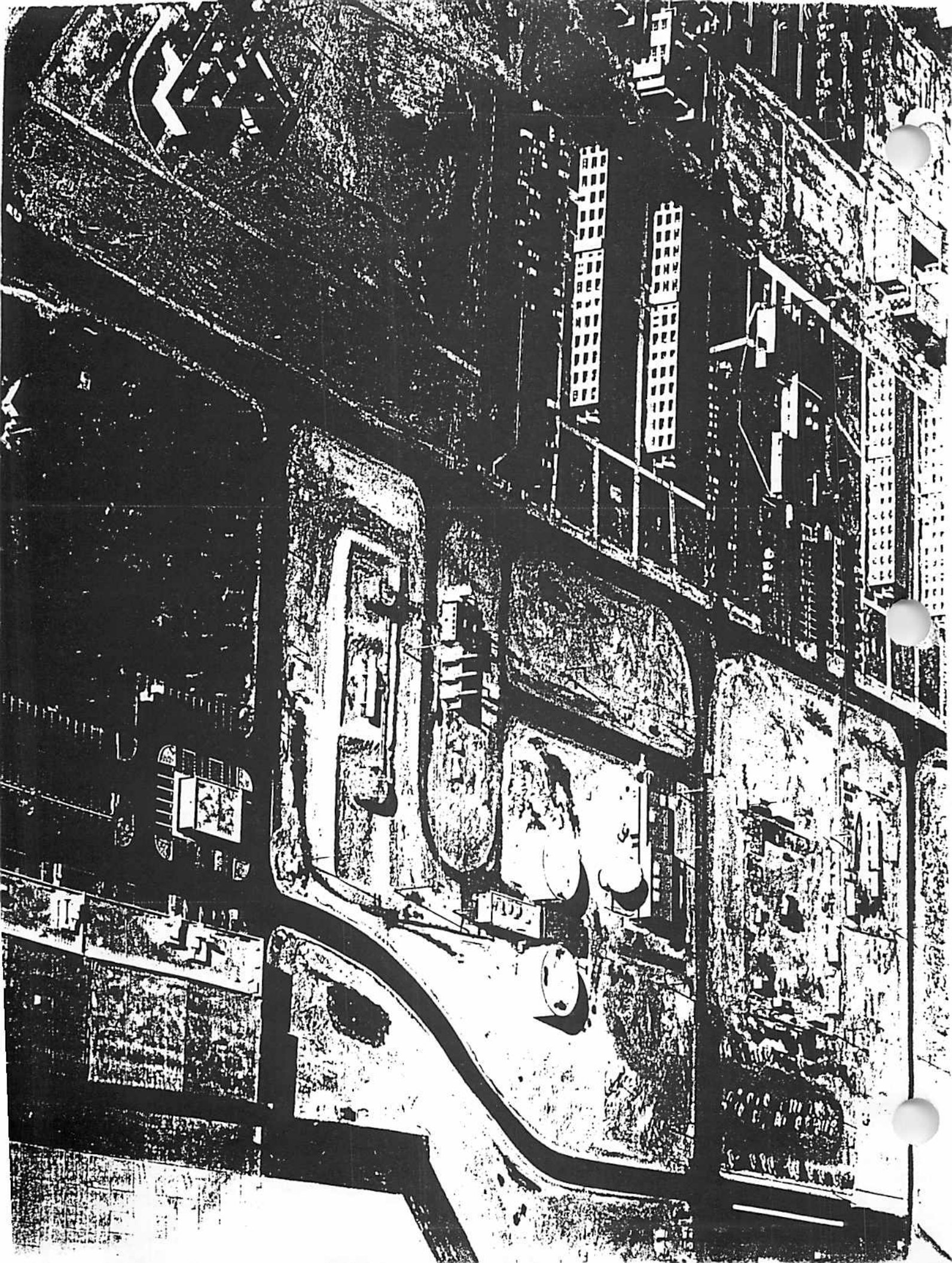

SEWER
FRMR.
7'-0"
30'-0"
EXIST. 6" SEWER
EXIST. TANK
(ABANDONED)
3932.0'
H.T.H.W. HEATING
PLANT - 314
F.F. EL.
=3934.0'
NEW HTHW
GENERATOR
EXPANSION TK.
104'-8"
EXISTING
LPG TANK
℄ DITCH
120'-0"
3935
3934
3933
25'-0"
44'-8"
48'-0"
42'-0"
30°
29½
TOP OF
BERM
EXIST. 60,000 GAL.
NO. 6 OIL STORAGE TK.
(F.F. EL. = 3933.0')
EXIST. 15,000 GAL.
TOP OF EXIST.
BERM EL. = 3936.0'
NEW 2000 BARREL
ABOVE GROUND
NO. 6 OIL STORAGE TK.







