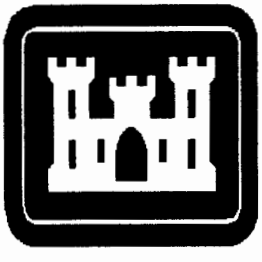
# Draft Final
# SITE INVESTIGATION REPORT

## Fort McDowell / Angel Island
## Marin County, California

**Contract No. DACW05-00-D-0027**
**Delivery Order 0003**



*Prepared for*
**U.S. Army Corps of Engineers**
**Sacramento District**
**Sacramento, California**

*Prepared by*

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**December 2002**

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## ACRONYMS

| | |
|---|---|
| AC | Ayala Cove |
| AST | aboveground storage tank |
| B205 | UST at Building 202 |
| B332 | UST at Building 332 |
| BB241 | UST at Barracks Building 241 |
| BB242 | UST at Barracks Building 242 |
| bgs | below ground surface |
| BR AST | Boat Ramp ASTs |
| BR | Boat Ramp Dump Site |
| BW | Battery Wallace - Ambient Metals |
| BCV | Below comparison value |
| DERP | Defense Environmental Restoration Program |
| DOI | Department of the Interior |
| DPT | direct push technology |
| DPT | Deer Pen Tank |
| DSA | Drum Storage Area |
| EDXRF | energy dispersive x-ray fluoroscopy |
| EES | Electrical Equipment Storage |
| EG | East Garrison |
| EPA | U.S. Environmental Protection Agency |
| ES | Electrical Substation |
| EWT | UST East of Water Tank |
| FBS | Former Boiler Stack |
| FDB | Former Disinfection Building |
| FPS | Former Photo Shop |
| FSF | Former Ship Fueling (beach) |
| FTP | Former Transformer Pad |
| FUDS | Formerly Used Defense Site |
| INC | Incinerator |
| MCL | Maximum Contaminant Level |
| NG | North Garrison |
| OCR | Oil Change Rack |
| PA | Preliminary Assessment |
| PCB | Polychlorinated Biphenyl |
| PG | Parade Ground Dump Site |
| PP | Power Plant ASTs near Gym |
| PR | Pistol Range |
| PRD | Perimeter Road Ambient Samples |
| PS | Paint Shop |
| QAPP | Quality Assurance Project Plan |
| RBSL | Risk-Based Screening Level |
| RI/FS | remedial investigation/feasibility study |
| RR | Rifle Range |

## ACRONYMS, Continued

| | |
|---|---|
| SAP | Sampling and Analysis Plan |
| SI | Site Investigation |
| SSHSP | Site-Specific Health and Safety Plan |
| SVOCs | semi volatile organic compounds |
| TN&A | T N & Associates, Inc. |
| TPH-D | total petroleum hydrocarbons as diesel |
| TPH-G | total petroleum hydrocarbons as gasoline |
| TPH-MO | total petroleum hydrocarbons as motor oil |
| USACE | U.S. Army Corps of Engineers |
| UST | underground storage tank |
| VC10 | UST 10' from Visitor's Center |
| VC80 | UST 80' from Visitor's Center |
| VLR | Vehicle Lift Rack |
| VOCs | volatile organic compounds |
| WG | West Garrison |
| WR | Wash Rack |

# EXECUTIVE SUMMARY

This report describes the activities conducted during the Site Investigation (SI) at the former Fort McDowell, located on Angel Island in the San Francisco Bay, Marin County, California. The purpose of the SI is to conduct an onsite investigation for the potential or actual release of hazardous substances. The investigation included soil and water sampling and geophysical surveys. This report summarizes the results of the investigation activities conducted at Fort McDowell from June 11 though 27, 2002. The SI activities were conducted in accordance with the *Final Environmental Site Investigation Work Plan, Sampling and Analysis Plan, Quality Assurance Program Plan, and Site Safety and Health Plan, Fort McDowell/Angel Island, Marin County California,* March 2002.

Fort McDowell has been identified as a Formerly Used Defense Site (FUDS). The history of the island includes various military uses as well as an immigration and quarantine station. Military use included harbor defense batteries, Civil War era garrison, World War II debarkation station, prisoner of war camp, and Nike Missile station. The island is currently used as a state park.

This report includes a summary of the background history and use of Fort McDowell, including previous environmental investigations. Information is presented on the physical setting, including geologic and hydrogeologic features, as well as present use of the site. The investigation rationale and technical approach for the SI are discussed, followed by a summary of findings for each site. Pathway and target analyses are presented for soil, groundwater, surface water, and air. Finally, conclusions and recommendations for further investigation are presented based on the pathway analysis.

The Site Investigation helped to further define the extent of environmental contaminants at several sites around the island. In general, the concentrations of constituents detected during the SI are fairly low, with the exception of the petroleum hydrocarbons found at the beach in North Garrison and the dump site at Ayala Cove. The source of petroleum at these sites is uncertain due to their proximity to the island shoreline. Six petroleum sites are recommended for corrective actions, including two USTs and one AST site, and removal of three newly discovered underground tanks. Fifteen petroleum sites are recommended for closure. Ten non-petroleum sites are recommended for further investigation, and seven are recommended for closure. The Sands Springs Beach cannonball site will be turned over to the USACE Huntsville ordnance division.

This SI Report was prepared for the U.S. Army Corps of Engineers (USACE). The California Department of Toxic Substance Control (DTSC) has been designated as the lead regulatory agency for the former Fort Barry. The Regional Water Quality Control Board (RWQCB) shares state authority with respect to releases that may affect waters of the State of California.

# 1.0 INTRODUCTION

## 1.1 Purpose of the Report

T N & Associates, Inc. was tasked by the U.S. Army Corps of Engineers – Sacramento District (CESPK) to conduct an environmental investigation regarding potential contamination at Fort McDowell, Angel Island, California under Delivery Order 0003, Contract No. DACW05-00-D-0027.

The work associated with this contract is under the authority of the U.S. Army Defense Environmental Restoration Program, Formerly Used Defense Sites (FUDS), which consists of four phases: Preliminary Assessment (PA)/Site Investigation (SI), Remedial Investigation/Feasibility Study, and Remedial Actions. The objective of the program is to identify and eliminate or control the migration of contamination resulting from past Army activities and operations. The work tasks presented in this document constitute the SI phase.

The California Department of Toxic Substance Control has been designated the lead regulatory agency for Fort McDowell. Marin County shares authority with respect to petroleum releases from USTs and the Regional Water Quality Control Board (RWQCB) – San Francisco Bay Region shares state authority with respect to releases that may impact waters of the state. The regulatory Point of Contact is Chris Parent at 8800 Cal Center Drive, Sacramento, CA.

The purpose of the SI is to conduct an onsite investigation for the potential or actual release of hazardous substances, pollutants or contaminants. The investigation included soil and water sampling and geophysical surveys. This report summarizes the results of the investigation activities conducted at Fort McDowell from June 11 though 27, 2002.

## 1.2 Organization of the Report

This report begins with a summary of the background history and use of Fort McDowell, including previous environmental investigations. Information is presented on the physical setting, including geologic and hydrogeologic features, as well as present use of the site. The investigation rationale and technical approach for the SI are discussed, followed by a summary of findings for each site. Pathway and target analyses are presented for soil, groundwater, surface water, and air. Finally, conclusions and recommendations for further investigation are presented based on the pathway analysis.

# 2.0 Site Background

Fort McDowell is located on Angel Island in the San Francisco Bay, Marin County, California, approximately three miles north of the city of San Francisco (Figure 1). The island covers approximately 745 acres. The history of the island includes various military uses as well as an immigration and quarantine station. The island is currently used as a state park.

## *2.1 Installation History*

Angel Island was used by the U.S. Army from 1888 through the 1940's for various purposes including a discharge and replacement depot, and as an installation for San Francisco harbor defense. Part of the island was used as a quarantine facility and for disinfecting ships (Ayala Cove), operated by the U.S. Marine Health Service (later to become the U.S. Public Health Service). The northeast corner of the island was used as an immigration transfer center between 1905 and 1942. During World War II, this area was redesignated the North Garrison of Fort McDowell and was used for troop barracks and as a prisoner-of-war camp.

The U.S. Department of Interior (DOI), Bureau of Land Management, took over ownership of the island in 1950. In 1954, the U.S. Army established a Nike Missile Base at Point Blunt near the southeast tip of the island. This base operated until 1962.

Between 1954 and 1963, DOI granted 737.89 acres on Angel Island to the California State Parks Commission (Department of Parks and Recreation). The only portion of the island retained by the U.S. Government is a seven-acre strip of land at the end of Point Blunt, which is currently used as a U.S. Coast Guard lighthouse station.

Based on the history of the island, five separate use areas were identified: North Garrison, East Garrison, Ayala Cove, West Garrison, and Point Blunt (Figures 2 through 6). The following sections describe the activities at each of the five use areas, along with the findings of the Preliminary Assessment.

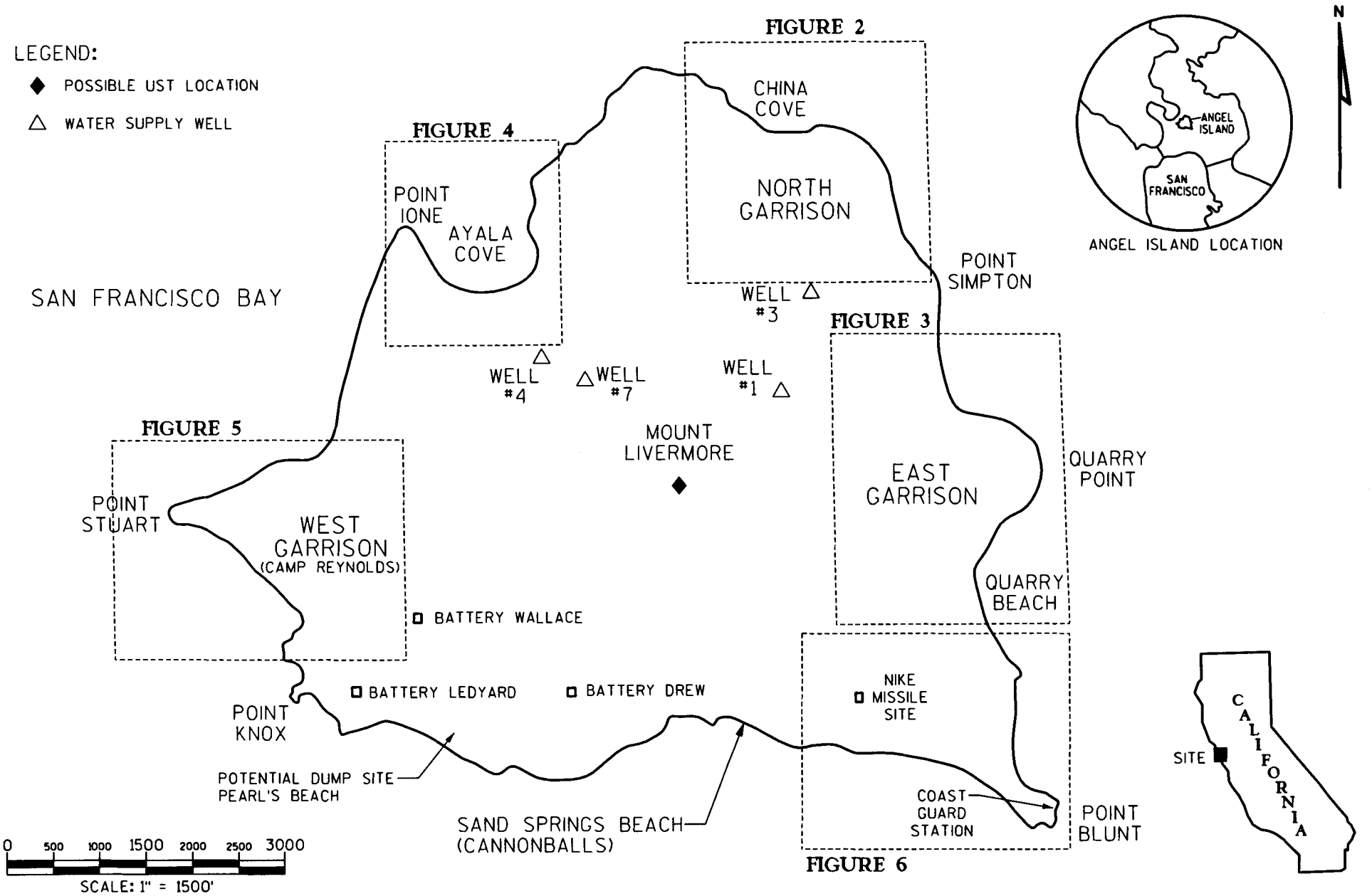
### 2.1.1 North Garrison



Photo 1 – North Garrison Central Heating Plant

The North Garrison, originally known as China Cove, is located in the northeast corner of the island (Figure 2). The site was used as an immigration detention station for Asian immigrants starting in 1905. In 1941, the land was transferred to the Army, and redesignated as the North Garrison of Fort McDowell. Army uses included troop barracks and a prisoner-of-war camp.

Potential source areas identified during the PA include a former ship fueling area with possible beach contamination, four former underground storage tank (UST) locations, six possible remaining USTs, four aboveground storage tanks (ASTs), a rifle range, and a pistol range.



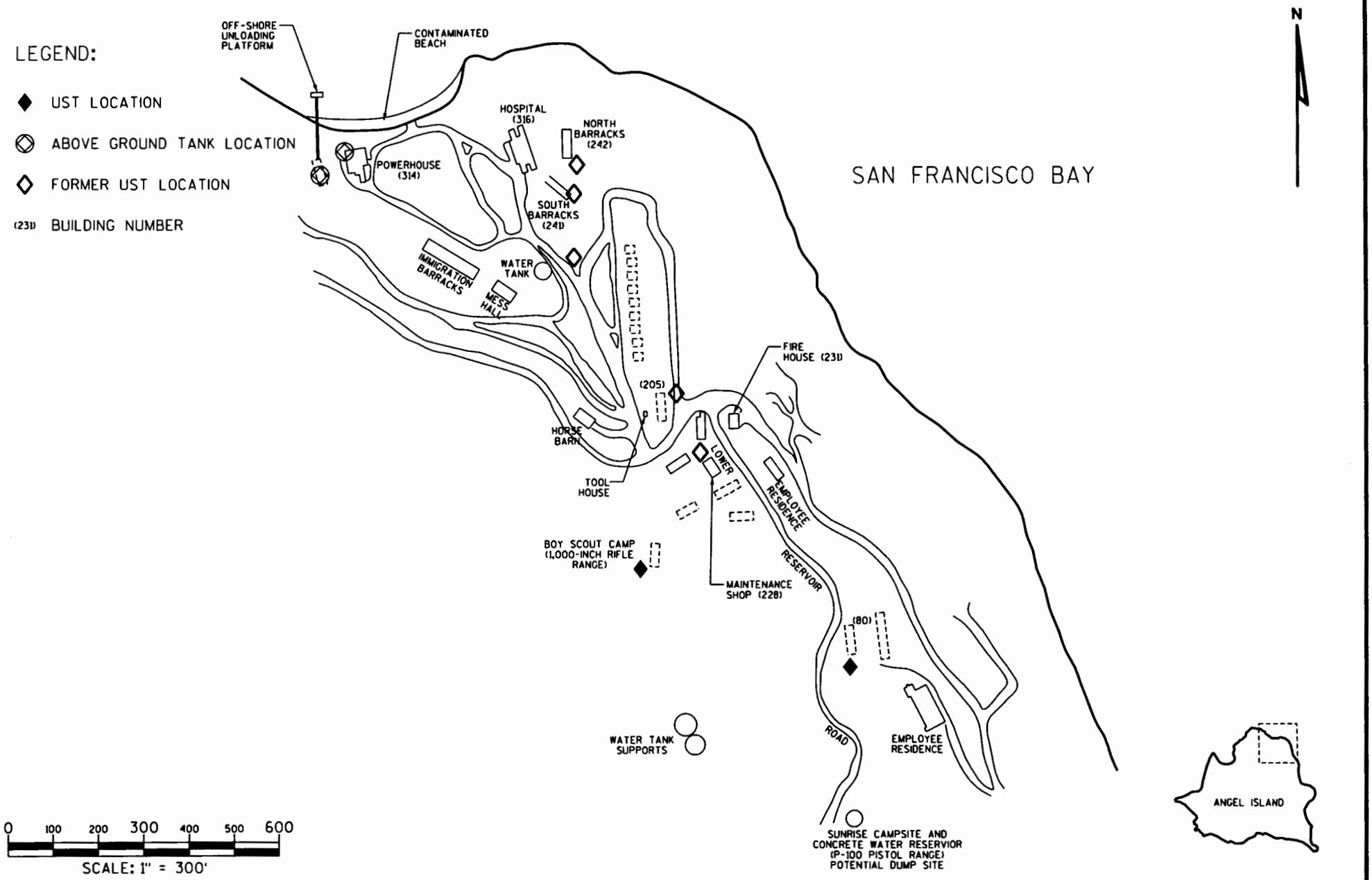

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FIGURE 1
SITE MAP
FORT McDOWELL (ANGEL ISLAND)

| | |
|---|---|
| DSGN | MB |
| DR | MP |
| CHK | MB |
| PROJ ID | 2001070 |

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# FIGURE 2
# SITE MAP
# NORTH GARRISON

| | |
|---|---|
| DSGN | MB |
| DR | MP |
| CHK | MB |
| PROJ ID | 2001070 |

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SI activities were completed at each of these sites. A possible dump site was identified near the pistol range after the PA was complete. This dump site will be investigated in the next investigation phase.

A UST near the Park Maintenance Warehouse was removed in the fall of 2000 (Figure 2). Because soil sampling conducted during tank removal activities did not indicate the presence of petroleum contamination, the site will be recommended for closure. No further investigation is recommended for this UST at this time, pending closure acceptance by the regulatory agencies.

### 2.1.2 East Garrison

East Garrison was established in 1907. The garrison was used during World War I as a recruit depot and during World War II as a debarkation and receiving point for troops sent to the Pacific Theater. The garrison included barracks, a hospital, motor pool area, gymnasium, incinerator, and several administrative buildings (Figure 3).

Potential source areas identified during the PA include the former motor pool area (hazardous waste drum storage area, vehicle lift rack, oil change rack, incinerator, wash rack, an electrical equipment storage area, and a former UST location), two possible remaining USTs, two 30,000-gallon ASTs, a former photo shop, an electrical substation, and a former transformer pad. SI activities were conducted at each of these locations.

An underground gasoline tank, located east of the Engineer's Shop and Garage, Building 130, was removed in the fall of 2000 (Figure 3). Because soil sampling conducted during tank removal activities did not indicate the presence of petroleum contamination, the site will be recommended for closure. No further investigation was conducted at this time, pending closure acceptance by the regulatory agencies.

### 2.1.3 Ayala Cove

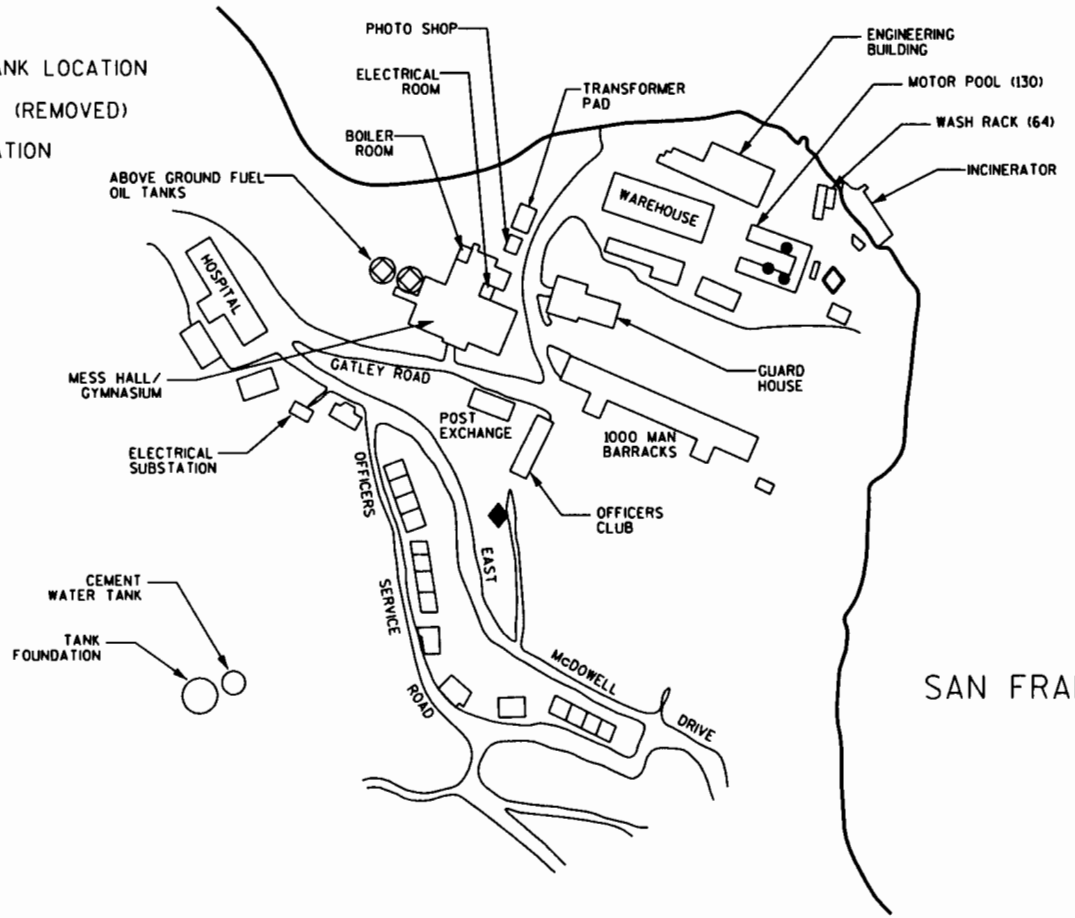
Ayala Cove is located south of the present State Parks boat launch area (Figure 4). The area was used as a quarantine station, which was established in 1892 by the U.S. Marine Health Service (later to become the U.S. Public Health Service). An extensive ship and baggage disinfection operation operated at the cove. The U.S. Army reportedly used the site during war times and took back ownership in 1952. The majority of the buildings in this area were demolished after the area was conveyed to the Park Service in 1954 (Ref. 1). The four remaining buildings in this area are used by the Park Service as a Visitor's Center and residences for park employees.