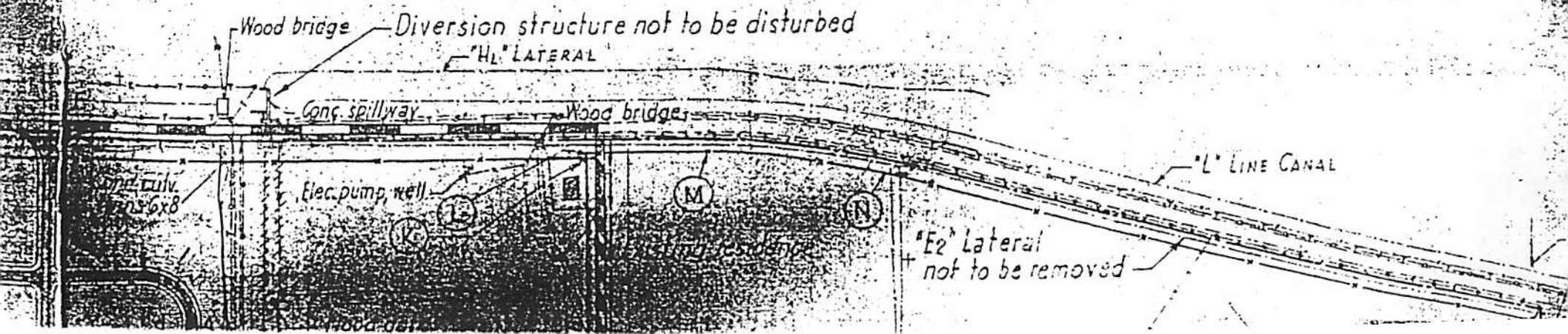
Late 85
to early 86

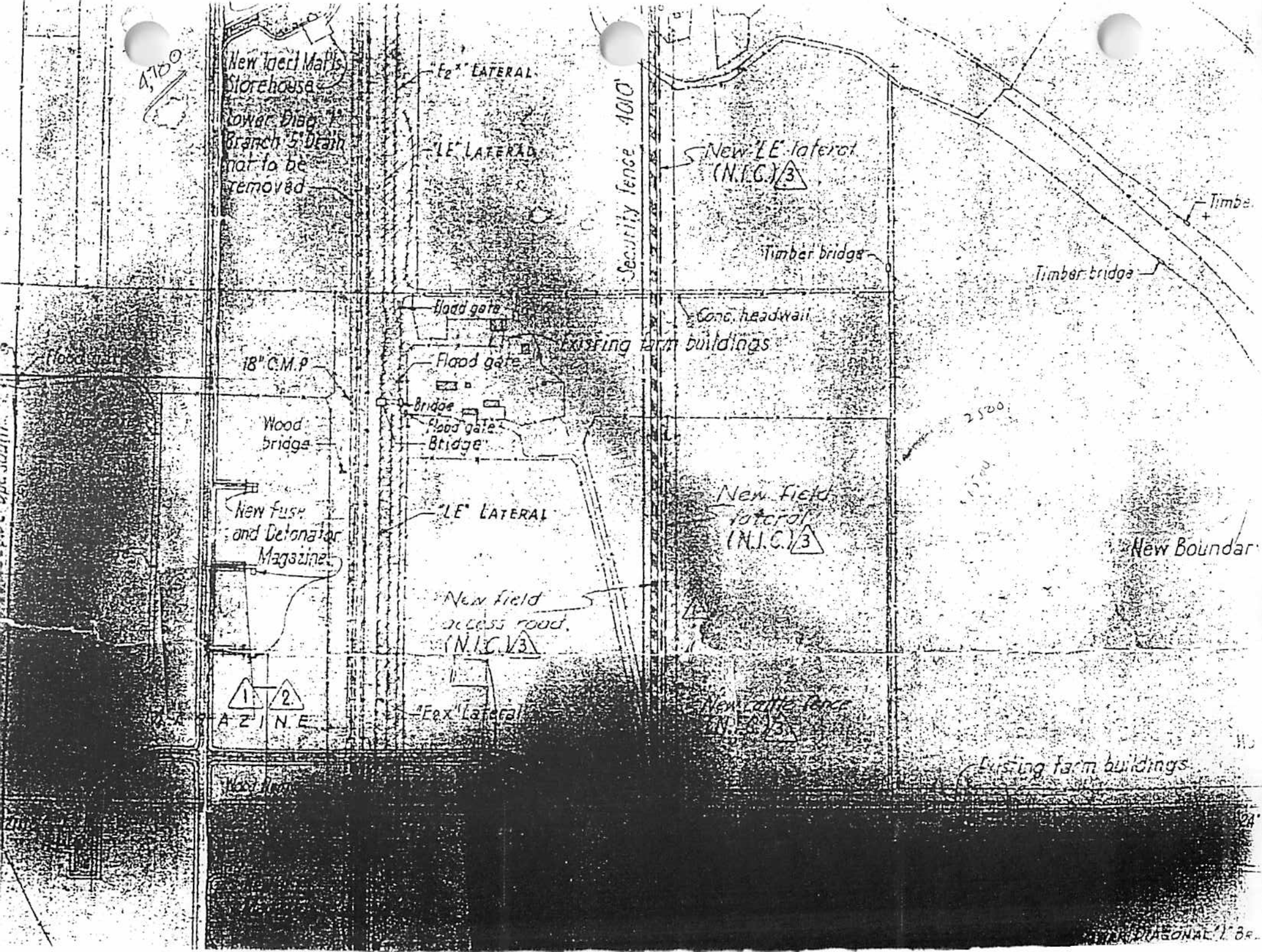


OPW Dwg # E-27552

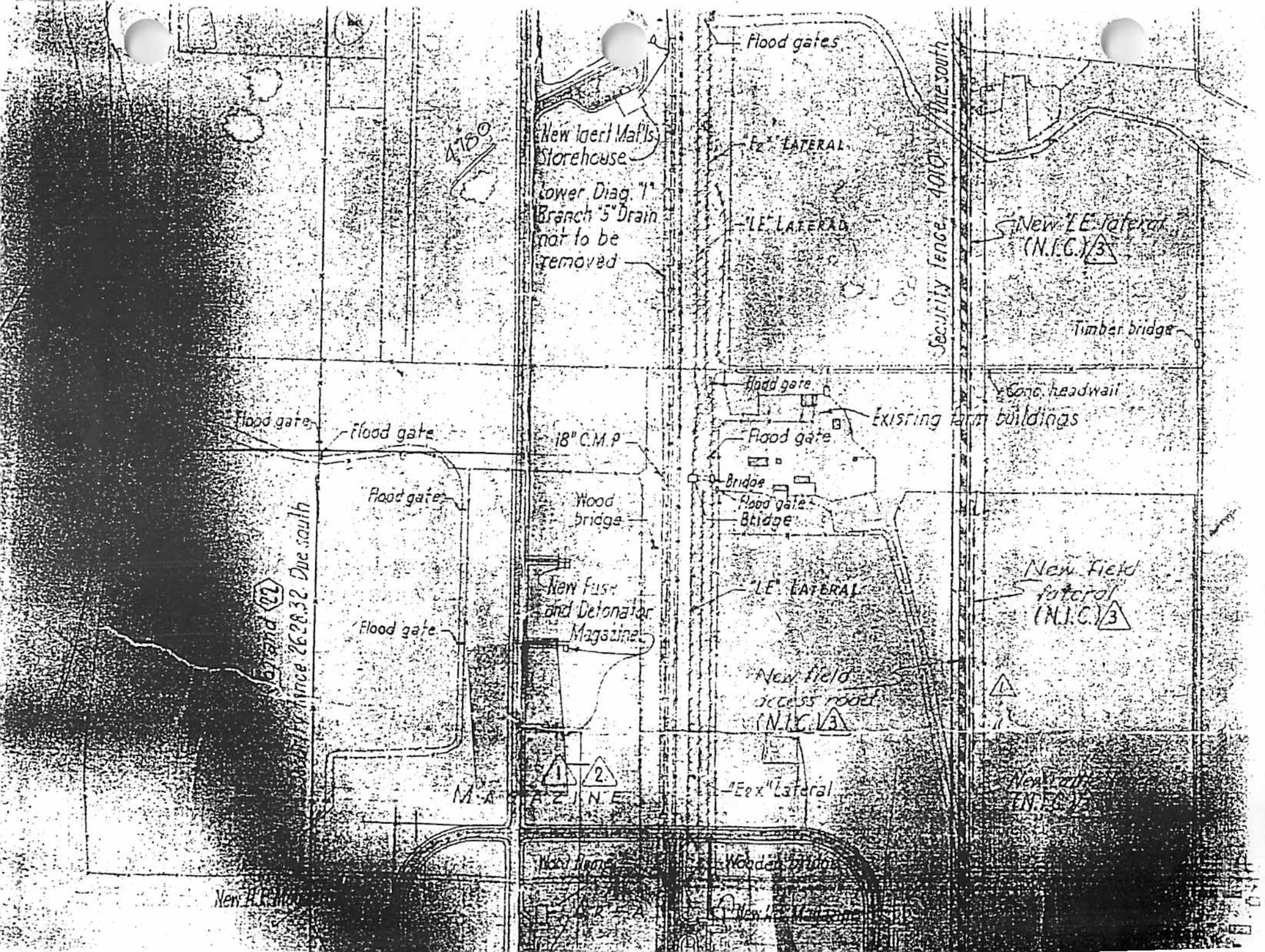
466,000

468,000

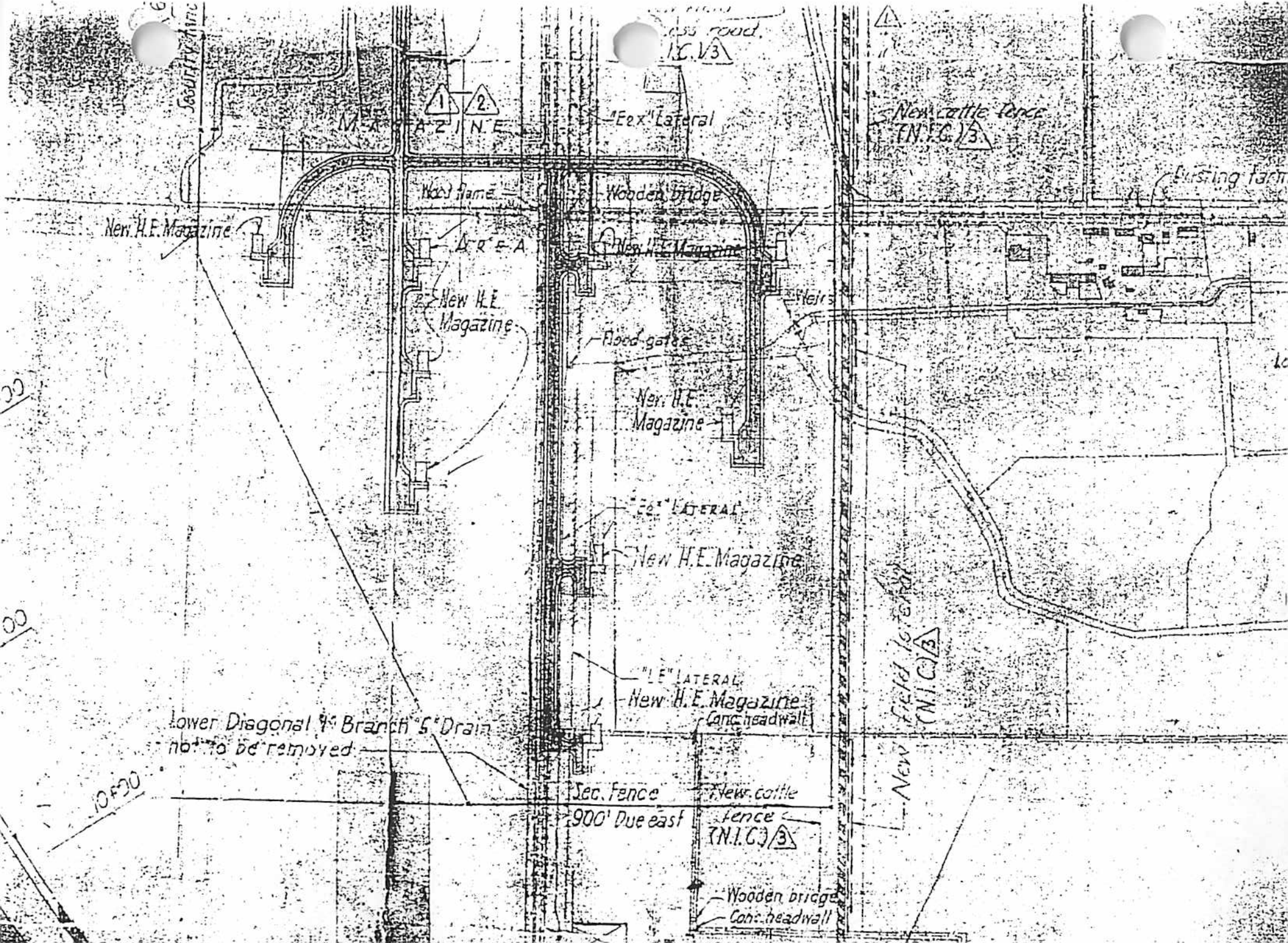




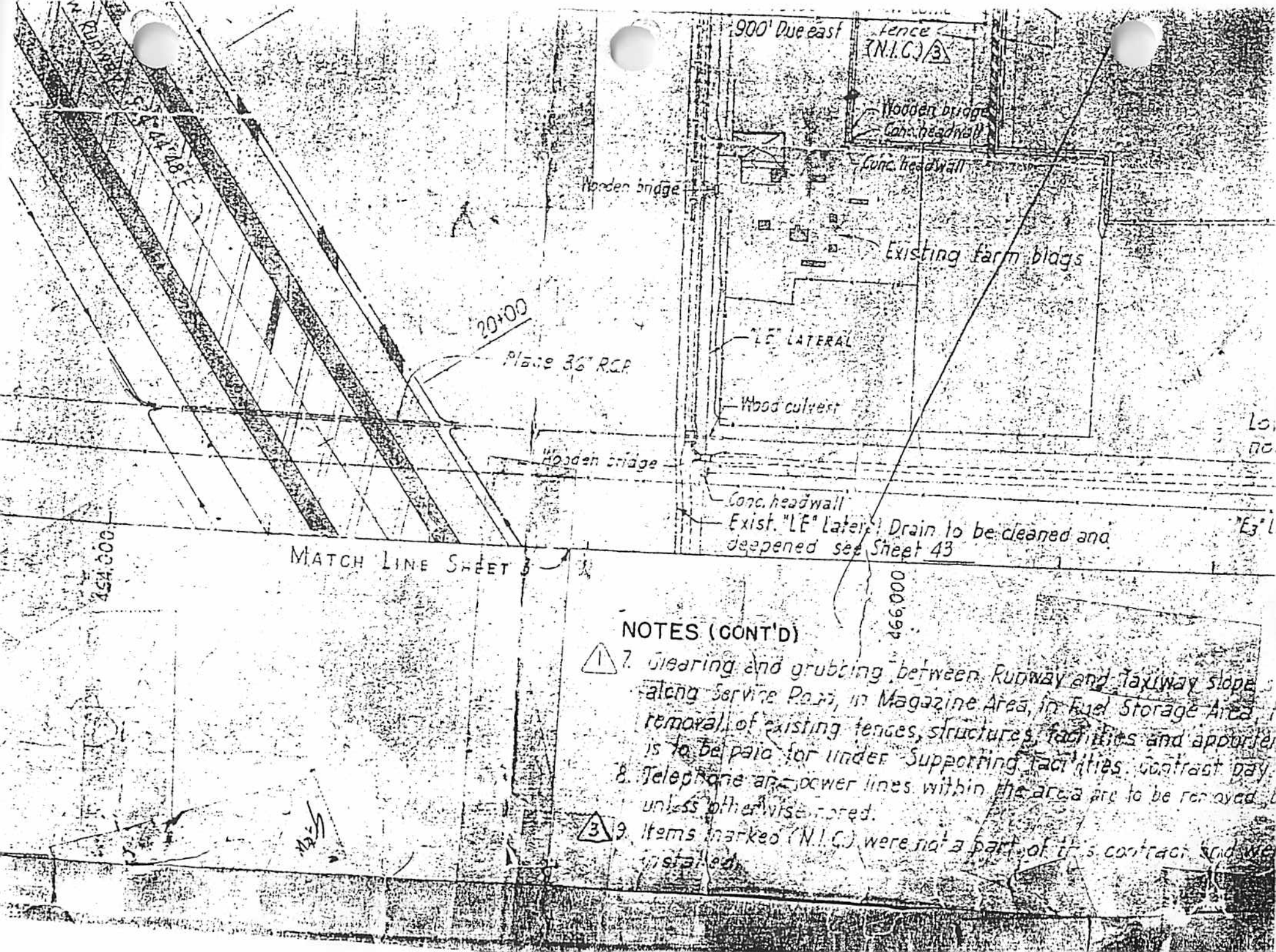
4,700
New Inert Mat'ls Storehouse
Lower Diag. 1 Branch 5 Drain not to be removed
"E2" LATERAL
"LE" LATERAL
Security fence 4010'
New "LE" lateral (N.I.C.) 3
Timber bridge
Timber bridge
Timbe
Flood gate
Conc. headwall
Existing farm buildings
Flood gate
18" C.M.P.
Flood gate
Bridge
Flood gate
Bridge
Wood bridge
2500
New fuse and Detonator Magazine
"LE" LATERAL
New field lateral (N.I.C.) 3
New Boundar
New field access road (N.I.C.) 3
1
2
MAGAZINE
"Fex" Lateral
New cattle fence (N.I.C.) 3
Existing farm buildings



Flood gates
New Igert Mat'ls Storehouse
"E2" LATERAL
Lower Diag. "1" Branch "5" Drain not to be removed
"LE" LATERAL
Security fence 4010' due south
New "LE" lateral (N.I.C.) 3
Timber bridge
Flood gate
Conc. headwall
Existing farm buildings
Flood gate
Flood gate
18" C.M.P.
Flood gate
Bridge
Flood gate
Wood bridge
Bridge
New Fuse and Detonator Magazine
"LE" LATERAL
New field lateral (N.I.C.) 3
Flood gate
New field access road (N.I.C.) 3
1
2
MAGAZINE
"E2x" Lateral
Wood flume
Wooden bridge



Security Fence
MAGAZINE
"E2x" Lateral
New cattle fence (N.I.C.) 3
Wood flame
Wooden bridge
New H.E. Magazine
AREA
New H.E. Magazine
New H.E. Magazine
Weirs
Flood gates
New H.E. Magazine
"E2" LATERAL
New H.E. Magazine
"LE" LATERAL
New H.E. Magazine
Conc. headwall
Lower Diagonal 4" Branch "5" Drain not to be removed
Sec. Fence 900' Due east
New cattle fence (N.I.C.) 3
Wooden bridge
Conc. headwall
New field lateral (N.I.C.) 3



NOTES (CONT'D)

1 7. Clearing and grubbing between Runway and Taxiway slope, along Service Road, in Magazine Area, in Fuel Storage Area, removal of existing fences, structures, facilities and appurte is to be paid for under Supporting Facilities. Contract pay

8. Telephone and power lines within the area are to be removed unless otherwise noted.

3 9. Items marked (N.I.C.) were not a part of this contract and we installed.