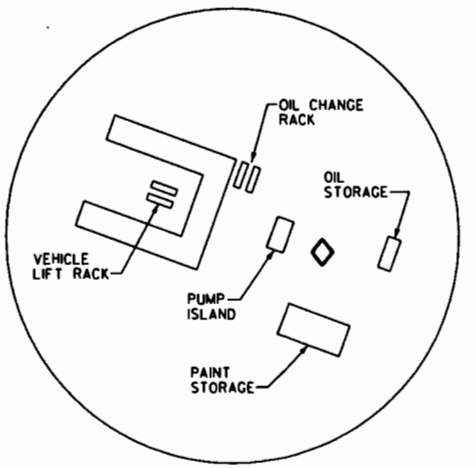
Potential source areas identified in the PA include four former UST locations, three former AST locations, a former disinfection building, and a possible dumpsite. SI activities were completed at each of these locations.

A UST at a residence in Ayala Cove, Building 239, was removed in the fall of 2000. Because soil sampling conducted during tank removal activities did not indicate the presence of petroleum contamination, the site will be recommended for closure. No further investigation was completed at this time, pending closure acceptance by the regulatory agencies.

LEGEND:

- ◆ UST LOCATION
- ⊘ ABOVE GROUND TANK LOCATION
- • 55 GALLON DRUMS (REMOVED)
- ◇ FORMER UST LOCATION
- (130) BUILDING NUMBER




MOTOR POOL DETAIL




0 100 200 300 400 500 600

SCALE: 1" = 300'

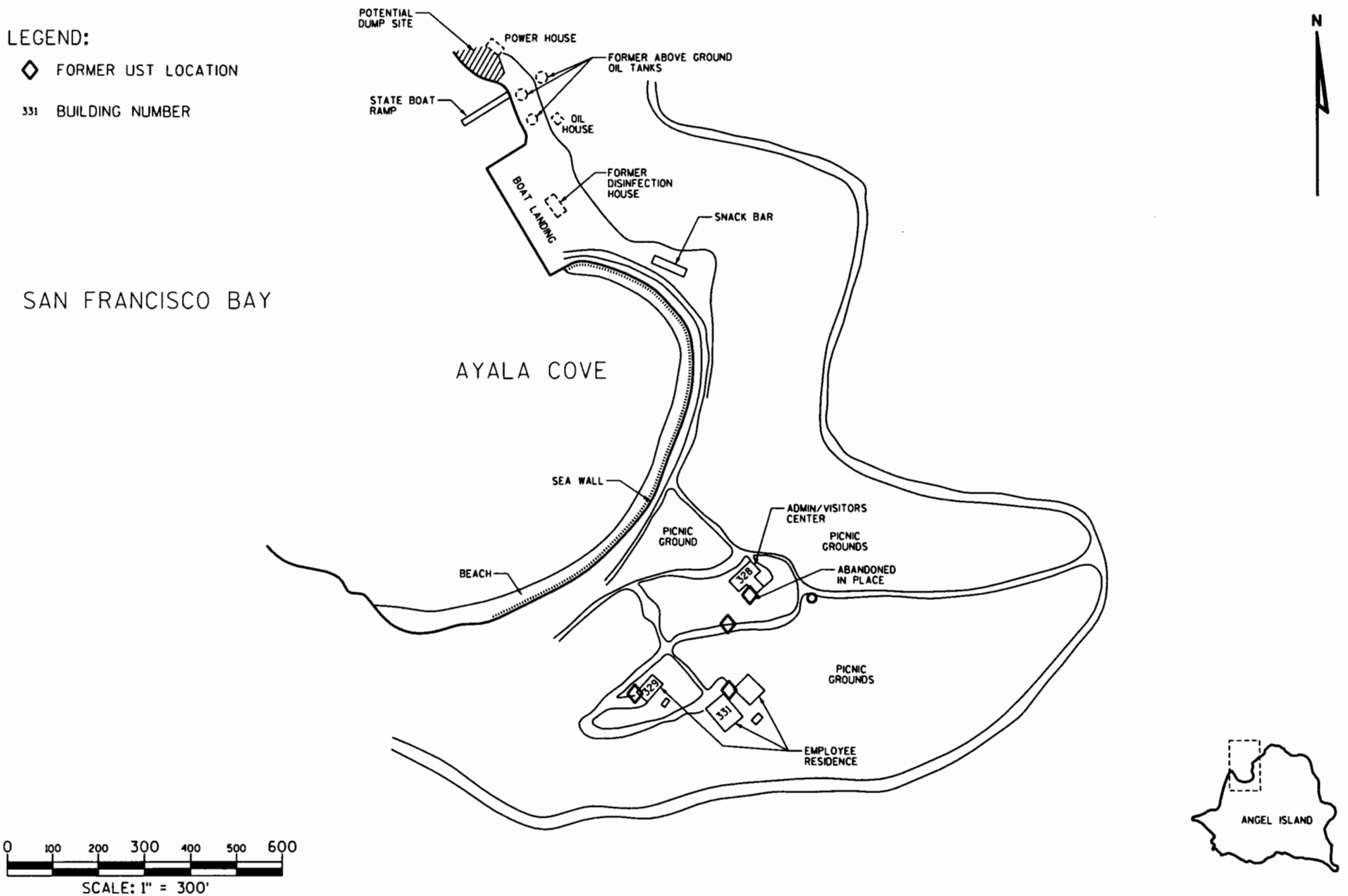
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# FIGURE 3
# SITE MAP
# EAST GARRISON

| | |
|---|---|
| DSGN | MB |
| DR | MP |
| CHK | MB |
| PROJ ID | 2001070 |

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FIGURE 4
SITE MAP
AYALA COVE

| | |
|---|---|
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| DR | MP |
| CHK | MB |
| PROJ ID | 2001070 |

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## 2.1.4 West Garrison

The West Garrison, also known as Camp Reynolds, was established in 1850 and used by the Army during the Civil War era for the receipt and distribution of new recruits bound for the west (Ref. 2). Several barracks buildings and a hospital are located in this area. Several gun batteries, including Battery Wallace, Battery Ledyard, and Battery Drew were established for defense of the bay and are located southeast of the West Garrison (Figure 5).

Potential source areas identified during the PA include a possible dumpsite in the parade grounds, a possible UST at the lighthouse, and a paint shop. SI Activities were conducted at each of these locations.

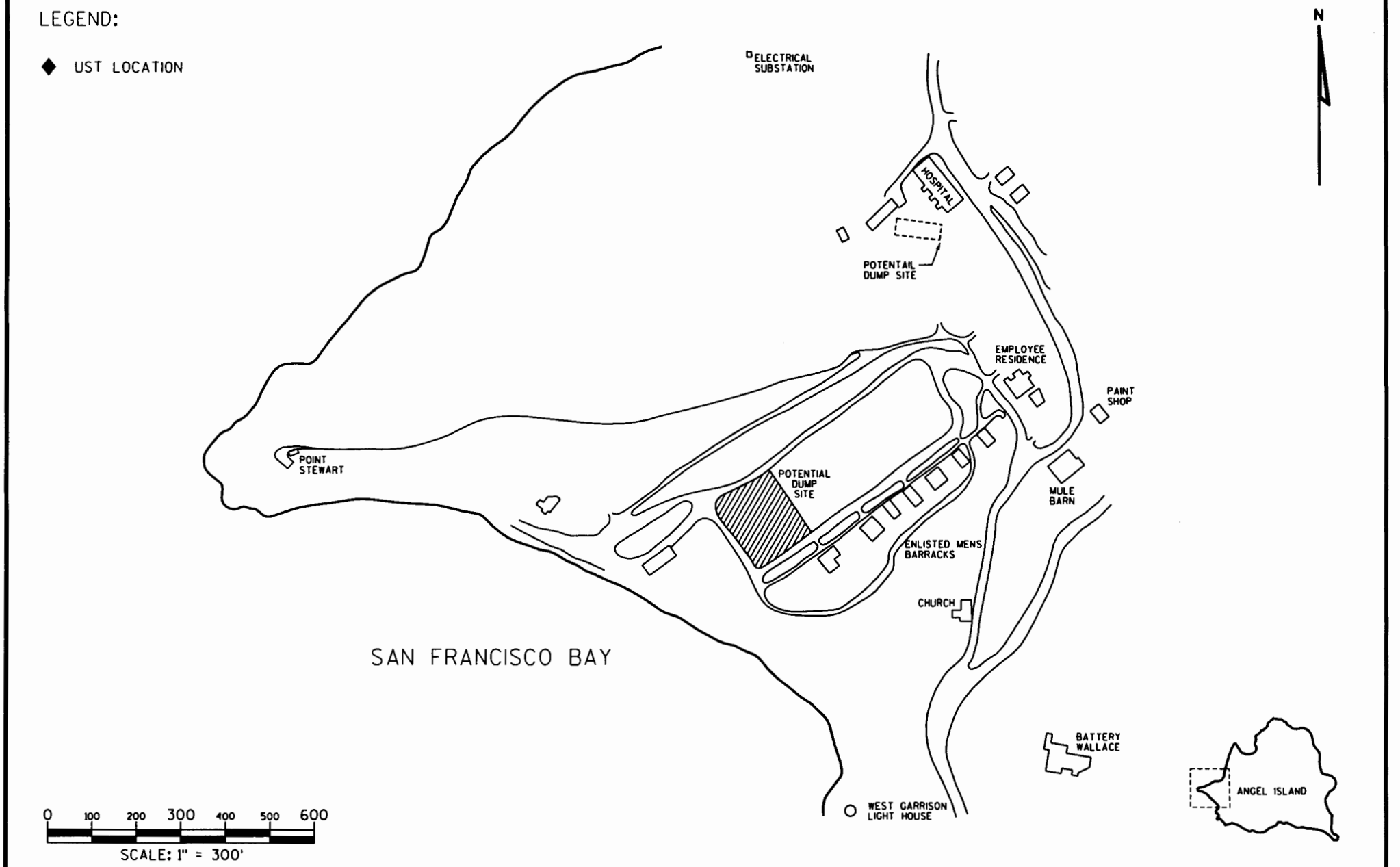
Two additional possible dump sites were identified near the West Garrison after the PA was complete. One is located near the West Garrison Hospital, and the second is at Pearl's Beach (Figures 1 and 2). These two dump sites will be investigated during the next phase of the investigation .

## 2.1.5 Point Blunt

A gun battery was constructed on Point Blunt in 1864, but reportedly slid into the water in 1869 (Ref. 3). In 1954, the U.S. Army established a Nike Missile Base at Point Blunt (Figure 6). Approximately 100 men were stationed at the base, and occupied buildings in the East Garrison. The base was in operation until 1962. A seven-acre strip of land on the southeast tip of the island is currently used a U.S. Coast Guard lighthouse station.

Potential source areas identified during the PA include a possible cannonball disposal site, and two possible remaining USTs. SI activities were conducted at each of these locations.

The Nike Missile facility located near Point Blunt consists of three missile magazines, a generator building, missile refueling area, missile assembly building, and sentry building. An Inventory Project Report prepared in November 1990 for Nike Battery 91 indicated the presence of 25 rusted 55-gallon drums in the refueling area (Ref. 9). The 55-gallon drums were moved to the motor pool in East Garrison and disposed of in 1994. Soil sampling was conducted at the refueling area in 1992 and again in 1997. No further action was recommend based on the sample results, and DTSC issued a closure letter on November 25$^{th}$, 1998 (Ref. 10, 11). A Nike CON/HTRW Project (No. J09CA0943) was conducted to remove the hydraulic fluids, USTs and associated pipelines between July and December 1995. No documentation of the UST and hydraulic closure was located during the PA. Because the Nike Missile facility is a separate FUDS site, it was not addressed in this PA/SI.



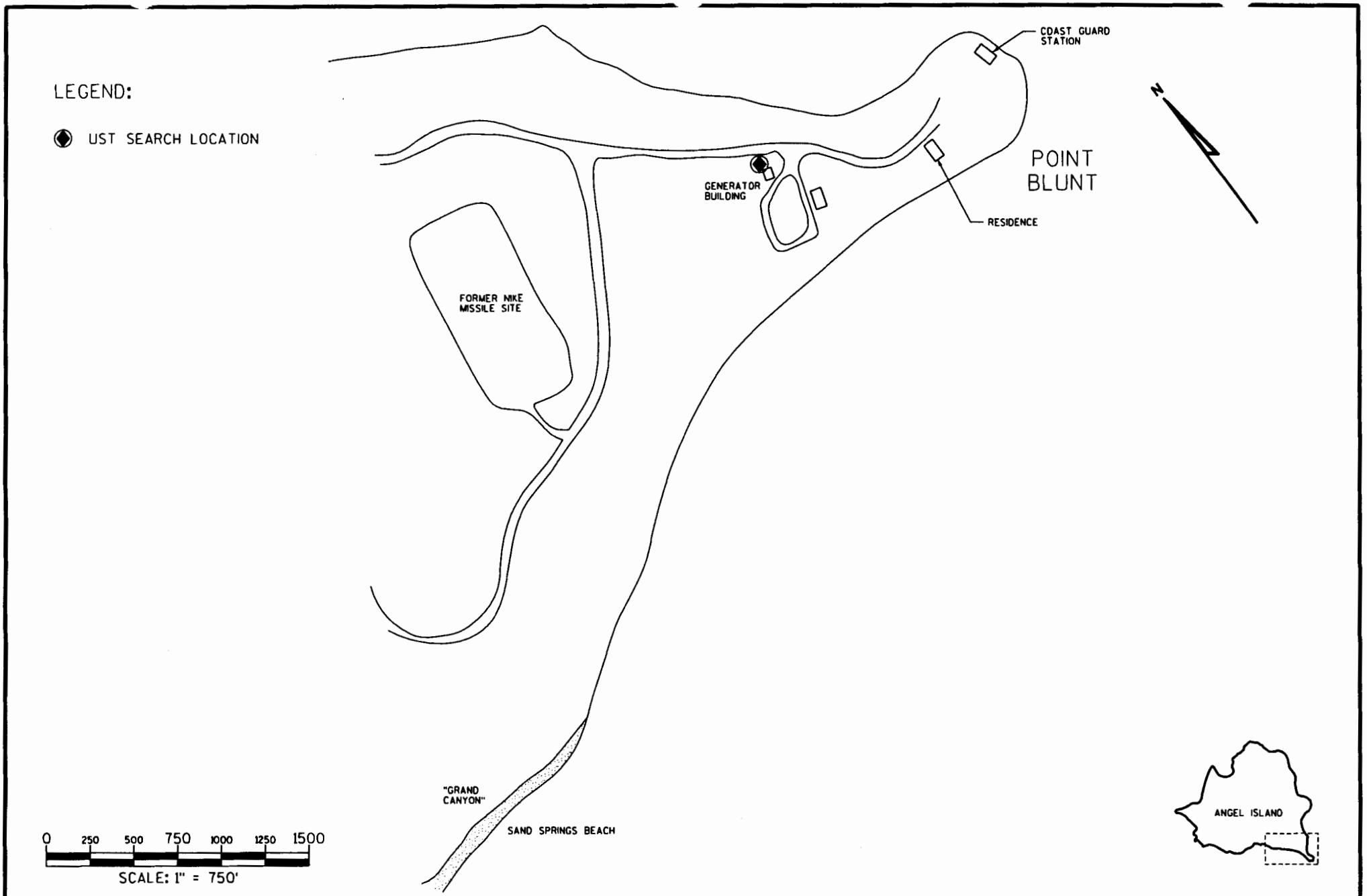

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# FIGURE 5
# SITE MAP
# WEST GARRISON

| | |
|---|---|
| DSGN | MB |
| DR | MP |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure05.dgn

DATE: 12/04/2002




TN & Associates, Inc.
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FIGURE 6
SITE MAP
POINT BLUNT

| | |
|---|---|
| DSGN | MB |
| DR | MP |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure06.dgn

DATE: 12/04/2002

## 2.2 Previous Investigation Activities

A number of previous environmental studies and actions have been conducted at Angel Island, as listed below: Summaries of previous sample results are shown on the figures in Appendix A.

**Preliminary Assessments and Reports** – Preliminary assessments and site visits have been conducted to assess the potential contamination left by military use of the island, as presented in the following reports:

- USACE, *Defense Environmental Restoration Program, Formerly Used Defense Sites, Inventory Project Report, Fort McDowell, Marin County, Site Number J09CA0980500,* January 1992 (Revised August 1995).

- USACE, *Defense Environmental Restoration Program, Formerly Used Defense Sites, Archives Search Report Conclusions and Recommendations, Fort McDowell/Angel Island, Marin County, Site Number J09CA0980500,* March 1994.

- USACE, *Trip Report, Fort McDowell (Angel Island State Park) Marin County, California,* CESPK-00-RV-FO, August 1998.

**Screening Assessment, Drum Storage Area** – A screening level assessment was conducted in 1997 to evaluate possible soil contamination from barrels of waste collected from around the island and stored in Motor Pool Building 130. The drums were removed for disposal. Soil samples collected beneath Building 130 during the screening level assessment were analyzed for TPH-D, TRPH, VOCs, PCBs, SVOCs, and metals. The results of the 1997 assessment are detailed in the following reports:

- State of California Department of Parks and Recreation, Park Services, *Work Plan for Angel Island Motor Pool*, November 20, 1997.

- State of California Department of Parks and Recreation, *Quality Assurance Project Plan, Angel Island East Garrison Motorpool,* 1997.

- USACE, *Screening Assessment Report, East Garrison Motorpool Drum Storage Area, Angel Island State Park, Marin County, California*, February 1998

**Limited Scope Site Investigation** – A limited scope investigation was conducted in 1999 to assess possible contamination at a beach in North Garrison, and the incinerator, oil change rack, and vehicle lift rack at the motor pool in East Garrison. Results are presented in the follow report:

- USACE, *Limited Scope Site Investigation for Fort McDowell/Angel Island, Marin County,* Draft Submittal, March 2000.

**Underground Storage Tanks** – An underground storage tank removal program was conducted from 1998 to 2001. A total of nine USTs have been removed, and one has been abandoned in place. Details of the tank removal and abandonment activities and associated sampling are presented in the following reports:

- Norcal Geophysical Consultants, Inc., *Geophysical Survey Results*, September 1998.
- State of California Department of General Services, *Report of Underground Storage Tank Closure, Angle Island State Park, Marin County, California*, November 3, 2000.

# 3.0 Physical Characteristics of the Investigation Area

## *3.1 Geologic Setting*

The site is situated in the Coast Ranges physiographic province of California, characterized by northwest-trending mountains and valleys. The Coast Ranges include sedimentary, igneous rocks, and metamorphic rocks of the Franciscan Formation Complex. The Coastal Ranges mountain building period ended with the activation of the right-lateral, strike-slip San Andreas Fault, and the Hayward fault. The San Andreas Fault is approximately 12 miles west of the site; the Hayward fault is approximately 15 miles east of the site (Ref. 4).

Angel Island is primarily composed of San Francisco Sandstone, which exists in a synclinal trough with its axis pitched approximately northwest (Figure 7). Beds of serpentine, andesite, and fourchite (volcanic rock) follow the general bedding of the sandstone, with locally intense zones of contact metamorphic rock (Ref. 5).

### 3.1.1 Soil

The soils of Angel Island can be divided into three types, depending upon their parent materials:

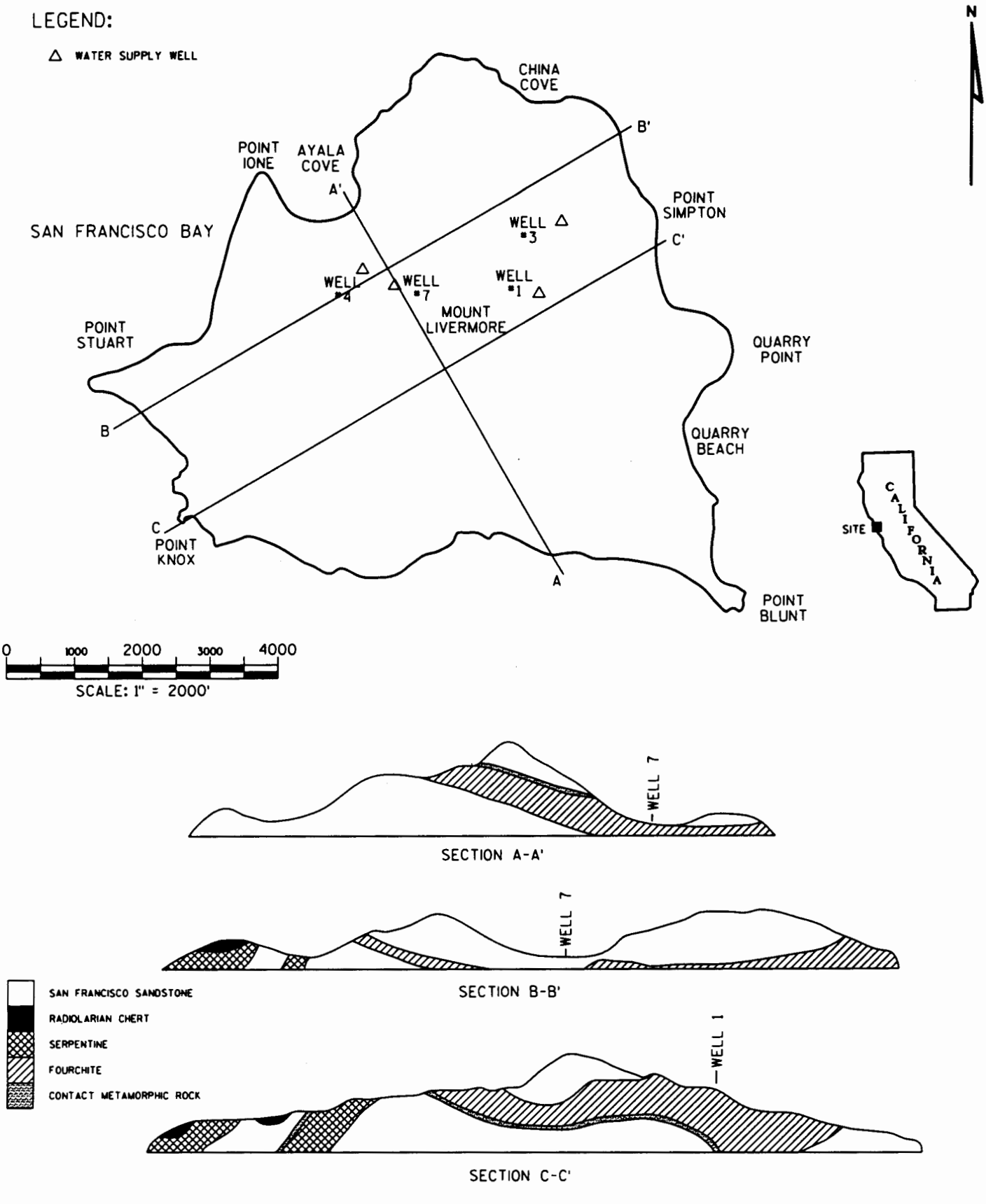
- Soils formed from sandstone and/or shales form the majority of soils on the island. The surface layers consist of silty, clayey sands or silty sandy clays below which are silty, clayey sands or silty, sandy clays. They can be shallow to moderately deep as bedrock ranges from 10-40" below the surface. These soils have moderately rapid permeability with very rapid runoff, making them highly susceptible to water erosion.