TABLE 2-1 (continued)

DISPOSAL SITES AND POTENTIALLY CONTAMINATED AREAS

Site Number and Name	Site Description	Site Location	Period of Operation	Waste Types	Total Quantities (Gallons)	Sources
5 Ordnance Area	Irrigation Ditch and Pit	E, F-14	Late 1950's to Early 1960's	Inert Materials (pallets, metal boxes, metal pallets, strapping, ammunition cans, cardboard packing)	2,200[15] yd^3	Ordnance Packing
	Ordnance Disposal Area	D-14	1950's	20 Millimeter Ammunition, Metal Boxes	500[16] yd^3	Ordnance Disposal
6 Defuel Disposal Sites	2 Defuel Disposal Sites	P-23 S-23	1966-1972	JP-4, JP-5	70,000[17]	Aircraft Defuel

(15) $\frac{(400 \text{ ft} \times 10 \text{ ft} \times 10 \text{ ft}) + (50 \text{ ft} \times 50 \text{ ft} \times 8 \text{ ft})}{27 \text{ ft}^3/\text{yd}^3} = 2200 \text{ yd}^3$

(16) Assume 500 yd^3 of ammunition, metal boxes and soil.

(17) $\frac{1000 \text{ gal}}{\text{month}} \times \frac{12 \text{ month}}{\text{yr}} \times 6 \text{ years} = 70{,}000 \text{ gal.}$

41.10G/2T-4

It is reported that a burned DC-3 airplane carcass was buried in the area behind Shipping and Receiving (Figure 2-2) in 1977. It is not known whether the airplane contained fuel or other hydrocarbon liquids but it is assumed that about 100 total gallons of fuel (either Avgas or JP-5), lube oil and hydraulic fluid may have been in tanks or the engines of the airplane (Table 2-1). Leakage of these fluids may have resulted in soil or ground-water contamination in this area.

Because of the potential for soil and possible ground-water contamination at the site, RI/FS is recommended. Potential contaminant pathways and receptors are discussed in Section 2.1.

2.2.21 Site 24: Road Oiling Area. Perimeter roads outlined on Figure 2-2 were oiled with waste oils, fuels and solvents between 1943 and 1946, and 1951 and 1981. Portions of this road are presently paved as indicated on Figure 2-2. Wastes used for oiling were generated by vehicle and aircraft maintenance. Waste type and quantity through time are summarized on Table 2-1. Waste liquids were transported from the shop areas by bowsers, some of which were equipped with spray bars. These bowsers were then pulled around the perimeter roads and allowed to empty. It is estimated that a total of as much as 37,000 gallons of waste liquids were disposed of in this manner (Table 2-1). This practice may have resulted in soil and possibly ground-water contamination in the oiling areas. Such contamination has the potential to migrate to offsite receptors (Section 2.1). Therefore, RI/FS is recommended.

2.3 REMEDIAL MEASURE SITE. One of the 27 sites is recommended for a Remedial Measure. It is discussed below.

2.3.1 Site 15: Old Navy Exchange Gas Station. The old Navy Exchange gas station consists of a quonset hut housing a mechanic bay with lube pits (Figure 2-2; coordinates FF-14). Two 7,000 gallon underground gasoline or diesel fuel storage tanks are present behind the building. The lube pits are reported to contain about 500 gallons of hydraulic fluid. The type and condition of the lube pit floor is unknown. The presence of the fluid over the last several years suggests that the lube pit floor is not transmitting fluid, and it is therefore unlikely that significant soil contamination has occurred at the site. However, due to the possibility that the lube pit floor has transmitted fluid, a remedial measure is recommended. This measure is outlined in Chapter 3.

2.4 NON-RI/FS SITES. Five of the 27 disposal sites and potentially contaminated areas are not recommended for RI/FS. These sites are discussed below.

2.4.1 Site 5: Ordnance Area. Two adjacent disposal areas are present in the ordnance area (Figure 2-2; coordinates E, F-14). The northern area was discovered during excavation for a utility line in 1986. Abundant metal debris and several 20 millimeter ammunition shells in an advanced state of decay and metal boxes were encountered. It believed that this material was buried sometime in the 1950s. The material near the trench was excavated and removed to the base landfill (the shells were disposed of by EOD offsite). Additional inert debris, possibly including some decayed 20 millimeter shells may remain in this area.

Inert packing material consisting of pallets, metal boxes, strapping, ammunition cans and cardboard was disposed of in trenches in the southern disposal area in the late 1950s and early 1960s. It is estimated that about 2200 cubic yards of this material was buried in this area (Table 2-1). This material was apparently buried in old drainage ditches or swales.

This site is not recommended for RI/FS because of the lack of hazardous materials at the site. The possible presence of several decayed 20 millimeter shells is not considered a potential threat to humans or the environment. It is recommended that the site be annotated on NAS Fallon development maps in order to plan future excavation in this area.

2.4.2 Site 8: Bore Site Gunbutt. The bore site gunbutt was located at east of the main runway (Figure 2-2; coordinates U-20) and was used for siting in of aircraft mounted machine guns from the 1940s to the mid·1960s. It is estimated that as much as 2 tons of lead from spent projectiles may have been present in soils near the gunbutt (Table 2-1). The gunbutt was removed in 1987 as a result of grading activities for the new runway. All soils in the area were probably removed for redistribution along the entire runway course. Due to these grading activities, it is unlikely that any substantial lead remains at this site. Lead distributed as a result of grading activities is unlikely to result in substantial soil contamination due to the inferred low soluability of lead in the alkaline soils in the area. The site is not deemed to pose a threat to human health or the environment. Therefore, the site is not recommended for RI/FS.