- Soils formed from andesite make up a significant portion of the total soils on the island. The surface soils (0-12") range from silty, clayey sand or silty, sandy clay to a silty, sandy clay overlying gravelly silty sandy clay to a depth of 30". Fractured andesite ranges from 20-40" deep. Permeability is moderately slow with rapid-runoff, making a high erosion hazard by water.

- The last type of soil consists of actual rock outcrop areas. These areas are long, narrow rocky beaches rising abruptly along the coasts and along inland terraces. The types of rocks include sandstone, slate, serpentinite, and chert. These areas are subject to sloughing.

### 3.1.2 Groundwater

Angel Island is surrounded by water of the San Francisco Bay. Fresh water flowing through the Bay Area is supplied by a drainage area of about 63,000 square miles, or about 40% of the surface area of the state (Ref. 6). Fresh water on Angel Island is stored in fractured bedrock and alluvial deposits, and currently tapped by four active wells and one reserve well (Ref. 6). Two wells are located in the north central area of the island, and two are near Ayala Cove (Figure 7). Well details are shown in Table 3-1.




Source: Ransome, F. Leslie, *The Geology of Angel Island, 1897.*

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FIGURE 7
CROSS SECTIONS
FORT McDOWELL (ANGEL ISLAND)

DSGN ME
DR MF
CHK ME
PROJ ID 200107(

FILE NAME: D:\C1V1\USTA\2001070\figure07.dgn

DATE: 10/04/01

**Table 3-1**
**Water Well Details**

| Well No. | Total Depth (feet) | Ground Elevation (feet) | Perforation Depth (feet) | Standing Water Level (feet) | Pumping Level (feet) |
|---|---|---|---|---|---|
| 1 | 259 | 368 | Unknown | Unknown | Unknown |
| 3 | 300 | 250 | 120-140,160-260, 280-300 | Unknown | Unknown |
| 4 | 302 | Unknown | 110-200, 205-302 | Unknown | 60 |
| 6 (inactive) | 300 | 120 | 87-200 | Unknown | Unknown |
| 7 | 300 | 90 | 78-200 | 8 | 90 |

Fresh water is also located in perched zones that surface as seasonal natural springs throughout the island.

### 3.1.3 Surface Water

No natural surface water bodies such as ponds or streams exist on the island, with the exception of surface springs as described above. One small man-made reservoir is located north of the West Garrison near the quarry rock crusher. Drainage channels have been constructed around the island to allow drainage of rainwater into the San Francisco Bay. Surface springs historically used for drinking water were located near West Garrison and near Wells 1 and 3 (Ref. 6). The intermittent springs are no longer used for drinking water.

## *3.2 Natural Resources*

Flora and fauna on Angel Island includes both native species and those introduced by military and other occupants. Native plants include oak, bay and madrone trees, sagebrush, chamise, manzanita, toyon, elderberry, and coyote brush. Eucalyptus, Monterey pine, Douglas fir, Monterey cypress, black locust, Australian tea trees, Portuguese cork oaks and other trees and shrubs were introduced by the military occupants (Ref. 7). Animal life includes seals, sea lions, deer, and raccoons. Birds include robins, scrub jays, sparrows, juncos, hummingbirds, flickers, hawks, owls, sea gulls, ducks, egrets, grebes, scoters, and kingfishers, as well as blue herons, pelicans (both brown and white), and many other waterfowl (Ref. 7).

According to Mr. Dave Boyd, State Park Service Ecologist, there is one California listed species existing at Angel Island. The Angel Island Mole; *scapanus latimanus insularis,* lives in the grassy lawn areas of the island. The species has a Department of Fish and Games NDDB rank of G5T1S1, which corresponds to species that are federally defined as demonstrably secure and commonly found throughout its historic range, and defined by the state as only found in California and extremely endangered within California.

## *3.3 Climatology*

Angel Island temperatures range from an average maximum temperature of 65° F, to an average low of 48° F (Ref. 6). Precipitation on Angel Island is approximately 20 inches per year (Ref. 6). The seasonal averages are as follows:

**Climatology Data – Angel Island**

| | Mean Precipitation (inches) | Average High (°F) | Average Low (°F) |
|---|---|---|---|
| *Annual* | *19.97* | *65* | *48* |
| Winter | 11.09 | 58 | 44 |
| Spring | 4.53 | 66 | 49 |
| Summer | 0.28 | 72 | 54 |
| Fall | 4.08 | 63 | 47 |

Note: Data from 1998-2001.

## 3.4 Demography and Land Use

Historically, Fort McDowell activities took place over the entire island. The island is currently designated and used as the Angel Island State Park. Approximately 30 employees work at the park as Park Rangers, maintenance personnel, docents, and vendors, including 15 permanent residents. The residents live in the historic buildings in Ayala Cove, the former officer's quarters in East Garrison, and at Point Blunt. An active Coast Guard station operates at Point Blunt as well, with a limited number of personnel onsite.

Up to 400,000 people visit the Park each year. Hiking, bicycling, and camping are popular. Much of the island is accessible to the public, with the exception of the Nike Missile Site and the Motor Pool area.

## 3.5 Summary of Potential Source Areas

Tables 3-2 through 3-6 list the potential source areas in each of the five use areas, including the approximate size of the source and potential constituents. Figures A1 through A28, located in Appendix A, show the layouts of each source area, along with a conceptual site model drawing and summary of previous sampling efforts.

# Table 3-2
# Summary of Potential Source Areas
# North Garrison

| Location | Potential Source | Size | Potential Constituents |
|---|---|---|---|
| Beach Area | Former ship fueling operations (Figure A1) | 30,000 square feet (500' x 60') at a depth of 4 to 6 feet bgs | Petroleum Hydrocarbons – diesel |
| Barracks Building 241 | Former UST location (Figure A2) | 500-gallon heating oil | Petroleum Hydrocarbons – diesel |
| Barracks Building 242 | Former UST Location (Figure A3) | 300-gallon heating oil | Petroleum Hydrocarbons – diesel |
| East of the water tank | Former UST Location (Figure A4) | 500-gallon heating oil | Petroleum Hydrocarbons – diesel, BTEX |
| Building 205 | Former UST Location (Figure A5) | 500-gallon heating oil | Petroleum Hydrocarbons – diesel, BTEX |
| Hospital, Building 316 | Two possible USTs (Figure A6) | Unknown | Petroleum Hydrocarbons - diesel, BTEX |
| Fire House, Building 231 | Possible UST (Figure A7) | Unknown | Petroleum Hydrocarbons – diesel, BTEX |
| Building 80, west of Park Residence | Possible UST (Figure A8) | Unknown | Petroleum Hydrocarbons – diesel, BTEX |
| Behind Central Heating Plant, Building 314 | ASTs (Figure A9) | Unknown | Petroleum Hydrocarbons – diesel, BTEX |
| 1,000-inch Rifle Range / Boy Scout Camp | Possible UST (Figure A10) | Unknown | Petroleum Hydrocarbons – diesel, BTEX |
| | Rifle Range (Figure A11) | Approximately 100' x 100' | Metals, Bulk small arms ammunition |
| P-100 Pistol Range / Sunrise Campsite | P-100 Pistol Range (Figure A12) | Approximately 100' x 100' | Metals, Bulk small arms ammunition |
| | Possible Dump Site (Figure 2) | Unknown | Petroleum Hydrocarbons<br>VOCs<br>Metals<br>PCBs/Pesticides<br>Cyanide<br>SVOCs |
| Park Maint. Warehouse, Building 228 | Former UST (Figure 2) | 2000-gallon unleaded gasoline | Petroleum Hydrocarbons |

# Table 3-3
# Summary of Potential Source Areas
# East Garrison

| Location | Potential Source | Size | Potential Constituents |
|---|---|---|---|
| Motor Pool Area | Hazardous Waste Drum Storage Area (Figure A13) | Approximate 20' x 20' area inside building | PCBs<br>Metals<br>SVOCs, VOCs |
| | Vehicle Lift Rack (Figure A14) | 10' x 20' | PCBs<br>Metals<br>Petroleum hydrocarbons<br>SVOCs |
| | Oil Change Rack (Figure A15) | 20' x 40' | PCBs<br>Metals<br>Petroleum Hydrocarbons<br>SVOCs |
| | Incinerator (Figure A16) | 20' x 30' | PCBs<br>Metals<br>Petroleum Hydrocarbons<br>SVOCs |
| | Warehouse and Engineer's Building (Figure 3) | Misc electrical equipment | PCBs |
| | Wash Rack at Building 64 (Figure A17) | 30' x 40' | PCBs<br>Metals<br>Petroleum Hydrocarbons<br>SVOCs<br>VOC |
| | Former UST (Figure 3) | 10,000-gallon gasoline | Petroleum Hydrocarbons |
| Southeast of Post Exchange | Possible UST (Figure A18) | Unknown | Petroleum Hydrocarbons – Diesel, BTEX |
| Northwest of Gymnasium | Photo Shop (Figure A20) | 10' x 12' | Metals<br>SVOCs |
| Gymnasium basement | Transformers (Figure 3) | Two transformers, 5 to 10 gallons | PCBs |
| East of Hospital | Electrical Substation (Figure A20a) | 15' x 20' | PCBs |
| Power Plant west of Gymnasium | ASTs (Figure A19) | 30,000-gallon<br>31,000-gallon | Petroleum Hydrocarbons – Diesel, BTEX |
| Northwest of Gymnasium | Former Boiler Stack Location (Figure A19) | Approx. 150' x 100' | Metals |
| Transformer pad | Former transformer location (Figure A20) | 12' x 12' pad surrounded by fence. | PCBs |
| Deer Pen Tank, Building 64 | Possible UST (Figure A17) | Unknown | Petroleum hydrocarbons – diesel, BTEX |

# Table 3-4
# Summary of Potential Source Areas
# Ayala Cove

| Location | Potential Source | Size | Potential Constituents |
|---|---|---|---|
| Visitor's Center, Building 328 | Former UST Location – Abandoned in place (Figure 4) | Unknown | Petroleum Hydrocarbons – Diesel, BTEX |
| Residence Area, southwest of Visitor's Center | Former UST Location (Figure A21) | 1,000-gallon heating oil | Petroleum Hydrocarbons – Diesel<br>BTEX |
| Residence, between Buildings 331 and 332 | Former UST Location (Figure A22) | Unknown | Petroleum Hydrocarbons – Diesel<br>BTEX |
| Near State Boat Ramp | Three former ASTs (Figure A23) | Unknown | Petroleum Hydrocarbons – Diesel<br>BTEX |
| Near Ferry Landing Area | Former disinfection building (Figure A24) | Approximately 30' x 40' | Cyanide<br>Pesticides |
| North of Boat Dock | Possible dump site (Figure A25) | Approximately 40' x 100' | Petroleum Hydrocarbons<br>VOCs<br>Metals<br>PCBs/Pesticides<br>Cyanide<br>SVOCs |
| Park Residence, Building 329 | Former UST (Figure 4) | 1,000-gallon heating oil | Petroleum Hydrocarbons |

## Table 3-5
## Summary of Potential Source Areas
## West Garrison

| Location | Potential Source | Size | Potential Constituents |
|---|---|---|---|
| Parade grounds near flagpole | Possible Dump Site (Figure A26) | Approximately 200' x 400' | Petroleum Hydrocarbons<br>VOCs<br>Metals<br>PCBs/Pesticides<br>Cyanide<br>SVOCs |
| West Garrison Lighthouse | Possible UST (Figure 1) | Unknown | Petroleum Hydrocarbons |
| Northeast of Officer's Quarters | Former Paint Shop (Figure A26a) | Approximately 150' x 100 | Metals |
| Pearl's Beach | Possible Dump Site (Figure 1) | Unknown | Petroleum Hydrocarbons<br>VOCs<br>Metals<br>PCBs/Pesticides<br>Cyanide<br>SVOCs |
| Near Hospital | Possible Dump Site (Figure 5) | Unknown | Petroleum Hydrocarbons<br>VOCs<br>Metals<br>PCBs/Pesticides<br>Cyanide<br>SVOCs |

## Table 3-6
## Summary of Potential Source Areas
## Point Blunt

| Location | Potential Source | Size | Potential Constituents |
|---|---|---|---|
| Sand Springs Beach, "Grand Canyon" | Possible cannonball disposal area (Figure A27) | Approximately 6 acres | Ordnance |
| Nike Battery Generator Pad | Possible UST (Figure A28) | Unknown | Petroleum Hydrocarbons – Diesel |
| Mount Livermore IFC (Nike Control Station) | Possible UST (Figure 1) | Unknown | Petroleum Hydrocarbons - Diesel |

# 4.0 PROJECT OBJECTIVES

The purpose of the SI is to conduct an onsite investigation for the potential or actual release of hazardous substances, pollutants or contaminants. The investigation included soil and water sampling and geophysical surveys. Recommendation of remedial actions or no further action determinations based on the data collected during the SI and are summarized in Section 8.0.

## *4.1 Comparison Criteria*

The analytical results were compared to compound-specific regulatory concentrations to aid in developing the recommendations for each site. The sources of the comparison values are listed in Table 4-1. Compound-specific comparisons values are listed in the analytical results tables in Appendix B.

**Table 4-1**
**Comparison Values for Soil and Water**

| Analysis | Comparison Criteria | Source |
|---|---|---|
| VOCs – EPA 8260B<br>SVOCs – EPA 8270C<br>Pesticides – 8081A<br>Cyanide– E335.2 | **Soil** – Residential Preliminary Remediation Goals (PRGs)<br>**Water** –Maximum Contaminant Levels (MCLs) | **Soil** - U.S. EPA Region IX Website, http://www.epa.gov/Region9/waste/sfund/prg/index.html<br>**Water** - California MCLs are compiled from California Department of Health Services website, http://www.dhs.ca.gov/org/ps/ddwem/chemicals/MCL/primarymcls.htm January 2001. |
| Metals – EPA 6010B | **Soil** – Residential PRGs – SF RWQCB ambient levels<br>**Water** – MCLs | **Soil** - Same as above, with San Francisco Regional Water Quality Control Board (SF RWQCB) ambient metals data (Ref. 13).<br>**Water** – Same as above. |
| TPH-D, -G, -MO – EPA 8015B | **Soil** – Risk Based Screening Levels (RBSLs)<br>**Water** – MCL | **Soil** – RBSL - Risk-Based Screening Levels for petroleum hydrocarbons, SFRWQCB. (Ref.13)<br>**Water** – Same as above. |
| PCBs – EPA 8082 | **Soil** – Residential PRGs<br>**Water** –MCLs<br>**Product** – PCB criteria | **Soil** – Same as above.<br>**Water** – Same as above.<br>**Product** – Definition of "PCB-Contaminated" 40 CFR Sec 761.3 |

Table 4-2 lists the RBSLs for petroleum hydrocarbons as detailed in *The Application of Risk-Based Screening Levels and Decision Making To Sites With Impacted Soils And Groundwater, Interim Final, SFRWQCB,* December 2001 (Ref.13) For most sites, the RBSL levels for surface soil where groundwater is a not a potential or current source of drinking water were used, due to the fact that most UST and AST sites are located near the perimeter of the island, in areas most

likely underlain with seawater encroachment. However, each site was evaluated separately based on individual site conditions, as reflected in the pathway analysis in Section 6.0.

**Table 4-2**
**Risk Based Screening Levels for Petroleum Hydrocarbons**

| | Soil Residential (mg/kg) | Soil Commercial/ Industrial (mg/kg) | Groundwater (Drinking Water) (ug/L) |
|---|---|---|---|
| **Surface Soils (<3m bgs) where groundwater *is* a potential source of groundwater.** | | | |
| TPH-Gasoline | 100 | 100 | 100 |
| TPH-middle distillates (diesel) | 100 | 100 | 100 |
| TPH-residual fuels (motor oil) | 500 | 1000 | 100 |
| **Surface Soils (<3m bgs) where groundwater *is not* a potential source of groundwater.** | | | |
| TPH-Gasoline | 400 | 500 | 500 |
| TPH-middle distillates (diesel) | 500 | 500 | 640 |
| TPH-residual fuels (motor oil) | 500 | 1000 | 640 |
| **Subsurface Soils (>3m bgs) where groundwater *is* a potential source of groundwater.** | | | |
| TPH-Gasoline | 100 | 100 | 100 |
| TPH-middle distillates (diesel) | 100 | 100 | 100 |
| TPH-residual fuels (motor oil) | 1000 | 1000 | 100 |
| **Subsurface Soils (>3m bgs) where groundwater *is not* a potential source of groundwater.** | | | |
| TPH-Gasoline | 400 | 400 | 500 |
| TPH-middle distillates (diesel) | 500 | 500 | 640 |
| TPH-residual fuels (motor oil) | 1000 | 1000 | 640 |

Source: SF RWQCB, 2002 (Ref. 13).

## 4.2 Ambient Metals Concentrations

Metal analyses were conducted on samples from several sites in order to assess the presence of metals in the soil and water that may have been caused by past military use of the property. As with any metals analysis of soil, care must be taken to distinguish between ambient metals concentrations caused by natural mineral sources, and concentrations attributed to property use. To this end, the concentrations of metals found in samples collected during the investigation were first compared to the residential PRGs as discussed in Section 4.1. For those samples with metals concentrations over the residential PRGs, the results were evaluated in light of the lithologic characteristics of the sample. Thus, the SI sample results were compared to ambient metals concentrations from similar lithologies in the San Francisco Bay Area. This ambient data was recently assembled for the Presidio of San Francisco for the following lithologic categories: serpentinite, colma, beach/dunes, and chert (Ref. 16). The Presidio site is approximately 5 miles southwest of Angel Island, and is located in the same Coast Range physiographic province with rocks of the Franciscan Formation Complex. The ambient data is presented in Table 4-3.

## Table 4-3
## Ambient Metals Concentrations – Presidio of San Francisco
***Source: Development of Presidio-Wide Cleanup Levels for Soil, Sediment, Groundwater and Surface Water, 2002 (Ref. 16)***

| | Trust Screening and Threshold Levels by Lithology (mg/kg) | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Serpentinite | | Colma | | Beach/Dune | | Chert/Shale | |
| Metal | *Screening Level* | *Threshold Level* | *Screening Level* | *Threshold Level* | *Screening Level* | *Threshold Level* | *Screening Level* | *Threshold Level* |
| Antimony | 3.0$^{(DL)}$ | 3.0$^{(DL)}$ | 3.0$^{(DL)}$ | 3.0$^{(DL)}$ | 3.0$^{(DL)}$ | 3.0$^{(DL)}$ | 3.0$^{(DL)}$ | 3.0$^{(DL)}$ |
| Arsenic | 2.5$^{(80th)}$ | 5.4$^{(95th)}$ | 3.9$^{(UCL80)}$ | 6.2$^{(UCL95)}$ | 3.9$^{(UCL80)}$ | 5.9$^{(UCL95)}$ | 2.5$^{(DL)}$ | 3.2$^{(DL)}$ |
| Barium | 100$^{(80th)}$ | 230$^{(95th)}$ | 99$^{(UCL80)}$ | 180$^{(UCL95)}$ | 54$^{(UCL80)}$ | 120$^{(UCL95)}$ | 310$^{(UCL80)}$ | 900$^{(UCL95)}$ |
| Beryllium | 0.50$^{(DL)}$ | 1.1$^{(Max)}$ | 0.46$^{(UCL80)}$ | 0.99$^{(UCL95)}$ | 0.52$^{(UCL80)}$ | 0.89$^{(UCL95)}$ | 0.2$^{(DL)}$ | 0.72$^{(UCL95)}$ |
| Cadmium | 0.80$^{(DL)}$ | 1.9$^{(Max)}$ | 0.80$^{(DL)}$ | 0.8$^{(DL)}$ | 0.80$^{(DL)}$ | 1.7$^{(Max)}$ | 0.80$^{(DL)}$ | 1.7$^{(Max)}$ |
| Chromium | 1,300$^{(80th)}$ | 1,700$^{(95th)}$ | 95$^{(UCL80)}$ | 140$^{(UCL95)}$ | 81$^{(UCL80)}$ | 120$^{(UCL95)}$ | 13$^{(UCL80)}$ | 41$^{(UCL95)}$ |
| Cobalt | 140$^{(80th)}$ | 170$^{(95th)}$ | 16$^{(UCL80)}$ | 21$^{(UCL95)}$ | 11$^{(UCL80)}$ | 16$^{(UCL95)}$ | 13$^{(UCL80)}$ | 37$^{(UCL95)}$ |
| Copper | 18$^{(80th)}$ | 85$^{(95th)}$ | 24$^{(UCL80)}$ | 49$^{(UCL95)}$ | 21$^{(UCL80)}$ | 43$^{(UCL95)}$ | 130$^{(UCL80)}$ | 360$^{(UCL95)}$ |
| Lead | 21$^{(80th)}$ | 66$^{(95th)}$ | 5.2$^{(UCL80)}$ | 7.5$^{(UCL95)}$ | 21$^{(UCL80)}$ | 57$^{(UCL95)}$ | 10$^{(DL)}$ | 45$^{(Max)}$ |
| Mercury | 0.2$^{(DL)}$ | 0.2$^{(DL)}$ | 0.2$^{(DL)}$ | 0.2$^{(DL)}$ | 0.2$^{(DL)}$ | 0.2$^{(DL)}$ | 0.2$^{(DL)}$ | 0.2$^{(DL)}$ |
| Molybdenum | 2.0$^{(DL)}$ | 2.0$^{(DL)}$ | 2.0$^{(DL)}$ | 2.0$^{(DL)}$ | 2.0$^{(DL)}$ | 2.0$^{(DL)}$ | 2.0$^{(DL)}$ | 2.0$^{(DL)}$ |
| Nickel | 3,100$^{(80th)}$ | 4,500$^{(95th)}$ | 83$^{(UCL80)}$ | 110$^{(UCL95)}$ | 48$^{(UCL80)}$ | 70$^{(UCL95)}$ | 27$^{(UCL80)}$ | 71$^{(UCL95)}$ |
| Selenium | 0.5$^{(DL)}$ | 0.5$^{(DL)}$ | 0.5$^{(DL)}$ | 0.5$^{(DL)}$ | 0.5$^{(DL)}$ | 0.75$^{(DL)}$ | 0.5$^{(DL)}$ | 0.5$^{(DL)}$ |
| Silver | 1.0$^{(DL)}$ | 1.7$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ |
| Thallium | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ | 1.0$^{(DL)}$ |
| Vanadium | 51$^{(80th)}$ | 74$^{(95th)}$ | 62$^{(UCL80)}$ | 90$^{(UCL95)}$ | 59$^{(UCL80)}$ | 92$^{(UCL95)}$ | 23$^{(UCL80)}$ | 61$^{(UCL95)}$ |
| Zinc | 86$^{(80th)}$ | 160$^{(95th)}$ | 43$^{(UCL80)}$ | 60$^{(UCL95)}$ | 42$^{(UCL80)}$ | 66$^{(UCL95)}$ | 41$^{(UCL80)}$ | 120$^{(UCL95)}$ |

Notes:

DL: Detection Limit: A typical detection limit is included when there were insufficient data to calculate a 95% UCL of the 80$^{th}$ and/or 95$^{th}$ percentiles (e.g. fewer than 50% detections).