2.4.3 Site 25: New Runway Rubble Disposal Area. Concrete, asphalt and wood were reportedly buried in pits or ditches east of the new runway (Figure 2-2; coordinates Y-22). This material was reportedly generated from base-wide runway and road repair projects. About 14,000 cubic yards of this material is estimated to have been buried between 1970 and 1980 (Table 2-1). Portions of this material may have been excavated and removed during construction of the new runway.

The site poses no threat to human health or the environment due to the lack of hazardous substances in this area. RI/FS is not recommended.

2.4.4 Site 26: Offsite Rubble Disposal Area. Concrete, asphalt and wood were reported to have been buried offsite as shown in Figure 2-2; coordinates K, N-5, 7). This material originated from road and runway projects on the base and was disposed of in shallow pits or on ground surface. About 14,000 cubic yards of material may have been disposed of in this area (Table 2-1).

Due to the lack of hazardous substances in this area, the site poses no threat to human health or the environment. Thus, RI/FS is not recommended.

2.4.5 Site 27: Diesel Fuel Spill Site. About 100 gallons of diesel fuel was spilled along the access road to bombing range B-17 in 1987. About 10 cubic yards of soil was contaminated. This soil was apparently excavated and removed to a remote portion of Range B-17. This spill and cleanup was reported to NDEP. It is reported that NDEP has approved the cleanup as conducted.

TABLE 5-1
(continued)

Operation	Waste Material	Waste Quantity Gallons/Year	1940	1945	1950	1955	1960	1965	1970	1975	1980	1985
Ordnance	Napalm M-2 and A-B	12,000 gals									Disposal by burning near landfill and crash crew training area (1983)	Disposal by burning or detonation on Ranges (1987)
	Inert Packing Materials and 20mm shells	2,700yds^3				? Disposal by burial ?						
	Ordnance Waste Including Dud Shells	100yds^3/yr			1951 Transferred to EOD for detonation on ranges						1983	Diposal off base (1987)
	Inert Packing	500yds^3/yr					? Disposal to onsite landfills					1987
Ranges	Exploded and Unexploded Ordnance	—										
	Inert Target Materials	—										
	Waste Oil (from generators)	20 gals					? Disposal by incineration w/trash at each range				1985	Disposal at base (1987)

41.100/T-5-1.4

5.24 ORDNANCE. The ordnance storage and handling area has been located in the northeastern portion of NAS Fallon since the early 1950s. Prior to that, ordnance is believed to have been located in the old portion of NAS Fallon near coordinates EE-15 Figure 5-1. Wastes generated by ordnance activities are summarized on Table 5-1 and generally include waste napalm, defective ammunition and inert packing materials. Waste napalm was generated by: (1) having excess left over after initial mixing; or, (2) napalm returned to ordnance which was not dropped on the ranges. Defective ammunition was generally detected at the ordnance facilities immediately after receiving the ordnance by special shipment. Inert packing materials were generated during routine unpacking of shipped materials. Quantities of these materials generated through time and their disposition are summarized on Table 5-1 and are discussed further in Section 8.5

5.25 RANGES. Wastes generated on the bombing ranges consists of exploded and unexploded ordnance, inert target materials, waste oil from generators, a diesel fuel spill and radioactive waste from an underground nuclear explosion in 1963.

Exploded and unexploded ordnance is present on ranges B-16, B-17, B-19 and B-20. These ranges are in the process of being cleaned of all ordnance and out-dated target materials over 6 inches in diameter by a private contractor. The clean up does not include removal of any possible residual contaminants which might exist as a result of unexploded or exploded ordnance on the ranges.

It is reported that electrical generators are present on the Electronic Warfare (EW), B-16, B-17 and B-19 ranges. About 20 gallons of waste oil generated annually during routine maintenance of these generators was reportedly disposed of by incineration at each range. This practice was reportedly stopped in 1985 when waste oil was returned to the base (to Shipping and Receiving) for eventual off-base removal (Section 7.4).

About 100 gallons of diesel fuel was spilled along the access road to bombing range B-17 in 1987. About 10 cubic yards of soil was contaminated and reportedly removed.

A nuclear device was exploded underground on the AEC site (located between B-19 and B17 ranges) in 1963. The device was exploded at a depth of about 1,000 feet below ground surface. The surface area in the site vicinity has been extensively tested for evidence of radioactivity and none has been detected. However, it is assumed that radioactive materials are present at depth.

or in 55 gallon drums over paved and unpaved surfaces south of the building. Shipping and Receiving took over the DPDO yard in 1977. They continued to temporarily store chemicals and hazardous liquids in similar manner prior to off-base removal for disposal. Since early 1987, Safety has acquired the responsibility for excess chemicals and hazardous liquids. These liquids are segregated by type in the shops and stored in color coded drums which are periodically removed by truck to several fenced compounds around the base. From there, the materials are transferred to the GATAR compound for temporary storage. Minor amounts of liquids may also be delivered from the shops to Safety or Shipping and Receiving. These materials are then transferred to the GATAR compound by truck for storage prior to off-base disposal.

6.5 PESTICIDE. The NAS Fallon pesticide shop is located as shown on Figure 5-1. The shop has probably been at this location since the early 1960s. Information relating to this shop was available for the period since 1974. Incoming pesticides have been transported to Shipping and Receiving and then transferred to the pesticide shop by truck for storage. As much as about 1,000 to 2,000 gallons of various pesticides including DDT, DDD, DDE (pre mid-1970s), and malathion, pyrethrin, diazion and 2,4-D (post mid-1970s) are typically stored in their original containers (1 to 5 gallons) in a separate storage shed adjacent to the shop prior to mixing and use. Mixing is typically conducted in the tanks of the trucks used for pesticide application. These trucks have 100 or 500 gallon tanks from which the pesticides are applied. No pesticide spills are reported to have occurred.