Max: Maximum concentrations detected in background sample of this lithology (threshold level when there are fewer than 50% detections).

95$^{th}$: The concentrations corresponding to the 95$^{th}$ percentile of the lognormal data distribution calculated for data sets with a frequency of detection greater than 50%. Applied to serpentinite only due to small number of data in background data set.

80$^{th}$: The concentration corresponding to the 80-th percentile of the lognormal data distribution calculated for data sets with a frequency of detection greater than 50%. Applied to serpentinite only due to small number of data in background data set.

UCL95: The concentration corresponding to 95% UCL of the 95$^{th}$ percentile of the lognormal data distribution.

UCL80: The concentration corresponding to 80% UCL of the 95$^{th}$ percentile of the lognormal data distribution.

A limited number of ambient soil samples (five) were collected during the Site Investigation. An attempt was made to collect the ambient samples in areas of the island not subject to heavy use. The samples were collected from the same general soil types as the environmental samples. Three of the ambient samples were collected along the perimeter road just south of East Garrison. The soil was 80% organic rich silt, 10% clay, 5% fine to medium grained sand, 5% angular gravel (chert and serpentinite) to 20mm; dusky brown (color) - 5YR 2/2 (color code); moist to wet (moisture); no odor; abundant organic matter. All three samples were collected within an approximate 30' radius and all were lithologically similar. Two additional ambient samples were collected along the perimeter road just north of West Garrison. The soil was 85% silt, with a trace of fine sand, 15% angular gravel (chert and serpentinite) to 25mm; dark yellowish brown - 10YR 4/2; dry. The samples collected in close proximity and were lithologically very similar. The metal concentrations detected in these samples most likely correspond to the high silt content of the samples. The results are listed in Table 4-4.

## Table 4-4
## Ambient Metals Concentrations – Fort McDowell

| | | SITE NAME: | E_Garrison Perimeter Rd | E_Garrison Perimeter Rd | E_Garrison Perimeter Rd | Perimeter Road Ambient Metals | Perimeter Road Ambient Metals |
|---|---|---|---|---|---|---|---|
| | | FIELD SAMPLE ID: | EG1022 | EG1023 | EG1024 | WG1001 | WG1002 |
| | | LOCATION ID: | H-EGPR-1 | H-EGPR-1 | H-EGPR-1 | H-WG-PR-1 | H-WG-PR-2 |
| **Metals (SW6010/7471)** | *Comparison Value* | | | | | | |
| Antimony | MG/KG | *31* | ND | ND | ND | ND | ND |
| Arsenic | MG/KG | *2.7* | 1.6 | 1.7 | 1.3 | 3.7 | 4.4 |
| Barium | MG/KG | *5,400* | 110 | 96 | 120 | 120 | 130 |
| Beryllium | MG/KG | *150* | 0.37 | 0.38 | 0.36 | 0.31 | 0.35 |
| Cadmium | MG/KG | *9* | 2.1 | 1.9 | 2.1 | 2.2 | 2.4 |
| Chromium | MG/KG | *210* | 60 J | 100 J | 45 J | 110 J | 120 J |
| Cobalt | MG/KG | *4,700* | 25 | 25 | 26 | 28 | 30 |
| Copper | MG/KG | *2,900* | 26 | 22 | 25 | 39 | 44 |
| Lead | MG/KG | *400* | 18 J | 24 J | 19 J | 40 J | 42 J |
| Mercury | MG/KG | *23* | 0.07 | 0.091 | 0.072 | 0.19 | 0.19 |
| Molybdenum | MG/KG | *390* | 0.36 J | 0.39 J | 0.74 J | ND | ND |
| Nickel | MG/KG | *150* | 97 | 180 | 73 | 170 | 180 |
| Selenium | MG/KG | *390* | ND | 1.3 | 1.5 | 1.7 | 1.7 |
| Silver | MG/KG | *390* | 0.17 J | 0.25 U | 0.15 J | 0.075 J | 0.16 J |
| Thallium | MG/KG | *5.2* | 2.1 | 2.3 | 2.4 | 1.9 | 1.4 |
| Vanadium | MG/KG | *550* | 87 | 81 | 87 | 70 | 78 |
| Zinc | MG/KG | *23,000* | 67 | 63 | 70 | 77 | 81 |

Notes:
ND = Not detected.
J = Value estimated.

# 5.0 PROJECT STRATEGY AND RESULTS

This section describes the general investigation and sampling procedures and protocols used for this project. Results are summarized for each potential source area.

The potential source areas can be divided into seven main categories:

1. Former UST Sites
2. Possible Remaining USTs
3. Above Ground Tanks
4. Possible Dump Sites
5. Motor Pool Sites
6. Transformer Sites
7. Possible Soil Contamination Sites
8. Ranges/Ordnance Sites

The investigation protocols for each of the source areas are presented below.

## *5.1 Former Underground Storage Tank Sites*

### 5.1.1 Sampling Approach – UST Sites

Ten former UST sites (removed or abandoned in place) were identified during the PA. Three of the sites are being recommended for closure, based on the results of confirmation sampling at the time of tank removal. Further investigation was conducted during the SI at seven of the former UST sites in order to evaluate contamination found during tank removal. Samples were also collected at the Deer Pen Tank. This possible tank in the Motor Pool area is suspected to have rusted away (Ref. 12).

Tank details for all USTs at Fort McDowell are listed in Appendix C. USACE is currently working on entering data into the UST database maintained by the Regional Water Quality Control Board, San Francisco (RWQCB SF).



Photo 2 – UST East of Water Tank, North Garrison

Details of the sampling are shown on Table 5-1. Two to three borings were advanced at the former UST locations using a direct push technology (DPT) rig. One boring was advanced at the approximate location of the highest concentration detected during previous sampling (usually at the supply line tank inlet), in an attempt to assess the vertical extent of the contamination. This boring was continuously logged to a depth of 15 feet bgs (or until refusal), and a soil sample was collected at the interval corresponding to the highest PID/FID reading or visual staining. A second sample was collected at the bottom of the boring.

staining. A second sample was collected at the bottom of the boring.

One to two additional borings were completed, one at the opposite end of the tank and one along the former supply line. No groundwater samples were collected at the UST locations. A discussion of potential groundwater impact for each UST site is shown in Section 6. Sample locations are shown on Figures A2, A3, A4, A5, A21, and A22. Sample analytical results tables are located in Appendix B.

## Table 5-1
## UST Sampling Approach

| UST Location | Number of Samples | Number of Borings | Depth of Borings | Tank Size and Contents | Analytes | Sample Locations |
|---|---|---|---|---|---|---|
| Barracks Building 241 North Garrison (Figure A2) | 3 | 2 | 9.5', 12' | 500-gallon heating oil | TPH-diesel[1] (EPA 8015B) | One boring near the fill port, one sample at the opposite end of tank, and one sample approx. 10' southeast of the tank. |
| Barracks Building 242 North Garrison (Figure A3) | 1 | 1 | 5.5' | 300-gallon heating oil | TPH-diesel (EPA 8015B) VOCs (EPA 8260) | Building 242 is located on a steep slope and was inaccessible with the drill rig. One hand auger samples was collected near the fill port. |
| East of the Water Tank North Garrison (Figure A4) | 3 | 3 | 5', 9' and 10' | 500-gallon heating oil | TPH-diesel (EPA 8015B) VOCs (EPA 8260) | One boring near fill port, one at opposite end of tank, and one near the former supply line. |
| Building 205 (foundation) North Garrison (Figure A5) | 3 | 3 | 8', 8', 10' | 500-gallon heating oil | TPH-diesel (EPA 8015B) VOCs (EPA 8260) | One boring near fill port, one at opposite end of tank, and one near the building foundation. |
| Deer Pen Tank East Garrison (Figure A17) | 1 | 1 | 12' | Unknown | TPH-diesel (EPA 8015B) VOCs (EPA 8260) | Geophysical survey, backhoe pot holing. One DPT boring at former excavation near seawall. |
| Visitor's Center, Approx 80' SW Ayala Cove (Figure A21) | 3 | 3 | 16', 16', 16' | 1,000-gallon, heating oil | TPH-diesel (EPA 8015B) VOCs (EPA 8260) | One soil sample near fill port, one at opposite end of tank and one near the former supply line. |
| Visitor's Center, Approx 10' west Ayala Cove (Figure A21) | 2 | 2 | 4.75', 11' | Unknown size, heating oil | TPH-diesel (EPA 8015B) | One soil sample northeast of the rock wall behind the Visitor's Center, and one southwest of the wall. |
| Residence Buildings 332 Ayala Cove (Figure A22) | 2 | 2 | 15', 15' | Unknown size, heating oil | TPH-diesel (EPA 8015B) VOCs (EPA 8260) | One soil sample near fill port, and one at opposite end of tank. |

Note:
1 – Analysis for TPH-diesel included motor oil as well.

## 5.1.2 Summary of Findings – UST Sites

The analytical results for constituents detected during UST sampling are presented in Table 5-2. Samples from two of the UST locations contained TPH-D at concentrations of COPCs exceeding the screening criteria levels – Barracks Building 242 and Building 205 (foundation only), both located in the North Garrison.

TPH-D was detected at Barracks Building 242 at 4700 mg/kg TPH-diesel (field duplicate at 6500 mg/kg). This site was deemed inaccessible with the DPT rigs (both truck and track-mounted) because of steep slopes and a heavy mat of dried grass. Therefore, the sample was collected with a hand auger at 5 feet bgs near the former tank fill port (Figure A3). The sample was collected from sandy fat clay with a faint hydrocarbon odor. Attempts to hand auger borings at two additional locations met with refusal at 2.5' and 4' bgs. No samples were collected from these attempted borings because the bottom of the borings were above the previous tank location.

TPH-D was detected at Building 205 at 150 mg/kg at 7.5 to 8 feet bgs. This value is just over the RBSL for shallow samples where groundwater is a potential source of drinking water. This former UST site is located approximately 600 feet north of Well #3.

A complete list of analytical results in located in Appendix B. The sample results for TPH-D and TPH-MO were compared to the RBSL for surface soil. A pathway analysis was conducted for each site (Section 6.0), and the RBSL was selected based on potential for drinking water beneath each site.

**Table 5-2**
**UST Soil Analytical Results Summary**

| UST Location | Boring ID / Sample Location | Field Sample Id: | Sampling Depth (Ft): | TPH-Diesel mg/kg | TPH-Motor Oil mg/kg | VOCs ug/kg |
|---|---|---|---|---|---|---|
| | | *Comparison Values (mg/kg)* | | *100 to 500* | *500 to 1000* | *Various* |
| Barracks Building 241 | B-NG-BB241-1 | NG1143 | 11-12' | 2.2 | 6.2 | NA |
| | B-NG-BB241-2 | NG1144 | 11-12' | 1.1 J | ND | NA |
| | B-NG-BB241-3 | NG1142 | 8.5-9.5" | 21 | 6.8 | NA |
| Barracks Building 242 | B-NG-BB242-3 | NG1148 | 5-5.5' | **4700** | 240 | BCV |
| | B-NG-BB242-3 | NG1149** | 5-5.5' | **6500** | 250 | BCV |
| UST East of Water Tank | B-NG-EWT-1 | NG1157 | 9-10' | ND | NA | NA |
| | B-NG-EWT-2 | NG1156 | 8-9' | ND | NA | NA |
| | B-NG-EWT-3 | NG1154 | 4-5' | NA | NA | BCV |
| | B-NG-EWT-3 | NG1155 | 4-5' | ND | NA | NA |
| Building 205 | B-NG-B205-1 | NG1137 | 7.5-8' | **150** | 27 | NA |
| | B-NG-B205-2 | NG1138 | 9-10' | ND | ND | NA |
| | B-NG-B205-3 | NG1136 | 0.5-1' | 60 | 58 | ND |
| | B-NG-B205-3 | NG1139 | 7-8' | ND | ND | NA |
| Deer Pen Tank | B-MP-DPT-1 (EG2026) | MP2001 | 6-7' | 5 | 7.7 | ND |

## Table 5-2, Continued
## UST Soil Analytical Results Summary

| UST Location | Boring ID / Sample Location | Field Sample Id: | Sampling Depth (Ft): | TPH-Diesel mg/kg | TPH-Motor Oil mg/kg | VOCs ug/kg |
|---|---|---|---|---|---|---|
| | | *Comparison Values (mg/kg)* | | *100 to 500* | *500 to 1000* | *Various* |
| Visitor's Center | B-AC-VC80-1 | AC1030 | 15-16' | ND | NA | ND |
| | B-AC-VC80-1 | AC1031* | 15-16' | ND | NA | ND |
| | B-AC-VC80-2 | AC1032 | 15-16' | ND | NA | NA |
| | B-AC-VC80-3 | AC1033 | 15-16' | ND | NA | NA |
| | B-AC-VC10-2 | AC1025 | 4.5' | ND | NA | NA |
| | B-AC-VC10-1 | AC1026 | 10-10.5' | ND | NA | NA |
| Residence Buildings 332 | B-332#1@15' | B-332#1@15' | 14.5-15' | ND | NA | ND |
| | B-332#2@15' | B-332#2@15' | 14.5-15' | ND | NA | NA |

Notes:
*Field duplicate of AC1030
** Field duplicate of NG1148
Bold = Concentration above comparison value.
J = Estimated value
NA = not analyzed
ND = not detected
BCV = below comparison values
- Comparison Values for TPH are RBSLs - Risk-Based Screening Levels. The range represents shallow soil samples (< 3 meters bgs) where groundwater may or may not be a potential source of drinking water.

## 5.2 Possible Remaining USTs

Eight possible remaining USTs were investigated, as follows:

**North Garrison:**
- Hospital, Building 316 (Figure A6)
- Fire House, Building 231 (Figure A7)
- West of Park Residence, Building 80 (Figure A8)
- 1,000-inch Rifle Range/Boy Scout Camp (Figure A10)

**East Garrison:**
- Southeast of Post Exchange (Figure A18)

**West Garrison:**
- West Garrison Lighthouse

**Point Blunt**
- Nike Battery Generator Pad (Figure A28)
- Mount Livermore Nike Control Station



Photo3 – Backhoe at the Fire House UST site.



Photo4 – Remote West Garrison Lighthouse site.

Investigation at the possible UST sites began with a cursory inspection including location of surface evidence including fill caps or pipes. Magnetometer and/or GPS surveys were conducted to help identify the size and location of the tanks. Geophysical survey results are located in Appendix D. Finally, potholing was conducted using a backhoe for final confirmation at two sites. The findings of the site work are summarized in Table 5-3.

As shown in the photo to the left, the Point Blunt lighthouse was determined to be inaccessible with the geophysical equipment.

## Table 5-3
## Summary of UST Geophysical Survey

| Location | Investigation Tasks | Results |
|---|---|---|
| **North Garrison:** | | |
| Hospital, Building 316 (Figure A6) | Geophysical Survey | No anomalies were found during the geophysical survey. (See Note 1.). |
| Fire House, Building 231 (Figure A7) | Geophysical Survey<br>Backhoe "potholing" | An anomaly was found during the geophysical survey anomaly. The backhoe exposed the top of the tank. |
| West of Park Residence, Building 80 (Figure A8) | Cleared extensive brush at site.<br>Geophysical Survey | Geophysical survey was inconclusive due to an abundance of metal debris around the building foundation. |
| 1,000-inch Rifle Range/Boy Scout Camp (Figure A10) | Geophysical Survey<br>Backhoe "potholing" | An anomaly was found during the geophysical survey. The backhoe exposed the top of the tank. |
| **East Garrison:** | | |
| Southeast of Post Exchange (Figure A18) | Geophysical Survey | The geophysical survey found an anomaly under a tree. A tank hatch/manway is visible in a concrete vault, as shown on Figure A18. |
| **Point Blunt** | | |
| Nike Battery Generator Pad (Figure A28) | Geophysical Survey | No anomalies were found during the geophysical survey. (See Note 1.) |
| Mount Livermore Nike Control Station | Inaccessible | Could not access the site because of a construction project. (See Note 2.) |
| **West Garrison:** | | |
| West Garrison Lighthouse | Inaccessible | Geophysical crew attempted to climb down the cliff to reach the lighthouse site, but could not reach the site safely. No survey was conducted. |

Notes:

1. Marianne Hurley, State Parks Cultural Resources, reported that drawings of the Nike generator buildings showed a 280-gallon fuel tank inside the building.
2. During the site investigation, a construction crew was working at Mount Livermore regrading the hilltop to the original contours. The hilltop had been flattened to house the Nike radar equipment. The earthwork may have obscured the possible tank location. The area was inaccessible during the investigation.

## 5.3 Above Ground Storage Tanks

### 5.3.1 Sampling Approach – AST Sites

Two 30,000-gallon ASTs are located at East Garrison and four 5,000-gallon tanks at North Garrison. In addition, three large ASTs were removed from a location near the present boat dock in Ayala Cove. Soil samples were collected at each site at the locations shown on Figures A9, A19, and A23. The samples at North Garrison were collected with a hand auger at a depth of approximately 5 feet bgs (Figure A9). These samples were hand augured due to the relative inaccessibility of the tanks. Soil samples at East Garrison were collected at depths of 10 and 16 feet bgs using a DPT rig (Figure A19). Water samples were also collected at East Garrison at 27 feet bgs. The samples at Ayala Cove were collected at a depth of 5 feet using a DPT rig (Figure A23). Table 5-4 lists the sampling details.

**Table 5-4**
**AST Sampling Approach**

| AST Location | Number of Samples | Number of Borings | Depth of Boring | Tank Size and Contents | Analytes | Sample Location |
|---|---|---|---|---|---|---|
| Behind Central Heating Plant, Building 314 North Garrison (Figure A9) | 3 | 3 (hand auger) | 5' | Four 5,000-gallon, heating oil | TPH-Diesel, BTEX | Shallow soil samples were collected north and south of the former tanks using a hand auger. Due to concrete paving east of the tanks, two of the planned auger locations could not be used. Instead, one sample was collected along the pipeline toward the beach. |
| Power Plant East Garrison (Figure A19) | 2 | 2 (DPT rig) | 16', 27' | Two 30,000-gal, heating oil | TPH-Diesel, BTEX | Two soil samples were collected near the tanks using a DPT rig. A water sample was collected at one boring. |
| Near State Boat Ramp Ayala Cove (Figure A23) | 2 | 2 (DPT rig) | 4', 6' | Unknown size, heating oil | TPH-Diesel, BTEX | Two shallow soil samples were collected using a DPT rig. |

### 5.3.2 Summary of Findings – AST Sites

The analytical results for constituents detected in the AST samples are presented in Tables 5-5 and 5-5a. The only location with concentrations exceeding comparison criteria for petroleum hydrocarbons is the AST at North Garrison, at 2,400 and 2,700 mg/kg TPH-diesel/motor oil, at a depth of 5' bgs, just north of the above ground tanks. Full analytical results tables are located in Appendix B. Lithologic logs for the borings are located in Appendix E.

Groundwater was encountered during boring at the East Garrison AST site. A groundwater sample was collected for analysis. The results indicated TPH-D at a concentration of 86 ug/L, and TPH-MO at 300 ug/L (see Table 5-5a). Both results are below the comparison value of 640 ug/L (BRSL).

**Table 5-5**
**AST Analytical Results Summary - Soil**

| AST Location | Boring ID/ Sample Location | Field Sample Id: | Sample Depth (Ft): | TPH-D mg/kg | TPH-MO mg/kg | Benzene ug/kg | Remaining VOCs |
|---|---|---|---|---|---|---|---|
| | | *Comparison Values (mg/kg)* | | *100 to 500* | *500 to 1000* | *650* | *Various* |
| North Garrison Central Heating Plant | A-NG-AST-2 | NG1001 | 5' | 1.1 | ND | NA | NA |
| | A-NG-AST-2 | NG1003 | 5' | **2,400** | **2,700** | 0.6 J | BCV |
| | A-NG-AST-3 | NG1005 | 5' | 0.96 | 2.4 | NA | NA |
| Ayala Cove Boat Ramp | B-AC-BRAST-1 | AC1001 | 4' | ND | ND | NA | NA |
| | B-AC-BRAST-1 | AC1001D | 5.5' | 2.7 | NA | NA | NA |
| | B-AC-BRAST-2 | AC1003 | 5' | NA | NA | -- | ND |
| East Garrison, Gym/Power Plant | B-EG-AST-1 | EG1001 | 16' | 3.8 | 7.9 | ND | ND |
| | B-EG-AST-2 | EG1003 | 11' | 1.3 | 19 | ND | ND |
| | B-EG-AST-2 | EG1006W | 25-27' | 4.5 | ND | ND | ND |

Notes: NA = not analyzed
J = Estimated value.
ND = not detected
BCV = below comparison values
Bold = Concentration above comparison value.
- Comparison Values for TPH are SFRWQCB RBSLs. Benzene and VOC comparison values are EPA Residential PRGs.

**Table 5-5a**
**Analytical Results Summary - Water**

| AST Location | Boring ID/ Sample Location | Field Sample ID | TPH-D ug/L | TPH-MO ug/L | 2-Butanone ug/L | Carbon Disulfide ug/L | Remaining VOCs ug/L |
|---|---|---|---|---|---|---|---|
| | | *Comparison Values* | *640* | *640* | *NE* | *NE* | *Various* |
| Gym/Power Plant AST | B-EG-AST-2* | EG1007W | 86 | 300 | 3.1 J | 1 J | ND |
| Gym/Power Plant AST | B-EG-AST-2 | EG1008W** | 86 | 200 | 1.4 J | 0.4 J | ND |

Note: * Water sample collected from boring, most likely Bay water.
** Field duplicate of EG1007W.
Bold = Concentration above Comparison Value.
J = Estimated value
NE = Not established.
- Comparison Values for TPH are SFRWQCB RBSLs. VOC comparison values are EPA Residential PRGs

## 5.4 Possible Dump Sites

Two possible dumpsites were identified on the island, one in Ayala Cove next to the boat ramp and the other in the parade grounds at West Garrison (Figures A25 and A26). Magnetometer/EM surveys were conducted at each possible dumpsite to assess the location and extent of buried debris. The results of the geophysical survey are located in Appendix D. Test pit trenches were excavated at the locations chosen after completion of the geophysical survey. Details for each site are discussed below.

### 5.4.1 Sampling Approach - West Garrison Parade Ground

On June 18, 2002 TN&A conducted a backhoe trench investigation at the Former Parade Ground Area of West Garrison. The objective of this investigation was to determine if this area was used as a landfill and if so characterize the contaminants present. During this investigation, a total of five test pits (Pit 1 through Pit 5) were dug to depths ranging from 9 to 15 feet below ground surface. Test pit locations are shown on Figure A26.

During the test pit excavations, no debris was encountered in Pit 1, 2, 3, or 4. As such, soil samples were not collected from these excavations. Wood debris and square nails were encountered in Pit 5 at approximately 2-feet below ground surface. Given the presence of wood debris in Pit 5, TN&A collected three soil samples from the base of this excavation at approximately 15 feet bgs (WG1001 through WG1003). Each of these three samples were analyzed for:

- TPH-G EPA 8015B
- TPH-D/MO EPA 8015B
- VOCs EPA 8260B
- Metals EPA 6010B
- PCBs EPA 8082
- Cyanide EPA 335.2
- SVOCs EPA 8270C



Photo 5 – Trenching at West Garrison

A summary of the analytical results is provided in Appendix B. The trenches and their contents were logged and categorized, then backfilled with the same material.

Because the dumpsites are associated with military use, there was a possibility of ordnance buried in the dumpsites. Therefore, ordnance avoidance activities were conducted during trenching. The activities consisted of visual inspection and magnetometer screening (Scheibel NA/19-2) of the material removed from the trenches. No ordnance was found at the site.

Also, because the park is listed on the National Historic Register, an archeologist was on site during excavation activities to assure that cultural resources were not disturbed. The archeologists summarized the oversight activities in a report titled *Archaeological Monitoring of Environmental Site Investigation at Fort McDowell, Angel Island, Marin County, CA*, William Self Associates, Inc. July 2002.

## 5.4.2 Summary of Findings – West Garrison Dump Site

Table 5-6 is a summary of the compounds detected in samples from the test pit at the West Garrison. Nickel at 160 to 260 mg/kg was the only compound detected at concentrations exceeding the comparison value (150 mg/kg). Since there was little evidence that the site was used as a dumpsite, nickel is likely to be within ambient concentrations for the area. Serpentinite cobbles were noted during the excavation activities. As shown in Table 4-3, nickel is likely to be present in high concentrations in serpentinite.

**Table 5-6**
**West Garrison Dump Sites - Analytical Results Summary**

| | | FIELD SAMPLE ID: | WG1004 | WG1005 | WG1006 |
|---|---|---|---|---|---|
| | | LOCATION DESCRIPTION: | T-WG-DS-5 | T-WG-DS-5 | T-WG-DS-5 |
| | | *Comparison* | | | |
| | SAMPLING DEPTH (ft): | *Values* | 15' | 15' | 15' |
| **TPH** | | | | | |
| Diesel | MG/KG | *500* | ND | ND | ND |
| Cyanide | | | | | |
| None Detected | MG/KG | *11* | ND | ND | ND |
| **Metals** | | | | | |
| Arsenic | MG/KG | *8* | 2.3 | 2.4 | 2.4 |
| Barium | MG/KG | *5,400* | 130 | 110 | 120 |
| Beryllium | MG/KG | *150* | 0.46 | 0.41 | 0.44 |
| Cadmium | MG/KG | *9** | 1.5 | 1.5 | 1.4 |
| Chromium | MG/KG | *210* | 120 | 190 | 94 |
| Cobalt | MG/KG | *4,700* | 19 | 28 | 12 |
| Copper | MG/KG | *2,900* | 23 | 25 | 20 |
| Lead | MG/KG | *400* | 5.1 | 7.8 | 3.8 |
| Mercury | MG/KG | *23* | ND | ND | 0.064 |
| Nickel | MG/KG | *150** | **160** | **260** | 120 |
| Selenium | MG/KG | *390* | 0.36 | 0.73 | 0.27 J |
| Thallium | MG/KG | *5.2* | 1 | 1.4 | 0.63 |
| Vanadium | MG/KG | *550* | 45 | 50 | 44 |
| Zinc | MG/KG | *23,000* | 43 | 45 | 48 |
| **PCBs** | | | | | |
| None Detected | UG/KG | *Various* | ND | ND | ND |
| **VOCs** | | | | | |
| Toluene | UG/KG | *520,000* | ND | ND | 5.2 J |
| **SVOCs** | | | | | |
| **None Detected** | UG/KG | *Various* | ND | ND | ND |

Notes:
NA = not analyzed
ND = not detected
J = Value Estimated.
Bold = Concentration above Comparison Value.
- Unless otherwise noted, Comparison Criteria for soil are complied from the EPA Residential Preliminary Remediation Goals
* California Modified PRGs

## 5.4.3 Sampling Approach - Ayala Cove Dump Site

On June 19, 2001, TN&A investigated a suspected dump-site adjacent to the State Boat Ramp. The objective of this investigation was to determine if this area was historically used as a landfill and, if so, characterize the contaminants present. As part of this investigation, two test pits (Pit 1 and Pit 2) were excavated to approximately 5-feet below ground surface, representing the soil-water interface. The test pit locations are shown on Figure A25.



Trench 1 (T-AC-BR-1)
The types of debris encountered in Trench 1 included bricks, miscellaneous pieces of metal and angle iron. A layer of ash was also encountered from approximately 2 to 3 feet below ground surface. Upon completion, a total of three soil samples were collected from the base of Trench 1 (AC1008, AC1009, and AC1010). Sample locations are shown on Figure A25.



Trench 2 (T-AC-BR-2)
Debris was not encountered in Trench 2. However, heavy staining and strong hydrocarbon odors were apparent at 4 feet below ground surface. Groundwater was also encountered at this depth. Upon completion, a total of two soil samples and one groundwater sample were collected from the base of Trench 2. (AC1011, AC1012, and AC1014W). Sample locations are shown on Figure A25.

Each of the five samples collected from Trench 1 and Trench 2 were analyzed for:

- TPH-G - EPA 8015B
- TPH-D/MO - EPA 8015
- VOC's - EPA 8260B
- Metals - EPA 6010B
- PCBs - EPA 8082
- Cyanide - EPA 335.2
- SVOCs - EPA 8270B

## 5.4.4 Summary of Findings – Ayala Cove Dump Site

Tables 5-7 and 5-7a summarize the compounds detected in soil and water samples from the test pits at the Ayala Cove boat ramp area. TPH-D was detected in soil samples from Trench No. 2 at 2,700 to 3,800 mg/kg. The source of the TPH in this area is unknown. Possible sources include previous fuel spills in the bay, leaks or spillage from former above ground fuel tanks located in the boat ramp area, and from boating operations at the dock. Other constituents detected in soil samples at concentrations exceeding the comparison criteria include beryllium at 160 to 540 mg/kg, mercury at 24 to 460 mg/kg, nickel at 270 mg/kg, and benzo(a)pyrene at 74 to 82 ug/kg. In addition, water samples collected from Trench No. 2 contained TPH-Diesel at 3,600,000 ug/l, TPH-MO at 93,000 ug/l, TPH-G at 1,100 ug/l, lead at 23 ug/l.

**Table 5-7**
**Ayala Cove Dump Sites - Analytical Results Summary - Soil**

| | FIELD SAMPLE ID: | | AC1008 | AC1009 | AC1009 | AC1010 | AC1011 | AC1012 | AC1013* |
|---|---|---|---|---|---|---|---|---|---|
| | LOCATION ID: | | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-2 | T-AC-BR-2 | T-AC-BR-2 |
| **Analysis** | **Units** | *Comparison* | | | | | | | |
| **Wet Chemistry** | | *Value (1)* | | | | | | | |
| Cyanide | MG/KG | *11* | ND | ND | NA | ND | ND | ND | ND |
| **TPH** | | | | | | | | | |
| Diesel | MG/KG | *100 to 500* | 29 | 19 | NA | 32 | **3,800** | **2,700** | **2,700** |
| Motor Oil | MG/KG | *500 to 1000* | 140 | 35 | NA | 46 | 93 | 81 | 76 |
| Gasoline | MG/KG | *100 to 400* | ND | ND | ND | ND | 97 | 24 | 94 |
| **Metals** | | | | | | | | | |
| Arsenic | MG/KG | *2.7* | **5.1** | **7.3** | NA | **9.6** | **6** | **6.2** | **7.6** |
| Barium | MG/KG | *5,400* | 540 | 160 | NA | 150 | 220 | 93 | 130 |
| Beryllium | MG/KG | *150* | 0.5 | 0.28 | NA | 0.36 | 0.57 | 0.48 | 0.36 |
| Cadmium | MG/KG | *9* | 1.5 | 1.6 | NA | 1.9 | 2.3 | 2 | 1.9 |
| Chromium | MG/KG | *210* | 24 | 33 | NA | 37 | 180 | 73 | 51 |
| Cobalt | MG/KG | *4,700* | 9.6 | 12 | NA | 16 | 23 | 18 | 15 |
| Copper | MG/KG | *2,900* | 28 | 22 | NA | 23 | 24 | 19 | 19 |
| Lead | MG/KG | *400* | **460** | 58 | NA | 42 | 7.3 | 24 | 18 |
| Mercury | MG/KG | *23* | 0.38 | 0.17 | NA | 0.24 | 0.18 | 0.15 | 0.11 |
| Nickel | MG/KG | *150* | 53 | 59 | NA | 64 | **270** | 110 | 100 |
| Selenium | MG/KG | *390* | ND | 0.74 | NA | 0.6 | 0.45 | 0.81 | 0.88 |
| Vanadium | MG/KG | *550* | 36 | 27 | NA | 32 | 48 | 39 | 27 |
| Zinc | MG/KG | *23,000* | 270 | 90 | NA | 80 | 57 | 67 | 59 |
| **Pesticides** | | | | | | | | | |
| 4,4'-DDE | UG/KG | *1,700* | 6.9 J | ND | NA | ND | ND | ND | -- |
| alpha-BHC | UG/KG | *90* | ND | ND | NA | ND | 1.5 J | ND | -- |
| beta-BHC | UG/KG | *320* | ND | ND | NA | ND | 3.8 J | ND | -- |
| delta-BHC | UG/KG | *NE* | ND | ND | NA | ND | 0.85 J | ND | -- |
| Heptachlor | UG/KG | *110* | ND | ND | NA | ND | 1.5 J | ND | -- |
| **PCBs** | | | | | | | | | |
| None Detected | | | | | | | | | |

## Table 5-7, Continued
## Ayala Cove Dump Sites - Analytical Results Summary - Soil

| | FIELD SAMPLE ID: | AC1008 | AC1009 | AC1009 | AC1010 | AC1011 | AC1012 | AC1013* |
|---|---|---|---|---|---|---|---|---|
| | LOCATION ID: | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-2 | T-AC-BR-2 | T-AC-BR-2 |
| **Analysis** | **Units** | *Comparison* | | | | | | |
| **VOCs** | | *Value (1)* | | | | | | |
| Carbon Disulfide | UG/KG | *360,000* | ND | ND | NA | ND | ND | ND | 0.61 J |
| Isopropylbenzene | UG/KG | *160,000* | ND | ND | NA | ND | ND | ND | 2.4 J |
| sec-Butylbenzene | UG/KG | *110,000* | ND | ND | NA | ND | 2.1 J | 1.3 J | 34 |
| Tetrachloroethene | UG/KG | *5,700* | ND | ND | NA | ND | ND | 5.2 J | ND |
| Toluene | UG/KG | *520,000* | ND | ND | NA | ND | ND | 0.75 | ND |
| **SVOCs** | | | | | | | | | |
| 2-Methylnaphthalene | UG/KG | *NE* | 27 J | 17 J | NA | 110 J | 360 J | ND | 94 J |
| Acenaphthene | UG/KG | *3,700,000* | ND | ND | NA | ND | 360 J | ND | ND |
| Anthracene | UG/KG | *22,000,000#* | 23 J | 32 J | NA | ND | ND | ND | ND |
| Benzo(a) anthracene | UG/KG | *620* | 54 J | 65 J | NA | 41 J | ND | ND | ND |
| Benzo(a)pyrene | UG/KG | *62* | **82 J** | **74 J** | NA | 48 J | ND | ND | ND |
| Benzo(b) fluoranthene | UG/KG | *620* | 170 J | 47 J | NA | 66 J | ND | ND | ND |
| Benzo(g,h,i) perylene | UG/KG | *NE* | 70 J | 67 J | NA | 68 J | ND | ND | ND |
| Benzo(k) fluoranthene | UG/KG | *610* | 78 J | 61 J | NA | 21 J | ND | ND | ND |
| Chrysene | UG/KG | *6,100* | 120 J | 83 J | NA | 75 J | ND | ND | 27 J |
| Dibenz(a,h) anthracene | UG/KG | *62* | ND | 29 J | NA | ND | ND | ND | ND |
| Dibenzofuran | UG/KG | *290,000* | ND | ND | NA | ND | 350 J | ND | ND |
| Fluoranthene | UG/KG | *2,300,000* | 120 J | 130 J | NA | 56 J | ND | ND | ND |
| Fluorene | UG/KG | *2,600,000* | ND | ND | NA | 25 J | 1900 J | ND | 180 J |
| Indeno (1,2,3-cd)pyrene | UG/KG | *620* | 70 J | 55 J | NA | 52 J | ND | ND | ND |
| Naphthalene | UG/KG | *56,000* | ND | ND | NA | 45 J | ND | ND | 62 J |
| Phenanthrene | UG/KG | *NE* | 65 J | 100 J | NA | 150 J | 3800 J | 220 J | 320 J |
| Pyrene | UG/KG | *2,300,000* | 120 J | 160 J | NA | 88 J | ND | 140 J | 69 J |

Notes:

NA = not analyzed
ND = not detected
*Field Duplicate of AC1012
BCV = below comparison values
NE = Not established
J = Estimated value.
Bold = Concentration above Comparison Value.
- Comparison Values for TPH are SFRWQCB RBSLs. VOC, SVOC, PCB, and most metal comparison values are EPA Residential PRGs. Cadmium and nickel PRGs are California modified PRGs. Arsenic CVs are SFRWQCB RBSLs.

# Table 5-7a
# Ayala Cove Dump Sites - Analytical Results Summary - Water

| | | | |
|---|---|---|---|
| | | **SITE NAME:** | Boat Ramp |
| | | **FIELD SAMPLE ID:** | AC1014W |
| | | **LOCATION ID:** | T-AC-BR-2 |
| | | **LABORATORY SAMPLE ID:** | 159313-001 |
| **Analysis** | **Units** | ***Comparison*** | |
| **Cyanide (335.2)** | | ***Values*** | |
| None Detected | UG/L | *0.2* | ND |
| **TPH (SW8015)** | | | |
| Diesel | UG/L | *640* | **3,600,000** |
| Motor Oil | UG/L | *640* | **93,000** |
| Gasoline | UG/L | *500* | **1,100** |
| **Metals (SW6010/7470)** | | | |
| Barium | UG/L | *1,000* | 360 |
| Beryllium | UG/L | *4* | 1.9 J |
| Cadmium | UG/L | *5* | 0.4 J |
| Chromium | UG/L | *50* | 46 |
| Cobalt | UG/L | *NE* | 13 J |
| Copper | UG/L | *1,300* | 3 J |
| Lead | UG/L | *15* | **23** |
| Mercury | UG/L | *2* | 0.089 J |
| Nickel | UG/L | *100* | 92 |
| Vanadium | UG/L | *NE* | 37 |
| Zinc | UG/L | *NE* | 66 |
| **PCBs (SW8082)** | | | |
| None Detected | | | ND |
| **VOCs (SW8260B)** | | | |
| 2-Butanone | UG/L | *NE* | 1.5 J |
| Carbon Disulfide | UG/L | *NE* | 13 |
| **SVOCs (SW8270C)** | | | |
| Fluorene | UG/L | *NE* | 500 J |
| Phenanthrene | UG/L | *NE* | 950 J |
| Pyrene | UG/L | *NE* | 160 J |

Notes:

NE = Not Established.
J = Estimated value.
Bold = Concentration above Comparison Value.
- Comparison values for water samples are California MCLs.

## 5.5 Motor Pool Sites

### 5.5.1 Sampling Approach – Motor Pool Sites

Five areas of possible soil contamination are located in the motor pool area (Figures A13 through A17): the former hazardous waste storage area, vehicle lift rack, oil change rack, wash rack, and incinerator. Table 5-8 lists the sample type, depth, and analytes for these areas.

**Table 5-8**
**Motor Pool Sampling Approach**

| Location | Sample Quantity and Type | Boring Depth | Method | Analytes |
|---|---|---|---|---|
| Hazardous Waste Drum Storage Area | 6 Soil (3 borings – samples at 6 and 12 feet bgs) | 12 feet bgs | Push technology rig | PCBs<br>Metals<br>SVOCs<br>VOCs |
| | 1 Soil | Refusal at 2', no sample collected | Hand Auger | |
| Vehicle Lift Rack | 6 Soil (4 borings) | 3, 5 and 8 feet bgs (Refusal at 1' bgs at one boring, no sample collected) | Push technology rig | Metals<br>VOCs<br>TPH-D<br>TPH-G<br>TPH-motor oil PCBs (3 samples)<br>SVOCs (3 samples) |
| Oil Change Rack | 6 Soil<br>2 Water<br>(3 borings) | 11, 18, and 20 feet bgs | Push technology rig | Metals<br>VOCs<br>TPH-D<br>TPH-G<br>TPH-motor oil PCBs (1 sample)<br>SVOCs (1 sample) |
| Wash Rack | 2 Soil | 6 feet bgs | Push technology rig | Metals<br>VOCs<br>TPH-D<br>TPH-G<br>TPH-motor oil PCBs (1 sample)<br>SVOCs (1 sample) |
| Incinerator | 16 Soil | Surface to 0.5 foot bgs | Hand trowel | Metals EDXRF (16 samples)<br>Metals 6010B (2 samples) |

### 5.5.2 Summary of Findings - Hazardous Waste Drum Storage Area

The Hazardous Waste Drum Storage Area is located inside Building 130. Previous sampling at a depth of 0 to 3 feet bgs indicated PCB and arsenic concentrations above the U.S. Environmental Protection Agency (EPA) Residential Preliminary Remediation Goals (PRGs) or Soil Screening Levels (SSLs) as well as TPH-D up to 690 mg/kg (Ref. 4). During previous sampling conducted

in the southwest corner of the building, hand auger refusal was encountered at 0.5 to 4 feet bgs. In order to assess the depth of these constituents at the site, one sample was attempted beneath the building floor with a hand auger. The hand auger team met refusal at about 3' bgs in previous sample location "V" (see Figure A13). Since the material removed from the auger location was most likely cuttings from the previous sampling, no samples were collected at this location. Three DPT points were advanced to 12 feet bgs outside the building as shown on Figure A13. Samples were collected at 5 to 6 feet and 11 to 12 feet bgs in each boring.

A summary of detected concentrations is listed in Table 5-9. The only constituent found at concentrations exceeding comparison values is lead at 1500 mg/kg, from a sample collected at 6 feet bgs (B-MP-DSA-3, Appendix E). This sample was located at the southeast corner of the building.