6.6 POLYCHLORINATED BIPHENYLS (PCBs). Approximately 15 transformers containing with PCBs were removed by electrical shop personnel from various locations around the base between 1982 and 1987. After removal, the transformers were taken to Shipping and Receiving or the GATAR compound (see Section 8.10) for temporary storage before being shipped to Herlong, California for disposal by DPDO. The GATAR compound presently holds 3 transformers awaiting offsite disposal. It is unknown whether any of the transformers leaked during storage in the GATAR compound.

6.7 ORDNANCE. The ordnance storage and handling area has been located in the northeastern portion of NAS Fallon since the early 1950s. Prior to that, ordnance facilities are believed to have been located in the old portion of NAS Fallon near the original runway. Ordnance is and has been delivered to NAS Fallon by special truck transport directly to the ordnance facilities in the northeast portion of the base. Ordnance which typically is or has been used at NAS Fallon includes 50 caliber machine gun ammo, 20 mm cannon shells, 2.5 and 5 inch wing mount air-to-ground rockets, napalm and 100, 500 and 1,000 pound high explosive bombs. Ordnance is unloaded, inspected for defects, and placed directly into storage magazines. Defective ordnance is transferred to custody of EOD. Prior to 1983, EOD disposed of defective or out of date ordnance by explosion on the ranges. Since 1983, defective ordnance has been returned to point of origin for disposal or reconditioning. Ordnance is transferred on base by special ordnance transport vehicles.

6.8 RADIOLOGICAL MATERIALS. The only radiological materials reported to be present at NAS Fallon are x-ray generation sources for the medical and dental

E. Kissic — works in transportation

Dick Lane Eng. dept.

NOTES

History of New Sites

Fuel Tank Near Boiler Building | boiler plant

Back in the mid-1970's, there was reportedly a problem with a tank (that no longer exists); perhaps it was leaking. The tank was drained into a pit next to the tank. The pit area is now paved with asphalt. The tank contained fuel oil (or perhaps jet fuel, according to Mr. Charlie Driver). The pit was very black with petroleum.

Mr Evert Kissic drove by in a semi and saw the activities from the road. The operators (of??) at the time were Harold Richards (rtd -may not be alive) and Art Houston (rtd in Fallon). Mr. Houston did not recall a single tank on the site (TELECON 6/27/91). When he first arrived at the base in 1968, there were two tanks and he does not recall any tank removals prior to his retirement in 1978. He did refer us back to Mr. Richards who was on the base before Mr. Houston started. The last he knew, Mr. Richards was in Carson City. Charlie Driver (rtd on Gommow Drive) may have been the boiler boss at the time. Kenny Townsend (works for MK at x3430) may have been boilerboss. George Levitt (now in PW) may know a lot about the site. Jim Riggin (~~PW~~, DEL~~?~~) was the head boss at the time and assigned hours, money, etc. for work to be done. 3-4784 now a City Commissioner under (PW) Public Works dept. here in '59 Jim Riggin

The old Fuel tank was used for the boilers to produce steam for the whole base. It was about 30-35 feet in diameter and as high as bldg 314 (about 20 ft). The estimated volume is therefore about 14,000 cu.ft. or __ gal.

The disposal pit was created with a bulldozer and was about 2 blades across, or approximately 24 ft. wide. The tank cleaning took about 3-4 months and Mr. Kissic had no idea if they cleaned up the pit before it was covered over. He could not tell if there was water in the pit or how deep it was. The pit is about 50 ft. long and 24 ft. wide. The middle of the pit is aligned with the middle stack on Bldg. 314. The pit is about 125 feet from Bldg. 314. The old tank was about 50-60 feet from Bldg. 314.

Initial examination of aerial photos allows some preliminary determinations:

- At one time there was only one fuel tank next to the boiler plant, Bldg. 314. The fuel tank was #315 according to a 1967 drawing. The aerial photo shown a berm but no sign of a pit.

- Sometime later the tank was removed and replaced with 3 tanks and berms as shown in the 1985-86 aerial photo. Today there is only one oblong tank. Whether that tank is the same as shown in aerials is unknown. The two others have since been removed.

- Parking lot (where? over the old pit) has not always been there.

- ~~There appears to be soil staining in the area from a culvert. (see zerox of 1985-86 aerials)~~ It's only water.

6/12

Evert Kissic x2783
- Bldg 314 Pit

- Back in mid 1970s they had a problem w/ the tank (tank no longer exists), maybe it was leaking. So they drained the tank into a pit next to the tank. The pit area is now paved w/ asphalt. The tank contained fuel oil. The pit was very black w/ petroleum.

Evert drove by in a semi and saw the activities from the road. The operators at the time were Harold Richards (Rtd - may not be alive) and Art Houston (Rtd in Fallon). Charlie Dover (Rtd on Comet Dr.) may have been the boiler boss at the time. Kenny Townsend (works

Evert Kissic 314 Fuel Pit (2)