**Table 5-9**
**Drum Storage Area - Analytical Results Summary**

| | FIELD SAMPLE ID: | | MP1002 | MP1003 | MP1004 | MP1005 | MP1006 | MP1007 |
|---|---|---|---|---|---|---|---|---|
| | BORING ID / LOCATION DESCRIPTION: | | B-MP-DSA-1 | B-MP-DSA-1 | B-MP-DSA-2 | B-MP-DSA-2 | B-MP-DSA-3 | B-MP-DSA-3 |
| | SAMPLING DEPTH (ft): | | 6' | 12' | 6' | 12' | 6' | 12' |
| **Analysis** | **Units** | | | | | | | |
| **Metals** | | *Comparison Values* | | | | | | |
| Arsenic | MG/KG | *8* | ND | ND | 4.8 | ND | ND | ND |
| Barium | MG/KG | *5,400* | 140 | 160 | 220 | 85 | 160 | 100 |
| Beryllium | MG/KG | *150* | 0.66 | 0.76 | 0.67 | 0.68 | 0.68 | 0.65 |
| Cadmium | MG/KG | *9* | 1.1 | 1.1 | 1.5 | 1.1 | 1.1 | 1 |
| Chromium | MG/KG | *210* | 30 | 32 | 59 | 36 | 30 | 28 |
| Cobalt | MG/KG | *4,700* | 11 | 10 | 15 | 11 | 11 | 13 |
| Copper | MG/KG | *2,900* | 14 | 15 | 22 | 15 | 18 | 14 |
| Lead | MG/KG | *400* | 12 | 19 | **1,500** | 44 | 20 | 13 |
| Mercury | MG/KG | *23* | 0.15 | ND | ND | ND | ND | ND |
| Nickel | MG/KG | *150* | 42 | 47 | 110 | 66 | 49 | 44 |
| Selenium | MG/KG | *390* | 0.4 | ND | 0.41 | 0.31 | 0.33 | ND |
| Thallium | MG/KG | *5.2* | ND | 0.51 | ND | ND | ND | ND |
| Vanadium | MG/KG | *550* | 37 | 39 | 39 | 35 | 36 | 34 |
| Zinc | MG/KG | *23,000* | 37 | 46 | 180 | 48 | 43 | 37 |
| **PCBs** | | | | | | | | |
| None Detected | UG/KG | | ND | ND | ND | ND | ND | ND |
| **VOCs** | | | | | | | | |
| Toluene | UG/KG | *520,000* | 1.4 J | ND | 0.44 J | 2 J | ND | ND |
| **SVOCs** | | | | | | | | |
| Acenaphthylene | UG/KG | *3,700,000* | ND | ND | ND | ND | 43 J | ND |
| Benzo(a)anthracene | UG/KG | *620* | ND | ND | ND | ND | 60 J | ND |
| Benzo(a)pyrene | UG/KG | *62* | ND | ND | ND | ND | 59 J | 42 J |
| Benzo(b)fluoranthene | UG/KG | *620* | ND | ND | ND | ND | 49 J | 50 J |
| Chrysene | UG/KG | *6,100* | ND | ND | ND | ND | 57 J | 41 J |
| Fluoranthene | UG/KG | *2,300,000* | ND | ND | ND | ND | 65 J | ND |

Note: See Analytical Tables in Appendix B for full results. ND = Not Detected

Bold = Concentration above Comparison Value. J = Estimated value.

- Comparison Values for TPH are SFRWQCB RBSLs. VOC, SVOC, PCB, and most metal comparison values are EPA Residential PRGs. Cadmium and nickel PRGs are California modified PRGs. Arsenic CVs are SFRWQCB RBSLs.

## 5.5.3 Summary of Findings - Vehicle Lift Rack

Previous sampling at the two drop inlets at the vehicle lift rack indicated concentrations of lead and chromium in excess of the EPA residential PRGs (Ref. 4). Four borings were attempted with a DPT rig, one east of the drop inlets, one sample approximately five feet on either side of the lift rack rails, and one near the small hydraulic tank, as shown on Figure A14. Boring B-MP-VLR-1, located near the drop inlets, was advanced to refusal at 5' below surface. Samples were collected from silty sand pockets at 4 to 5 feet bgs. Boring No. B-MP-VLR-2, located north of the lift rack, was advanced to refusal at 3 feet bgs, and samples were collected for analysis from poorly graded gravel. Boring No. B-MP-VLR-3, located south of the lift rack, met refusal at 1 foot bgs, no sample was collected. Boring No. B-MP-VLR-4, located near the hydraulic tank, was advanced to refusal at 8 feet bgs, and samples collected from well-graded sand with possible hydrocarbon staining at 4 to 5 feet bgs. A fifth sample planned for the space between the lift racks was not attempted because the concrete in this area was too thick for the drill rig to cut through. The site geologist logged the lithologic features as the borings were advanced, see Appendix E.

No constituents were detected at concentrations exceeding the comparison values. Table 5-10 lists the consituents detected at the vehicle lift rack. See Appendix B for a full list of analytical results.

**Table 5-10**
**Drum Vehicle Lift Rack - Analytical Results Summary**

| | | FIELD SAMPLE ID: | MP1066 | MP1067 | MP1069 |
|---|---|---|---|---|---|
| | | LOCATION ID: | B-MP-VLR-1 | B-MP-VLR-2 | B-MP-VLR-4 |
| **TPH** | **Units** | *Comparison Value* | | | |
| Diesel | MG/KG | *100 to 500* | 20 | 4.8 | 8 |
| Motor Oil | MG/KG | *500 to 1000* | 150 | 19 | 12 |
| Gasoline | MG/KG | *100 to 400* | ND | ND | ND |
| **Metals** | | | | | |
| Arsenic | MG/KG | *8* | 4 | 3.1 | ND |
| Barium | MG/KG | *5,400* | 130 | 88 | 120 |
| Beryllium | MG/KG | *150* | 0.6 | 0.57 | 0.61 |
| Cadmium | MG/KG | *9* | 1.1 | 0.82 | 1.2 |
| Chromium | MG/KG | *210* | 31 | 24 | 28 |
| Cobalt | MG/KG | *4,700* | 10 | 8.3 | 9.5 |
| Copper | MG/KG | *2,900* | 15 | 12 | 15 |
| Lead | MG/KG | *400* | 32 | 6.8 | ND |
| Mercury | MG/KG | *23* | 0.14 | 0.056 | ND |
| Nickel | MG/KG | *150* | 46 | 38 | 42 |
| Selenium | MG/KG | *390* | 0.47 | 0.21 J | 0.39 |
| Vanadium | MG/KG | *550* | 33 | 30 | 36 |
| Zinc | MG/KG | *23,000* | 57 | 36 | 42 |
| **PCBs** – None Detected | | | NA | NA | ND |
| **VOCs** – None Detected | | | ND | ND | ND |
| **SVOCs** | | | NA | NA | BCV |

Notes: ND = Not Detected

Bold = Concentration above Comparison Value. J = Estimated value.

- Comparison Values for TPH are SFRWQCB RBSLs. VOC, SVOC, PCB, and most metal comparison values are EPA Residential PRGs. Cadmium and nickel PRGs are California modified PRGs. Arsenic CVs are SFRWQCB RBSLs.

### 5.5.4 Summary of Findings - Oil Change Rack

Previous sampling results at the oil change rack indicated concentrations of lead in excess of the EPA residential PRGs (Ref. 4). Three borings were advanced at the oil change rack during the SI. The locations were chosen along the eastern edge of the rack due to rig accessibility and drainage patterns at the site.

Boring B-MP-OCR-1, located on the southern end of the rack, was drilled to a depth of 20 feet bgs. A soil sample was collected from a sandy gravel at 5 to 6 feet bgs. Groundwater was encountered at 15 to 20 feet bgs and a groundwater sample was collected.

Boring B-MP-OCR-2, located in the center of the rack, was drilled to refusal at 18 feet bgs. A soil sample was collected at 5 to 6 feet bgs from well-graded sand. A second soil sample was collected at 17 to 18 feet bgs in well-graded gravel with sand. Groundwater was encountered at 15 to 18 feet bgs and a groundwater sample was collected.

Boring B-MP-OCR-3, located on the northern end of the rack at the end of a drainage trough, was drilled to refusal at 11 feet bgs. Soil samples were collected at 5 to 6 feet bgs and 10 to 11 feet bgs, from poorly graded gravel.

Tables 5-11 and 5-11a contains a summary of constituents detected at the oil change rack. Two metals were detected in soil samples at concentrations exceeding the comparison values: lead at 760 mg/kg and nickel at 210 mg/kg. Nickel is not usually associated with motor pool activities. The concentration of nickel detected at the site is possibly due to ambient concentrations found in serpentinite found in gravels throughout the island. Ambient concentrations range from 3,100 to 4,500 at serpentinite rock found at the Presidio, as shown on Table 4-3. For these reasons, the nickel concentrations are not considered to be significant at the oil change rack.

# Table 5-11
## Oil Change Rack - Analytical Results Summary - Soil

| | FIELD SAMPLE ID: | | MP1052 | MP1054 | MP1055 | MP1056 | MP1057 | MP1058 |
|---|---|---|---|---|---|---|---|---|
| | LOCATION DESCRIPTION: | | B-MP-OCR-1 | B-MP-OCR-2 | B-MP-OCR-2 | B-MP-OCR-3 | B-MP-OCR-3 | B-MP-OCR-3 |
| | SAMPLE PURPOSE: | | N | N | N | N | N | FD-MP1056 |
| | SAMPLING DEPTH (ft): | | 5' | 5' | 17' | 5' | 10' | 5' |
| **Analysis** | **Units** | **Comparison** | | | | | | |
| **TPH** | | Values | | | | | | |
| Diesel | MG/KG | *500* | 6.1 | 12 | 15 | 1.4 | 4.8 | NA |
| Motor Oil | MG/KG | *500* | 86 | 30 | 66 | ND | 8.9 | NA |
| Gasoline | MG/KG | *400* | ND | ND | ND | ND | ND | ND |
| **Metals** | | | | | | | | |
| Arsenic | MG/KG | *8* | 4.2 | 6.5 | 3 | 3.1 | 4 | NA |
| Barium | MG/KG | *5,400* | 130 | 230 | 84 | 62 | 76 | NA |
| Beryllium | MG/KG | *150* | 0.68 | 1.4 | 0.54 | 0.54 | 0.53 | NA |
| Cadmium | MG/KG | *9* | 1.1 | 2.2 | 0.91 | 1.4 | 0.94 | NA |
| Chromium | MG/KG | *210* | 30 | 59 | 34 | 110 | 26 | NA |
| Cobalt | MG/KG | *4,700* | 12 | 24 | 9.7 | 16 | 9.3 | NA |
| Copper | MG/KG | *2,900* | 17 | 29 | 14 | 77 | 18 | NA |
| Lead | MG/KG | *400* | 240 | 35 | 15 | **760** | 6 | NA |
| Mercury | MG/KG | *23* | 0.15 | 0.25 | ND | 0.058 | 0.12 | NA |
| Nickel | MG/KG | *150* | 45 | 100 | 55 | **210** | 43 | NA |
| Selenium | MG/KG | *390* | 0.65 | 1.1 | ND | 0.39 | 0.46 | NA |
| Thallium | MG/KG | *5.2* | ND | 1.8 | 0.54 | ND | ND | NA |
| Vanadium | MG/KG | *550* | 38 | 70 | 29 | 41 | 30 | NA |
| Zinc | MG/KG | *23,000* | 52 | 87 | 43 | 98 | 37 | NA |
| **PCBs** | | | | | | | | |
| None Detected | UG/KG | *220* | NA | ND | NA | ND | NA | NA |
| **VOCs** | | | | | | | | |
| None Detected | UG/KG | *Various* | ND | ND | ND | ND | ND | ND |
| **SVOCs** | | | | | | | | |
| None Detected | UG/KG | *Various* | NA | ND | NA | NA | NA | NA |

Notes:
ND = Not Detected
NA = Not Analyzed
Bold = Concentration above Comparison Value.
- Comparison Values for TPH are SFRWQCB RBSLs. VOC, SVOC, PCB, and most metal comparison values are EPA Residential PRGs. Cadmium and nickel CVs are California modified PRGs. Arsenic CVs are SFRWQCB RBSLs.

## Table 5-11a
## Oil Change Rack - Analytical Results Summary - Water

| | | FIELD SAMPLE ID: | MP1073 | MP1074 |
|---|---|---|---|---|
| | | BORING ID / LOCATION DESCRIPTION: | B-MP-ORC-1 | B-MP-ORC-2 |
| **Analysis** | **Units** | ***Comparison Values*** | | |
| **TPH (SW8015)** | | | | |
| Diesel | UG/L | *640* | ND | ND |
| Motor Oil | UG/L | *640* | ND | ND |
| Gasoline | UG/L | *500* | 24 J | ND |
| **Metals (SW6010/7470)** | | | | |
| Antimony | UG/L | *6* | 60 UJ | ND |
| Arsenic | UG/L | *50* | 3.7 J | ND |
| Barium | UG/L | *1,000* | 53 | 78 |
| Beryllium | UG/L | *4* | 0.54 J | ND |
| Cadmium | UG/L | *5* | ND | 0.8 J |
| Chromium | UG/L | *50* | 2.7 J | 8.9 J |
| Cobalt | UG/L | *NE* | 1.3 J | 2.7 J |
| Copper | UG/L | *1,300* | 3 J | 7.1 J |
| Lead | UG/L | *15* | 4.4 | 2.5 J |
| Mercury | UG/L | *2* | 0.058 J | ND |
| Molybdenum | UG/L | *NE* | 20 U | ND |
| Nickel | UG/L | *100* | 3.1 J | 12 J |
| Selenium | UG/L | *50* | 5.2 | ND |
| Silver | UG/L | *NE* | ND | ND |
| Thallium | UG/L | *2* | ND | ND |
| Vanadium | UG/L | *NE* | 3.5 J | 8.7 J |
| Zinc | UG/L | *NE* | 17 | 32 |
| **PCBs (SW8082)** | | *Various* | ND | ND |
| **VOCs (SW8260B)** | | *Various* | ND | ND |

Note:
ND = Not Detected.
Bold = Concentration above Comparison Value.
J = Estimated value
UJ Not detected, value estimated.
NE = Not established.
- Comparison Values are California MCLs.

## 5.5.5 Summary of Findings - Wash Rack

Two borings were advanced at the former wash rack location, as shown on Figure A17. Boring No. B-MP-WR-1 was advanced to a depth of 6 feet bgs and a sample was collected from 5 to 6 feet bgs from well-graded gravel. Boring B-MP-WR-2 was advanced to refusal at 5 feet bgs, and a soil sample collected from well-graded gravel with sand.

Samples were analyzed for TPH-D, -G, and -MO, metals, VOCs, PCBs, and SVOCs. No constituents were detected at concentrations exceeding the comparison values. See Appendix B for analytical results.

## 5.5.6 Summary of Findings - Incinerator

Previous sampling at the incinerator indicated concentrations of lead up to 733 mg/kg in soil east of the incinerator stack. For the SI, soil sampling was conducted in two phases. The initial phase consisted of 11 surface soil samples collected around the incinerator as shown on Figure A16. Because the ground surface around the incinerator is covered in concrete and a gravel stockpile in some areas, a strict grid pattern was not followed. The samples were analyzed for metals by energy dispersive x-ray fluorescence spectroscopy (EDXRF) at an onsite laboratory. Based on the initial sampling results, a second round of five samples was collected to help delineate the lateral extent of metals contamination. Figure A16 illustrates the delineated areas.



Samples INCSE-1 and –2 were collected 2 and 4 feet inside the incinerator bays of the smoke stack. Samples were largely unconsolidated ash debris laden with abundant serpentine and other indistinguishable minerals; light bluish gray (5B 7/1); dry. Samples INCSE-3 and -4 collected in front of the stack were 65% unconsolidated beach sands with 25% ashen debris and 5% calcium carbonate shell fragments; pale brown (5YR 5/2); moist. All other samples collected at the incinerator periphery were typical San Franciscan meta-silts with ashen debris and organic material; pale brown (5YR) to dark yellowish brown (5YR ¾); dry.

Ten percent split samples were submitted to a fixed-base lab for analysis by EPA 6010. The split samples were taken from the samples prepared by the EDXRF lab. Preparation included sieving and grinding the samples to uniform size. Splitting the prepared samples provided well-mixed, fairly homogeneous samples for comparison of the EDXRF and Method 6010 analysis. In general, the comparison indicates that the EDXRF results are consistently higher than the EPA 6010 results. This is to be expected because Method 6010 requires solvent extraction prior to analysis. The extraction process is not likely to retrieve 100% of the metals in the sample, whereas the EDXRF analysis will measure 100% of the metals in the samples.

Table 5-12 contains a summary of constituents detected at the incinerator. Several metals were detected at concentrations exceeding the comparison values, including: lead up to 6,200 mg/kg, chromium up to 290 mg/kg, copper up to 16,000 mg/kg, cadmium up to 24 mg/kg, and zinc up to 23,000 mg/kg in the EDXRF samples, and arsenic at 28 mg/kg, cadmium at 26 mg/kg, lead at 3,100 J mg/kg and nickel at 200 mg/kg in the 6010 analysis. The metals seem to be distributed primarily in the area directly east of the stack and in the area west of the incinerator, as shown in Figure A16.

# Table 5-12
# Incinerator – Soil Analytical Results Summary, EDXFR

| Total Metals by EDXRF | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Field Sample ID | Units | Date Sampled | As | Ba | Cd | Cr | Pb | Hg | Se | Ag | Cu | Zn |
| | *Comparison Values* | | *8* | *5,400* | *9* | *210* | *400* | *23* | *390* | *390* | *2,900* | *23,000* |
| INCNW-1 | mg/kg | 06/19/02 | <85 | 780 | <15 | 200 | **850** | <15 | <15 | <15 | 88 | 1,100 |
| INCNW-2 | mg/kg | 06/19/02 | <120 | 850 | <15 | 180 | **1200** | <15 | <15 | <15 | 150 | 1,500 |
| INCNE-1 | mg/kg | 06/19/02 | <620 | 1100 | **24** | 150 | **6200** | <15 | <15 | <15 | 980 | 23,000 |
| INCNE-2 | mg/kg | 06/19/02 | <33 | 710 | <15 | **220** | 330 | <15 | <15 | <15 | 69 | 840 |
| INCNE-3 | mg/kg | 06/19/02 | <560 | 1000 | **16** | 140 | **5600** | <15 | <15 | <15 | 760 | 23,000 |
| INCSE-1 | mg/kg | 06/19/02 | <15 | 640 | <15 | 82 | 140 | <15 | <15 | <15 | 68 | 250 |
| INCSE-2 | mg/kg | 06/19/02 | <48 | 73 | <15 | 26 | **480** | <15 | <15 | <15 | **16,000** | 6,800 |
| INCSE-3 | mg/kg | 06/19/02 | <27 | 440 | <15 | **230** | 270 | <15 | <15 | <15 | 65 | 620 |
| INCSE-4 | mg/kg | 06/19/02 | <15 | 870 | <15 | 160 | 110 | <15 | <15 | <15 | 51 | 230 |
| INCNW-3 | mg/kg | 06/20/02 | <29 | NA | NA | **240** | 290 | <15 | <15 | NA | 48 | 280 |
| INCNW-4 | mg/kg | 06/20/02 | <71 | NA | NA | **240** | **710** | <15 | <15 | NA | 88 | 720 |
| INCNW-5 | mg/kg | 06/20/02 | <60 | NA | NA | **230** | **600** | <15 | <15 | NA | 110 | 790 |
| INCNW-6 | mg/kg | 06/20/02 | <44 | NA | NA | **230** | **440** | <15 | <15 | NA | 68 | 650 |
| INCNE-4 | mg/kg | 06/20/02 | <37 | NA | NA | **230** | 370 | <15 | <15 | NA | 33 | 400 |
| INCNE-5 | mg/kg | 06/20/02 | <15 | NA | NA | 24 | 29 | <15 | <15 | NA | <15 | 32 |
| INCSE-5 | mg/kg | 06/20/02 | <22 | NA | NA | **290** | 220 | <15 | <15 | NA | 41 | 370 |

Notes:
ND = Not Detected
NA = Not Analyzed
Bold = Concentration above Comparison Value.
- Comparison Values for TPH are SFRWQCB RBSLs. For most metals, Comparison Values are EPA Residential PRGs. Cadmium and nickel CVs are California modified PRGs. Arsenic CVs are SFRWQCB RBSLs.

# Table 5-12a
# Incinerator – Soil Analytical Results Summary, Method 6010

| | Sb mg/kg | As mg/kg | Ba mg/kg | Be mg/kg | Ca mg/kg | Cr mg/kg | Co mg/kg | Cu mg/kg | Pb mg/kg | Hg mg/kg | Mo mg/kg | Ni mg/kg | Se mg/kg | Ag mg/kg | Te mg/kg | V mg/kg | Zn mg/kg |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| *Comparison Values* | *31* | *2.7* | *5,400* | *150* | *9* | *210* | *4,700* | *2,900* | *400* | *23* | *390* | *150* | *390* | *390* | *5.2* | *550* | *23,000* |
| **Field Sample ID:** | | | | | | | | | | | | | | | | | |
| INCNE-3 | 30 U | **28** | 370 | 1.3 J | **26** | 59 J | 18 | 520 | **3100 J** | 0.47 | 4.1 | **200** | 5 U | 0.37 | 5 U | 27 | 12000 |
| INCNW-6 | 2.2 UJ | 4.9 | 120 | 0.44 | 2.4 | 52 J | 12 | 60 | 330 J | 0.2 | 0.53 J | 86 | 0.59 U | 0.18 U | 0.55 | 35 | 580 |

Notes:
Bold = Concentration above Comparison Value.
J = Estimated value
- Comparison Values for TPH are SFRWQCB RBSLs. For most metals, Comparison Values are EPA Residential PRGs. Cadmium and nickel CVs are California modified PRGs. Arsenic CVs are SFRWQCB RBSLs.

## 5.6 Miscellaneous Sites

### 5.6.1 Sampling Approach – Miscellaneous Sites

Miscellaneous sites located throughout the island include potential soil contamination sites and possible PCB items. Sample locations and details are shown in Figures A1, A20, and A24, and in Table 5-13.