x2777

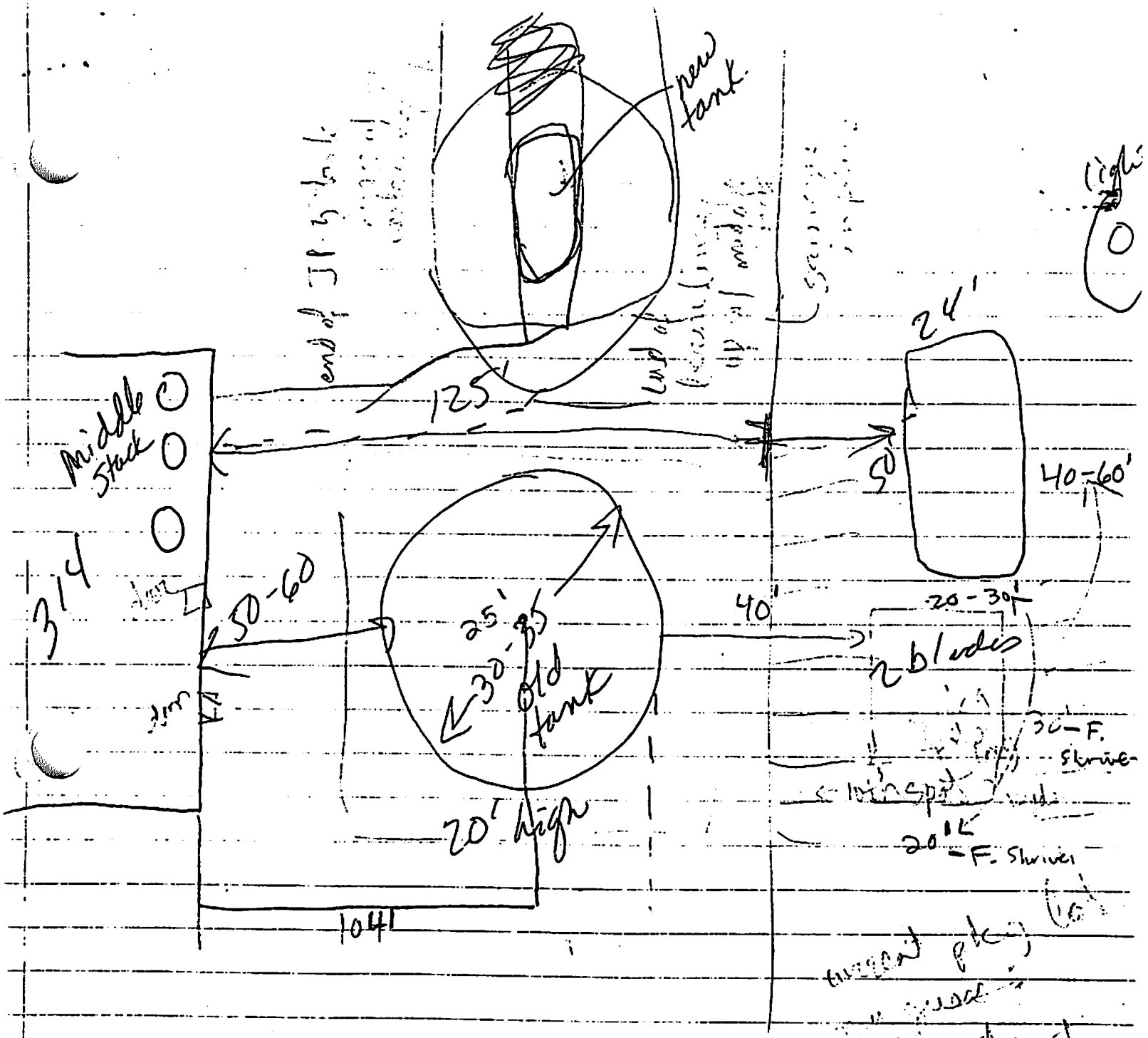
Boss. George Levitt (now in PW) may know a lot about the site. Jim Riggin Del (~~PW~~) was the head boss @ the time & assigned hours, money etc for work to be done.

The old fuel tank was used for the boilers for steam for the whole base. It was about 30-35 feet diameter & ~~[illegible]~~ as high as bldg 314 (maybe about 20 ft).

The pit was dug w/ a dozer ~ about 2 blades across so about 12x2 = 24' wide. The tank cleaning took about 3-4 months & he had no idea if they cleaned it up before they covered it. He couldn't tell [illegible]

Evert Kissic X2783
- Bldg 314 pit

was water in the pit or how deep it was. The pit is about 50' long and 24' wide. The middle of the pit is aligned w/ the middle stack on 314. The pit is about 125' from Bldg 314. The old tank was about 50-60 ft from Bldg 314.



Road

← N

lined up with left hand westerly door in heating plant or letter yet the

the way

pit - dug w/ dozer
~~trench~~ 2 blades wide 1'-2

Evert Kissic 2783

→ Bldg 314 pit

mid 70s

big fuel tank problem

drain tank

fuel oil

black petroleum

tank as high as bldg

30-35 across

one time tank cleaning took about 3-4 months don't know if they drained it then covered it up

- couldn't tell if water in it

Charlie Driver (Rtrd) - Gumul Dr. - Navy not been boiler boss

Kenny ~~Thomp~~ Townsend (MK) 3430 Boiler Boss

George Levitt (PW)

operators

Harold Richards Rtr

Art Houston Rtr Fallon

Jim Riggin PW

black in pit

drove by in semi

fuel tank was for the boilers

steam for the whole base

1/2 GDM
1967 drwg

~~[illegible]~~

unit of measure

1500 BL

Bldg 314

Bldg 315 Fuel Storage Tank 1500 BL

~~(415) 244-2140 Pat Burke~~
~~AV 494~~

By looking at aerials some prelim determination could be made.

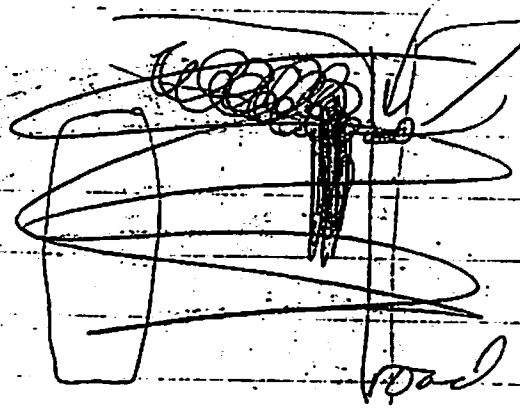
1. At one time there was ~~[illegible]~~ only one fuel tank next to the Boiler Plant, Bldg 314. the fuel tank is ~~Bldg~~ 315 according to a 1967 dwg. The areal showed a berm but no sign of a pit.

2. Sometime later the tank was removed + replaced with 3 tanks + berms as shown. ~~[illegible]~~ Today there is only one oblong tank. Whether that tank is the same as shown in aerial is unknown. The two others have since been removed.

3. Parking lot has not always been there.

over

4. There appears to ~~be~~ Soil Staining in the area from a culvert



See xerox of aerials

It was only water. It's in all ditches.