**Table 5-13**
**Miscellaneous Sites Sampling Approach**

| Location | Sample Quantity and Type | Depth | Method | Analytes |
|---|---|---|---|---|
| Former ship fueling beach area – North Garrison | 6 soil (9 trenches) | Approx. 4 to 5 feet bgs | Trenches | TPH-Diesel/Motor Oil VOCs |
| Former transformer pad – East Garrison | 4 soil | 0.5 to 1 foot bgs | Hand Trowel | PCBs |
| Electrical Substation – East Garrison | 4 soil | 0.5 to 1 foot bgs | Hand Trowel | PCBs |
| Possible PCB Items – East Garrison | 6 liquid | NA | Grab Samples | PCBs |
| Photo Shop – East Garrison | 2 soil | 0.5 to 1 foot bgs | Hand Trowel | Metals SVOCs |
| Former Boiler Stack Location – East Garrison | 4 soil (composite) | 0.5 to 1 feet bgs | Hand Trowel | Metals |
| Former Disinfection Building – Ayala Cove | 2 soil | Up to 5 feet bgs | DPT Rig | Cyanide Pesticides |
| Paint Shop – West Garrison | 4 soil (composite | 0.5 to 1 foot bgs | Hand Trowel | Metals |

### 5.6.2 Summary of Findings - Former Ship Fueling Area

On June 20, 2002, TN&A investigated the Former Ship Fueling Area along the beach north of the Central Heating Plant (Building 314). As part of this investigation a total of nine test pits were dug along the beach to 5-feet below ground surface representing the soil groundwater interface. Test pit locations are shown on Figure A1.



As anticipated, the soil type encountered in all test pits consisted of unconsolidated sand. Heavy staining and strong hydrocarbon odors were apparent at 3 to 5 feet bgs in all but three test pits. No staining or odor was encountered in Test Pits 11,14 or 18.

A total of seven soil samples were collected from the base of seven test pits (NG1011 through NG1016 and NG1018). Sample NG1017 was a

NG1018). Sample NG1017 was a duplicate of NG1016. Due to the presence of obvious contamination, three of the test pits were not sampled (Check Pit 1, Check Pit 2 and Check Pit 3). Once the obvious contamination was confirmed, the check pits were backfilled and another test pit was dug further down the beach to assess the horizontal distribution of the contaminants. All seven samples were analyzed for total petroleum hydrocarbons in the diesel/motor oil range (TPH-D/MO) using EPA Method 8015B.

Table 5-14 contains a summary of constituents detected at the former ship fueling area. TPH-D concentrations, when compared to the RBSL values for surface soil, are not likely to impact drinking water (Ref 13). See Appendix B for a full list of analytical results.

**Table 5-14**
**Former Ship Fueling Area - Analytical Results Summary**

| FIELD SAMPLE ID: | LOCATION DESCRIPTION: | SAMPLING DEPTH (ft): | TPH-Diesel MG/KG | TPH-Motor Oil MG/KG | VOCs MG/KG |
|---|---|---|---|---|---|
| | *Comparison Criteria* | | ***500*** | *500* | *Various* |
| NG1011 | T-NG-FSF-11 | 3' | **1,200** | **5,000** | BCV |
| NG1012 | T-NG-FSF-12 | 5.5' | **940** | **890** | BCV |
| NG1013 | T-NG-FSF-13 | 5.5' | **600** | **750** | BCV |
| NG1014 | T-NG-FSF-14 | 5.5' | 16 | 60 | BCV |
| NG1015 | T-NG-FSF-15 | 5.5' | **4,300** | **4,100** | BCV |
| NG1016 | T-NG-FSF-16 | 5.5' | **7,800** | **7,100** | BCV |
| NG1017* | T-NG-FSF-16 | 5.5' | **10,000** | **8,700** | BCV |
| NG1018 | T-NG-FSF-18 | 5.5' | 70 | 120 | BCV |

Notes: *Field duplicate of NG1016

BVC = Below comparison values

Bold = Above comparison value

- Comparison Values for TPH are SFRWQCB RBSLs. VOC comparison values are EPA Residential PRGs.

## 5.6.3 Summary of Findings - Former Transformer Pad

Four soil samples were collected at a depth of 0.5 to 1 foot bgs with a hand trowel near the former transformer pad as shown on Figure A20. The samples were analyzed for PCBs. No PCBs were detected in the samples. See Appendix B for analytical results tables.

## 5.6.4 Summary of Findings - Electrical Substation

Four soil samples were collected at a depth of 0.5 to 1 foot bgs with a hand trowel at the electrical substation as shown on Figure A20a. The samples were analyzed for PCBs. Analytical results are shown in Table 5-15. PCBs were detected at concentrations ranging from 340,00 to 2,400,000 ug/kg.

**Table 5-15**
**Electrical Substation – Analytical Results Summary**

| | **FIELD SAMPLE ID:** | | EG1006 | EG1007 | EG1008 | EG1009 |
|---|---|---|---|---|---|---|
| | **LOCATION DESCRIPTION:** | | H-EG-ES-1 | H-EG-ES-2 | H-EG-ES-3 | H-EG-ES-4 |
| | **SAMPLING DEPTH (ft):** | | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' |
| **Analysis** | **Units** | *Comparison Value* | | | | |
| **PCBs** | | | | | | |
| Aroclor-1260 | UG/KG | *220* | **2,400,000** | **1,900,000** | **340,000** | **1,100,000** |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.
Comparison Values for PCBs are EPA Residential PRGs.

## 5.6.5 Summary of Findings - Former Photo Shop

Two soil samples were collected at a depth of 0.5 to 1 foot bgs with a hand trowel at the approximate location of the photo shop in East Garrison, as shown in Figure A20. The samples were analyzed for metals and SVOCs. No constituents were detected at concentration exceeding the comparison values. See Appendix B for analytical results.

## Table 5-16
## Former Photo Shop – Analytical Results Summary

| | | FIELD SAMPLE ID: | EG1015 | EG1016 | EG1028* |
|---|---|---|---|---|---|
| | | LOCATION ID: | H-EG-FPS-1 | H-EG-FPS-2 | H-EG-FPS-2 |
| **Analysis** | **Units** | ***Comparison Values (1)*** | | | |
| **Metals (SW6010/7471)** | | | | | |
| Arsenic | MG/KG | *8* | 3.4 | 3.8 | 2.9 |
| Barium | MG/KG | *5,400* | 110 | 140 | 130 |
| Beryllium | MG/KG | *150* | 0.35 | 0.41 | 0.37 |
| Cadmium | MG/KG | *9 (2)* | 1.2 | 1.7 | 1.4 |
| Chromium | MG/KG | *210* | 43 J | 79 J | 62 J |
| Cobalt | MG/KG | *4,700* | 11 | 16 | 13 |
| Copper | MG/KG | *2,900* | 17 | 25 | 18 |
| Lead | MG/KG | *400* | 39 J | 40 J | 31 J |
| Mercury | MG/KG | *23* | 0.097 | 0.12 | 0.13 |
| Nickel | MG/KG | *150 (2)* | 58 | 120 | 89 |
| Selenium | MG/KG | *390* | 1.1 | 1.4 | 1 |
| Thallium | MG/KG | *5.2* | 0.9 | 0.84 | 0.7 |
| Vanadium | MG/KG | *550* | 37 | 42 | 35 |
| Zinc | MG/KG | *23,000* | 70 | 76 | 65 |
| **SVOCs (SW8270C)** | | | | | |
| 2-Methylnaphthalene | UG/KG | *NE* | 41 J | ND | ND |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | 16 J | ND | ND |
| Naphthalene | UG/KG | *56,000* | 41 J | ND | ND |

Notes: *Field duplicate of EG1016
Bold = Above comparison value
ND = Not detected.
NE = Not established.
J = Estimated value

(1) Unless otherwise noted, Comparison Criteria for soil are EPA Residential Preliminary Remediation Goals.
(2) California Modified PRGs

## 5.6.6 Summary of Findings - Disinfection Building

Historical maps of Ayala Cove indicated a disinfection building near the current ferry landing. The building has since been removed, and the landing area has been extensively redeveloped by the Park Service. Two DPT borings were advance to 6 feet bgs in the planter area near the ferry landing, as shown on Figure A24. One sample was collected from each boring at a depth of approximately 5 feet bgs, and analyzed for cyanide and pesticides. No constituents were detected at concentrations exceeding the comparison values. Analytical results are listed in Appendix B.

**Table 5-17**
**Former Disinfection Building – Analytical Results Summary**

| | | FIELD SAMPLE ID: | AC1015 | AC1016 | AC1017* |
|---|---|---|---|---|---|
| | | LOCATION ID: | B-AC-FDB-1 | B-AC-FDB-2 | B-AC-FDB-2 |
| **Analysis** | **Units** | *Comparison Value* | | | |
| **Wet Chemistry** | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | ND | NA | NA |
| **Pesticides (SW8081A)** | | | | | |
| alpha-Chlordane | UG/KG | *1,600* | 1.6 J | ND | ND |
| Dieldrin | UG/KG | *30* | 0.99 J | ND | ND |
| gamma-Chlordane | UG/KG | *NE* | 2.1 | ND | ND |
| **PCBs (SW8082)** | | | | | |
| None Detected | | | ND | ND | ND |

Notes:

* Field duplicate of AC1016

(1) Comparison Criteria EPA Residential Preliminary Remediation Goals.

J = The compound was detected. The concentration value is an estimate.

ND = Not detected. NA = Not analyzed.

NE = Not established.

## 5.6.7 Summary of Findings - Paint Shop

According to two historic maps (one dated 1907, the other undated), the paint shop was located in one of two buildings northeast of the officer's quarters at West Garrison. The building are located in an area approximately 150' by 100'. TN&A attempted to locate the building foundations in this area, but could not positively identify the former paint shop location.

Therefore, the 100 by 150 foot area was divided into four quadrants as shown on Figure A26a. The sample layout was taken from the EPA Soil Screening Guidance (Ref. 15). Six sub samples were collected from random locations within each quadrant, and combined in a stainless steel bowl to create one composite sample. Thus, four composite samples were analyzed for metals by EPA 6010.

The analytical results for constituents detected at the former paint shop are listed in Appendix B and in Figure A26a. Lead and nickel were the only constituents detected at concentrations exceeding the comparison values. Lead was detected at a concentration of 1,900 J mg/kg in the composite sample collected from the area closest to the officer's quarters. Nickel was detected in each of the four samples, at 180 to 380 mg/kg. Nickel is not usually associated with paint shops. The concentration of nickel detected at the site is possibly due to ambient concentrations in

serpentinite found in gravels throughout the island. Ambient concentrations range from 3,100 to 4,500 at serpentinite rock found at the Presidio, as shown on Table 4-3. For these reasons, the nickel concentrations are not considered to be significant at the paint shop site.

**Table 5-18**
**Paint Shop – Analytical Results Summary**

| | | FIELD SAMPLE ID: | WG1016 | WG1017 | WG1018 | WG1019 | WG1020* |
|---|---|---|---|---|---|---|---|
| | | LOCATION ID: | H-WG-PS-W | H-WG-PS-N | H-WG-PS-E | H-WH-PS-S | H-WG-PS-N |
| **Analysis** | **Units** | ***Comparison Value (1)*** | | | | | |
| **Metals (SW6010/7471)** | | | | | | | |
| Arsenic | MG/KG | *2.7* | 2.1 | 1.3 | 2.2 | 1.7 | 1.7 |
| Barium | MG/KG | *5,400* | 77 | 100 | 120 | 150 | 130 |
| Beryllium | MG/KG | *150* | 0.2 | 0.22 | 0.26 | 0.2 J | 0.31 J |
| Cadmium | MG/KG | *9* (2) | 1.6 | 1.3 | 1.7 | 2 | 1.9 |
| Chromium | MG/KG | *210* | 200 J | 89 J | 120 J | 110 J | 100 J |
| Cobalt | MG/KG | *4,700* | 27 | 21 | 23 | 23 | 24 |
| Copper | MG/KG | *2,900* | 19 | 19 | 32 | 29 | 25 |
| Lead | MG/KG | *400* | 110 J | 46 J | 97 | **1900 J** | 70 J |
| Mercury | MG/KG | *23* | 0.28 | 0.1 | 0.17 | 0.2 J | 0.099 J |
| Nickel | MG/KG | *150* (2) | **380** | **180** | **220** | **190** | **190** |
| Selenium | MG/KG | *390* | 1.1 | 1.1 | 1.3 | 1.4 | 1.3 |
| Silver | MG/KG | *390* | ND | ND | ND | 0.13 J | ND |
| Thallium | MG/KG | *5.2* | 0.93 | 0.72 | 0.98 | 0.85 J | 0.57 J |
| Vanadium | MG/KG | *550* | 42 | 40 | 48 | 53 | 61 |
| Zinc | MG/KG | *23,000* | 66 | 56 | 99 | 280 J | 76 J |

Notes:

* Field duplicate of WG1017.

(1) EPA Residential PRGs.

(2) California Modified PRGs

J = The compound was detected. The concentration value is an estimate.

ND = Not detected.

## 5.6.8 Summary of Findings - Former Boiler Stack Location

According to the 1990 Inventory Project Report, a boiler stack was located near the ASTs that supplied fuel oil for the boilers in the gymnasium. The stack had toppled over and lay in several sections northwest of the gymnasium at the time of the INPR (Ref. 8). The stack debris has since been removed. From photographs of the site, it appears that the stack originally stood on the northern corner of the gymnasium boiler room, and was approximately 4 stories tall. If it fell roughly to the north, there is an area approximately 100 feet by 50 feet where it could have landed when it fell over. This 100 by 50 foot area was divided into four quadrants as shown on Figure A19. The sample layout was taken from the EPA Soil Screening Guidance (Ref. 15). Soil samples were collected from six random locations within each quadrant. The six subsample were mixed together in a stainless steel bowl to create one composite sample. Thus, four composite samples were submitted for analysis for metals by EPA 6010.

Table 5-19 lists the sample results for compounds detected at the former boiler stack. The constituents found at concentrations exceeding the comparison criteria were lead at 500 to 940 J mg/kg, chromium at 300 J to 310 J mg/kg, and nickel at 320 to 710 mg/kg.

The suspected metals associated with the boiler stack are arsenic, beryllium, cadmium, chromium, copper, lead, manganese, mercury, nickel, selenium, and zinc. These metals are typical constituent found in emissions from boilers fired by fuel oil (Source: Air Toxics Emission Factors, Ref. 17). The concentration of nickel and chromium detected at the site are possibly due to ambient concentrations in serpentinite found in gravels throughout the island. Nickel and chromium concentrations detected in serpentinite rock found at the Presidio are shown on Table 4-3.

## Table 5-19
## Former Boiler Stack – Analytical Results Summary

| | FIELD SAMPLE ID: | EG1010 | EG1011 | EG1012 | EG1013 | EG1014* |
|---|---|---|---|---|---|---|
| | LOCATION DESCRIPTION: | H-EG-FBS-S | H-EG-FBS-E | H-EG-FBS-N | H-EG-FBS-W | H-EG-FBS-W |
| | SAMPLING DEPTH (ft): | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' |
| **Analysis** | **Units** | *Comparison* | | | | |
| **Metals** | | *Values* | | | | |
| Antimony | MG/KG | *31* | 3.2 UJ | 3.2 | 3.6 UJ | ND | 2.9 UJ |
| Arsenic | MG/KG | *8* | 3.9 | 3.2 UJ | 2 | 1.5 J | 2.2 J |
| Barium | MG/KG | *5,400* | 220 | 91 | 120 | 100 J | 210 J |
| Beryllium | MG/KG | *150* | 0.29 | 0.3 | 0.23 | 0.14 | 0.18 |
| Cadmium | MG/KG | *9* | 1.9 | 1.6 | 1.6 | 1.1 | 1.3 |
| Chromium | MG/KG | *210* | **300 J** | 190 J | **310 J** | 150 J | 190 J |
| Cobalt | MG/KG | *4,700* | 34 | 22 | 28 | 14 | 17 |
| Copper | MG/KG | *2,900* | 34 | 27 | 64 | 36 | 36 |
| Lead | MG/KG | *400* | **940 J** | 180 J | **500** | **720 J** | **640 J** |
| Mercury | MG/KG | *23* | 0.28 | 0.2 | 0.17 | 0.14 | 0.099 |
| Molybdenum | MG/KG | *390* | 0.91 J | 0.41 J | 0.68 J | 0.47 J | 0.75 J |
| Nickel | MG/KG | *150* | **710** | **370** | **650** | **320** | **390** |
| Selenium | MG/KG | *390* | 2.5 | 1.2 | 1.2 | 0.69 UJ | 1.1 J |
| Silver | MG/KG | *390* | ND | ND | 0.088 J | ND | ND |
| Thallium | MG/KG | *5.2* | 0.63 | 0.85 | 0.36 | 0.36 | ND |
| Vanadium | MG/KG | *550* | 120 | 42 | 81 | 42 | 55 |
| Zinc | MG/KG | *23,000* | 300 | 150 | 270 | 190 | 260 |

Notes:

* Field duplicate of EG1013.
Bold = Above comparison value
ND = Not Detected
J = Estimated value
U = The analyte was analyzed for, but not detected.
UJ = The analyte was analyzed for, but not detected. The associated numerical value is an estimate.
- Comparison Values for TPH are SFRWQCB RBSLs. VOC, SVOC, PCB, and most metal comparison values are EPA Residential PRGs. Cadmium and nickel CVs are California modified PRGs. Arsenic CVs are SFRWQCB RBSLs.

## 5.6.9 Summary of Findings - PCB Sampling

Grab samples were collected from the electrical equipment stored in the Motor Pool warehouse (Building 129), Engineer's building (Building 61), and in the gymnasium at East Garrison. The sample team conducted a visual survey of Buildings 61, 146, 130, and 129 in the Motor Pool area to search for oil-filled equipment. The results of the survey and sampling are described below.

Warehouse – Building 129

Miscellaneous Nike missile control panels stored in the warehouse were evaluated to determine if any liquid-filled reservoirs exists. No reservoirs were found during the search. Two oil-filled containers were found in the warehouse. Oil samples were collected using disposable pipettes and analyzed for PCBs. The samples did not contain PCBs in excess of the 50 ppm comparison criteria for PCB-contaminated equipment.

Engineer's Buildings - Buildings 61 and 146

Two pieces of oil-filled equipment were found in the Engineer's Building – a circuit breaker/switch, and a motor on a hopper. Samples were collected using disposable pipettes and analyzed for PCBs. The samples did not contain PCBs in excess of the 50 ppm comparison criteria for PCB-contaminated equipment. The three transformers stored in the Engineering Building northwest of Building 130 have been removed since the initial site assessment.

Gymnasium – Building 22

Two large transformers located in an electrical closet on the east side of the gymnasium building were sampled using disposable pipettes. The transformers were roughly three feet tall and one and a half feet in diameter, and filled with a mixture of oil and water. A sample from one of the transformers had a PCB concentration of 560 ppm, exceeding the comparison criteria of 50 ppm (40 CFR§761.3, definition of PCB contaminated equipment).

Table 5-20 contains a summary of the PCB analysis conducted on samples from the oil-filled equipment.

**Table 5-20**
**Electrical Equipment - Analytical Results Summary**

| | | **FIELD SAMPLE ID:** | MP1008 | MP1009 | MP1010 | MP1011 | MP1012 | MP1013 |
|---|---|---|---|---|---|---|---|---|
| | | **LOCATION ID:** | P-MP-EES-1 (Oil can #1) | P-MP-EES-2 (Oil can #2) | P-MP-EES-3 (Oil circuit breaker) | P-MP-EES-4 (Hopper) | P-MP-EES-5 (Transformer #1-Gym) | P-MP-EES-6 (Transformer #2-Gym) |
| **PCBs (SW8082)** | | *Comparison Value* | | | | | | |
| Aroclor-1016 | UG/KG | *50,000* | ND | ND | ND | ND | ND | ND |
| Aroclor-1221 | UG/KG | *50,000* | ND | ND | ND | ND | ND | ND |
| Aroclor-1232 | UG/KG | *50,000* | ND | ND | ND | ND | ND | ND |
| Aroclor-1242 | UG/KG | *50,000* | ND | ND | ND | ND | ND | ND |
| Aroclor-1248 | UG/KG | *50,000* | ND | ND | ND | ND | ND | ND |
| Aroclor-1254 | UG/KG | *50,000* | ND | ND | ND | ND | ND | ND |
| Aroclor-1260 | UG/KG | *50,000* | ND | ND | ND | ND | ND | **560,000** |

Note: ND = Not detected.
Bold = Above comparison value.

## 5.7 Ranges/Ordnance Sites

Three potential ordnance sites were identified during the PA – two small arms ranges and a possible cannonball disposal area. Investigation activities conducted at each area are described below.

### 5.7.1 Sand Springs Beach – Cannonballs.

A geophysical survey was conducted at Sand Springs Beach to search for cannonballs (Figure A27). The geophysical survey identified two cannonballs on the surface. Several anomalies were detected as detailed in the survey report located in Appendix D. One anomaly was of particular interest in the northwest portion of the site represents the most probable location of buried cannonballs.

### 5.7.2 Rifle Range

A geophysical survey was conducted at the rifle range prior to sampling to search for possible buried ammunition and to identify potential target areas. No ammunition was found on the site. Soil sampling was then conducted to assess possible metal contamination. On June 17, 2002, a primary round of 47 shallow soil samples was collected on an approximate 10' grid pattern, as shown on Figure A10. Samples were collected at the foot of the sloped berm area and at approximately 8 and 15' upslope. The samples were analyzed by EDXRF at an onsite laboratory. Based on the results of the primary round, 26 additional samples were collected to further define the lateral extent of contamination. These samples were also analyzed onsite by EDXFR. Ten percent split samples were sent to the fixed based lab for analysis by EPA 6010. The split samples were taken from the samples prepared for EDXRF analysis (preparation included screening and grinding). As described in Section 5.5.6, the samples analyzed by EDXRF were consistently higher than the EPA 6010 analysis, due to losses during the extraction process.

Samples NG3001 through NG3047 consisted mainly of typical Angel Island surface soils of weathered, metamorphosed San Franciscan Sandstone that largely equates to a uniform silt with sand and gravel and trace organic clay. The soil composition is approximately 70% silt, 15% subangular to subrounded fine-grained sand, 15% gravel comprised mainly of serpentine and some chert ranging form 5 to 35 mm; dark yellowish brown in color (Code 10YR 4/2);dry; no odor; USCS symbol ML. Samples 48 to 53 were dry silt (ML); same as above. Samples NG2054, 58, and 60; organic rich silt with clay, trace sand. 80% silt, 15% semiplastic clay, 5% fine sand; grayish brown (Code:5YR 3/2); moist; abundant organic material USCS symbol ML. Samples NG3061, 62 and 63 were 90% organic rich silt, 10% gravel of serpentine and chert; dusky brown (5YR; damp – USCS symbol ML).

Tables 5-21 and 5-21a list the analytical results for constituents detected in the rifle range samples. Lead was detected at concentrations above the comparison value in only two samples located on the southern berm, at 640 and 680 mg/kg. The approximate distribution of lead at the range is shown on Figure A11.

Nickel was detected at 200 mg/kg in one sample. Nickel is not usually associated with rifle

ranges. The concentration is consistent with concentrations found in samples throughout the island, and may represent ambient concentrations. For these reasons, nickel is not considered to be present in significant concentrations.

## Table 5-21
## Rifle Range – Analytical Results Summary, EDXRF

| | | | Total Metals by EDXRF | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Sample ID** | **Units** | **Date Analyzed** | **As** | **Ba** | **Cd** | **Cr** | **Pb** | **Hg** | **Se** | **Ag** | **Cu** | **Zn** |
| | *Comparison Values* | | *8* | *5,400* | *9* | *210* | *400* | *23* | *390* | *390* | *2,900* | *23,000* |
| NG3014 | MG/KG | 06/17/02 | <66 | 380 | <15 | 140 | **660** | <15 | <15 | <15 | 76 | 300 |
| NG3015 | MG/KG | 06/17/02 | <68 | 450 | <15 | 160 | **680** | <15 | <15 | <15 | 90 | 310 |
| NG3016* | MG/KG | 06/17/02 | <64 | 470 | <15 | 160 | **640** | <15 | <15 | <15 | 130 | 110 |

Notes:

* Field duplicate of NG3015.

Bold = Above comparison value.

## Table 5-21a
## Rifle Range – Analytical Results Summary, Method 6010

| **FIELD SAMPLE ID:** | | | NG3005 | NG3011 | NG3018 | NG3026 | NG3040 | NG3055 |
|---|---|---|---|---|---|---|---|---|
| **LOCATION ID:** | | | H-NG-RR-5 | H-NG-RR-11 | H-NG-RR-18 | H-NG-RR-26 | H-NG-RR-40 | H-NG-RR-55 |
| **Analysis** | **Units** | ***Comparison*** | | | | | | |
| **Metals** | | ***Value*** | | | | | | |
| Arsenic | MG/KG | *2.7* | **2.9** | **2.8** | 2.2 | **3.8** | **3** | **5.5** |
| Barium | MG/KG | *5,400* | 130 | 180 | 180 | 240 | 370 | 340 |
| Beryllium | MG/KG | *150* | 0.35 | 0.35 | 0.37 | 0.41 | 0.46 | 0.56 |
| Cadmium | MG/KG | *9* | 1.2 | 1.2 | 1.4 | 1.3 | 1.7 | 1.6 |
| Chromium | MG/KG | *210* | 73 J | 98 J | 32 J | 27 J | 46 J | 30 J |
| Cobalt | MG/KG | *4,700* | 13 | 12 | 14 | 7.7 | 13 | 12 |
| Copper | MG/KG | *2,900* | 12 | 27 | 21 | 14 | 31 | 15 |
| Lead | MG/KG | *400* | 20 J | 110 J | 13 J | 17 J | 43 J | 18 J |
| Mercury | MG/KG | *23* | 0.11 | 0.86 | 0.32 | 0.06 | 0.17 | 0.06 |
| Molybdenum | MG/KG | *390* | ND | ND | ND | 0.5 J | ND | 0.63 J |
| Nickel | MG/KG | *150* | 130 | **200** | 39 | 36 | 50 | 46 |
| Selenium | MG/KG | *390* | 0.94 | ND | 1.3 | ND | 1.6 | 1.4 |
| Thallium | MG/KG | *5.2* | 0.31 | ND | 1.2 | 0.58 | 1.7 | 0.9 |
| Vanadium | MG/KG | *550* | 36 | 30 | 48 | 32 | 50 | 33 |
| Zinc | MG/KG | *23,000* | ND | ND | 60 | 60 | 68 | 120 |

Bold = Above comparison value

ND = Not Detected

J = Estimated value

- Comparison Values for most metals are EPA Residential PRGs. Cadmium and nickel CVs are California modified PRGs. Arsenic CVs are SFRWQCB RBSLs.

### 5.7.3 Pistol Range

A geophysical survey was conducted prior to sampling to search for possible buried ammunition and to identify potential target areas. Only one small-arms bullet was found at the site, in the southeastern corner of the campground. The pistol range was sampled in a two-phase process similar to the rifle range sampling. Primary samples were collected on June 18, 2002 on a 10-foot grid pattern, with shallow soil samples collected every 10 feet at the foot of the slope and approximately 15' upslope. The samples were analyzed at an onsite EDXRF laboratory. Additional samples were collected on June 20th at potential hot spot areas at 2 and 8 feet upslope. Ten percent split samples were sent to the fixed based lab for analysis by EPA 6010. As described in Section 5.5.6, the samples analyzed by EDXRF were consistently higher than the EPA 6010 analysis, due to losses during the extraction process.

All samples were homogeneous silts – 85% silt, 10% fine sand; 5% gravel of serpentine and chert; trace organic material; dry; dark yellowish brown (10YR 4/2); no odor.

The only metal detected at concentration exceeding the comparison values was arsenic in one sample at 20 mg/kg. Because no other significant concentrations were detected, it is unlikely that the source of the arsenic is from the use of the property as a pistol range. Sample results are shown in Appendix B. The EDXRF results are presented in a table following the fixed-based lab results.

# 6.0 Pathway and Target Evaluation

This section presents an update of the evaluation of pathways and targets for the potential hazardous waste and ordnance sources identified during the preliminary assessment and investigation during the SI. Table 6-2 summarizes the potential sources found at Angel Island with potential pathways and associated target receptors.

## *6.1 Groundwater Evaluation*

### 6.1.1 Groundwater Pathway

Soils at Angel Island have rapidly moderate permeability and exist to a depth of up to 40 feet bgs before encountering fractured bedrock. Shallow, unconfined aquifers surface at natural springs throughout the island. There are four active water wells currently supplying approximately 27 gallons per minute each. The wells are up to 380 feet deep. Figure 7 shows the location of the wells with respect to geological bedding. Approximate elevations of the wellheads are as follows:

**Table 6-1**
**Wellhead Elevations**

| Well No. | Total Depth (feet) | Ground Elevation (feet) | Standing Water Level (feet, msl) | Pumping Level (feet, msl) |
|---|---|---|---|---|
| 1 | 259 | 368 | Unknown | Unknown |
| 3 | 300 | 250 | Unknown | Unknown |
| 4 | 302 | 50 | Unknown | -10 |
| 6 (inactive) | 300 | 120 | Unknown | Unknown |
| 7 | 300 | 90 | 82 | 0 |

According to Mr. Fernando Guzman, the Angel Island Park Service Water and Wastewater Supervisor, the wells are sampled periodically. He stated that he is not aware of any contamination detected in any of the wells located on the island (Ref. 14).

Table 6-2 lists the distance to the nearest well for each of the potential sources, as well as their approximate elevations of each source. There is some uncertainty over whether or not the potential sources located near the perimeter of the island are likely to impact fresh water, as it is likely that these areas are underlain with saltwater intrusion. The potential for a complete groundwater pathway was evaluated for each source based on location and elevation, as indicated in Table 6-2.

## Table 6-2
## Groundwater, Surface Water and Soil Pathway Analysis

| Location | Potential Source | Constituents Detected Above Comparison Values | | Approx. Elevation | Distance to Nearest Well | | Potential For Ground-water Impact | Distance to Shore-line | Potential for Surface Water Impact | Potential for Surface Soil Impact |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PA Research | SI Results | | Distance | Nearest Well | | | | |
| **North Garrison** | | | | | | | | | | |
| Beach Area | Former ship fueling operations | Yes | Yes | 0' | 1200' | #3 | Low | 0' | High | High |
| Barracks Building 241 | Former UST location | Yes | No | 90' | 1200' | #3 | Low | 600' | Low | Low |
| Barracks Building 242 | Former UST Location | Yes | Yes | 100' | 1300' | #3 | Low | 200' | Medium | Low |
| East of the water tank | Former UST Location | Yes | No | 90' | 1040' | #3 | Low | 500' | Medium | Low |
| Building 205 | Former UST Location | Yes | Yes | 140' | 600' | #3 | Medium | 1000' | Low | Low |
| Park Maintenance Warehouse, Building 228 | Former UST Location | No | -- | 185' | 520' | #3 | Low | 1200' | Low | Low |
| Hospital, Building 316 | Two possible USTs | Potential | No tanks found | 70' | 1280' | #3 | Low | 200' | Low | Low |
| Fire House, Building 231 | Possible UST | Potential | Tank located | 130' | 620' | #3 | Medium | 1100' | Low | Low |

## Table 6-2, continued
## Groundwater, Surface Water and Soil Pathway Analysis

| Location | Potential Source | Constituents Detected Above Comparison Values | | Approx. Elevation | Distance to Nearest Well | | Potential For Ground-water Impact | Distance to Shore-line | Potential for Surface Water Impact | Potential for Surface Soil Impact |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PA Research | SI Results | | Distance | Well # | | | | |
| **North Garrison, Continued** | | | | | | | | | | |
| Building 80, west of Park Residence | Possible UST | Potential | No tanks found. | 180' | 700' | #3 | Low | 500' | Low | Low |
| Behind Central Heating Plant, Building 314 | Above-ground fuel tanks | Potential | Yes | 30' | 1500' | #3 | Low | 40' | High | Medium |
| 1,000-inch Rifle Range / Boy Scout Camp | Possible UST | Potential | Yes | 200' | 200' | #3 | High | 800' | Medium | High |
| 1,000-inch Rifle Range / Boy Scout Camp | 1,000-inch Rifle Range / Boy Scout Camp | Potential | Potential, tank located | 200' | 200' | #3 | High | 800' | Medium | Low |
| P-100 Pistol Range | Pistol Range | Potential | No | 350' | 300' | #3 | Low | 1200' | Low | Low |

**Table 6-2, continued**
**Groundwater, Surface Water and Soil Pathway Analysis**

| Location | Potential Source | Constituents Detected Above Comparison Values | | Approx. Elevation | Distance to Nearest Well | | Potential For Ground-water Impact | Distance to Shore-line | Potential for Surface Water Impact | Potential for Surface Soil Impact |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PA Research | SI Results | | Distance | Well # | | | | |
| **East Garrison** | | | | | | | | | | |
| Motor Pool Area | Hazardous Waste Drum Storage Area | Yes | Yes | 30' | 2000' | #1 | Low | 200' | Medium | Low |
| Motor Pool Area | Vehicle Lift Rack | Yes | No | 30' | 2000' | #1 | Low | 200' | Medium | Medium |
| Motor Pool Area | Oil Change Rack | Yes | Yes | 30' | 2000' | #1 | Low | 100' | High | High |
| Motor Pool | Incinerator | Yes | Yes | 30' | 2000' | #1 | Low | 10' | High | High |
| Motor Pool Area | Former UST Location | No | -- | 30' | 2000' | #1 | Low | 100' | Low | Low |
| Motor Pool Building 64 | Wash Rack | Potential | No | 30' | 2000' | #1 | Low | 40' | Low | Low |
| Southeast of Post Exchange | Possible UST | Potential | Potential, Tank located | 100' | 1300' | #1 | Low | 800' | Medium | Low |
| Power Plant west of Gym | ASTs | Potential | No | 50' | 1500' | #1 | Low | 150' | Low | Low |
| Power Plant west of Gym | Former Boil Stack | Potential | Yes | 50' | 1500' | #1 | Low | 100' | Medium to High | Med. to High |
| West of Gymnasium | Former Photo Shop | Potential | No | 50' | 1500' | #1 | Low | 100' | Low | Low |
| Transformer pad | Former Transformer Location | Potential | No | 10' | 1600' | #1 | Low | 40' | Low | Low |
| Miscellaneous PCB Equipment | Engineering Building and Warehouse | Potential | Yes | 30' | 2000' | #1 | Low | 100' | Medium | Medium |

## Table 6-2, continued
## Groundwater, Surface Water and Soil Pathway Analysis

| Location | Potential Source | Constituents Detected Above Comparison Values | | Approx. Elevation | Distance to Nearest Well | | Potential For Ground-water Impact | Distance to Shoreline | Potential for Surface Water Impact | Potential for Surface Soil Impact |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PA Research | SI Results | | Distance | Well # | | | | |
| **Ayala Cove** | | | | | | | | | | |
| Visitor's Center, Building 328 | Former UST Location – Abandoned in place | Potential | No | 20' | 400' | #4 | Low | 300' | Low | Low |
| Residence, Building 329 | Former UST Location | No | -- | 40' | 550' | #4 | Low | 250' | Low | Low |
| Residence Area, southwest of Visitor's Center | Former UST Location | No | No | 30' | 400' | # | Low | 300' | Low | Low |
| Residence, between Buildings 331 and 332 | Former UST Location | Potential | No | 40' | 350' | #4 | Low | 400' | No | Low |
| Near State Boat Ramp | Three former ASTs | Potential | No (Inconclusive) | 10' | 1100' | #4 | Low | 10' | Med. | Low |
| Boat Landing Dock | Former Disinfection building | Potential | No | 10' | 750' | #4 | Low | 50' | Low | Low |
| North of Boat Dock | Possible Dump Site | Yes | Yes | 10' | 1100' | #4 | Low | 0' | High | Medium |

**Table 6-2, continued**
**Groundwater, Surface Water and Soil Pathway Analysis**

| Location | Potential Source | Constituents Detected Above Comparison Values | | Approx. Elevation | Distance to Nearest Well | | Potential For Ground-water Impact | Distance to Shoreline | Potential for Surface Water Impact | Potential for Surface Soil Impact |
|---|---|---|---|---|---|---|---|---|---|---|
| | | PA Research | SI Results | | Distance | Well # | | | | |
| **West Garrison** | | | | | | | | | | |
| Parade grounds near flagpole | Possible Dump Site | Potential | No | 30' | 3500' | #4 | Low | 200' | Low | Low |
| North of Mule Barn | Paint Shop | Unlikely | Yes | 100' | 3500' | #4 | Low | 900' | High | High |
| **Pt. Blunt** | | | | | | | | | | |
| Sand Springs Beach, "Grand Canyon" | Possible Cannonball Disposal Area | Yes (Ordnance ID only) | Yes (Ordnance ID only) | 0' | -- | #1 | Low* | -- | Low* | Low* |
| Nike Battery Generator Pad | Possible UST | Potential | No tank found | 50' | 4000' | #1 | Low | 200' | Low | Low |
| Mount Livermore IFC | Possible UST | Potential | No tank found | 780' | 2100' | #1 | Low | 2000' | Low | Low |

Note:
*The cannonballs are solid metal spheres with no evidence of fuse or powder. No environmental hazards associated with groundwater, surface water, or surface soil are likely from the cannonballs.

### 6.1.2 Groundwater Targets

Groundwater, originally tapped via surface springs, has been used on Angel Island for over 100 years. Over the years, nine wells have been installed by the Army (Ref. 6). Four of the nine wells are still in service, supplying water to 30 Park employees including 15 permanent residents, as well as up to 400,000 park visitors annually. Distances from the potential sources to the nearest well are listed on Table 6-2. No wellhead protection areas were identified during the PA.

### 6.1.3 Potential Groundwater Impacts

As shown in Table 6-2, the source areas with potential impact to groundwater at North Garrison include the UST at Building 205 and surface metal contamination at the rifle range. Two newly discovered USTs in North Garrison (at the Fire House and Rifle Range) may also pose a potential threat to groundwater, depending on the site conditions after tank removal.

## *6.2 Surface Water Evaluation*

### 6.2.1 Surface Water Pathway

No streams, rivers, ponds or lakes were identified on the island. There are various seasonal freshwater surface springs throughout the island as discussed above. A number of potential source areas are located fairly close to the shoreline. The hilly nature of the island and highly permeable soil conditions would allow contaminants, if present, to be carried via storm drainage channels into the waters of the San Francisco Bay. Precipitation on Angel Island ranges from 25 to 30 inches per year (Ref. 6). Potential for surface water impact is evaluated in Table 6-2, based on the distance from the shoreline.

Surface water drainage on the island follows natural channels, as well as man-made drainage ways. The only drop inlet drains noted on the island were at the vehicle lift rack in the motor pool area of the East Garrison. It is not known where the drainage from this area is directed.

### 6.2.2 Surface Water Targets

There are no significant surface sources of drinking water on the island, such as ponds or streams. Historically, surface springs on the island have been used as drinking water sources, but could not meet the demands of the occupants.

Fisheries in the vicinity of Angel Island include the San Francisco Bay, which is a source of sport fishing. The Bay serves as a major commercial shipping route. The coves around the island are used for the docking of recreational boats. Swimming is permitted on the beaches.

### 6.2.3 Potential Surface Water Impacts

Based on the results of the SI and previous investigations, several sites have potential to impact surface water, as listed in Table 6-2. The sites most likely to have an impact include the former ship fueling area on the beach at North Garrison and the dump site at Ayala Cove. These sites are located at the bay water interface on the shoreline of the island and have known contamination at the water interface. The ASTs at North Garrison and former AST locations at Ayala Cover are in close proximity to the shoreline as well. The incinerator at the Motor Pool has a high potential for surface runoff contamination.

Other sites with potential for surface water impact are the USTs at Building 242 and east of the water tank in North Garrison, the drum storage area and vehicle lift rack at the Motor Pool, as well as the rifle range, former boiler stack area, and paint shop. The newly discovered USTs at the Rifle Range and near the Post Exchange may present a threat to surface water, depending on the results of confirmation sampling following tank removal.

## *6.3 Soil Exposure Evaluation*

### 6.3.1 Soil Exposure Pathway

There are several areas of known soil contamination on the Island, both surface and subsurface, as discussed in Section 3.0. Subsurface soil contamination is primarily of concern regarding protection of groundwater. Surface soil contamination may cause exposure to residents, park visitors, and park employees, as discussed below.

### 6.3.2 Soil Exposure Targets

Potential soil exposure targets include the 15 to 30 park employees, including approximately 15 permanent residents. Additionally, there are up to 400,00 Park visitors annually (Ref. 6). The known surface soil contamination areas are for the most part inaccessible to the general public. At the UST sites, the contamination is located below the surface. The motor pool area at West Garrison is surrounded by a locked chain link fence.

### 6.3.3 Potential Surface Soil Impacts

Based on the results of the SI and previous investigations, several sites have potential to impact surface soil, as listed in Table 6-2. The sites most likely to have an impact on surface soil include the rifle range at North Garrison and the paint shop at West Garrison. These areas are easily accessible to the public and the metal concentrations were found in near surface soil. The incinerator at East Garrison is also likely to have an impact on surface soil; however, the site is closed to the general public. It is accessible to park employees. The former ship fueling area at the beach in North Garrison may cause an impact to surface soils if the oil leaches from the sand and washes up on the beach.

Other potential surface soil impact areas include the hydraulic reservoir at vehicle lift rack and oil change rack in the Motor Pool, the former boiler stack area, the PCB transformer in the gymnasium, and the dumpsite at Ayala Cove.

## 6.4 Air Pathway Evaluation

No documented or observed releases of hazardous constituents into the air were found during the PA or SI. Potential pathways include wind-blown dust from surface soil contamination. The potential for impact via the air pathway would be similar to those for surface soil, as discussed above.

# 7.0 Data Quality Assessment

## 7.1 Data Validation

Ninety percent of the data was validated at Level III or equivalent, with the remaining 10% at Level IV. A copy of the validation report is located in Appendix G. Data validations reference the *USEPA Contract Program National Functional Guidelines for Organic Data Review* (February 1994, USEPA-540/R-94/012) and the *Contract Laboratory Program National Guidelines for Inorganic Data Review* (October 1999, USEPA-540/R-94/013). For parameters that are not specifically addressed by USEPA's CLP or the validation guidelines, evaluation procedures similar to these references were followed. Validation of non-CLP methods will follow the functional guidelines as closely as possible.

Validation included data qualification, blank evaluation, evaluation of duplicates, spike recoveries, calibration data, holding times and statistical evaluation of data. Table 7-1 presents all data qualifiers used in data validation.

**Table 7-1 Data Qualifiers**
**Fort McDowell / Angel Island, California**

| Qualifier | Description |
|---|---|
| J | The analyte was positively identified; however, the concentration value is an estimate. Also used if a results was measured at a concentration below the Contract Required Quantification Limit (CRQL) or Contract Required Detection Limit (CRDL). |
| U | The analyte was analyzed for, but not detected. |
| UJ | The analyte was analyzed for, but not detected. The associated numerical value is an estimate. |

The quality of the analytical data was evaluated according to project-specific quality assurance guidelines. The purpose of the Data Quality Evaluation (DQE) process is to assess data usability for the project decision-making process.

Before analytical data are released by the laboratory, the laboratory analyst and senior staff members review the data to ensure that method-specific requirements are met, that calculations are proper and correct, and that quality control (QC) parameters are within the specified limits of review for them. Any deficiencies identified in their review are described in the case narrative included in the analytical data package delivered to TN&A, which are reviewed during data evaluation.

After TN&A project staff received the data packages, they are inventoried and reviewed according to matrix-specific protocols established for data quality objectives established for the project. The data review process is documented on checklists, which are maintained in the project files.

Data validation includes review of the following QC audits when they are required by the analytical method being used.

- Case narrative, chain of custody, and sample receipt forms
- Sample preservation, sample preparation/extraction and run logs, sample storage, and

holding time
- Recovery of LCS, MS/MSD, surrogates, and internal standard spikes
- Relative % difference (RPD) of MS/MSD, laboratory duplicates, and field duplicates
- Method blanks, equipment blanks, trip blanks, and instrument calibration blanks
- Instrument and detector tuning, initial and continuing calibrations, and retention times
- Confirm that the correct method of analysis was performed as described in the QAPP
- Confirm that the parameter specific reporting limits (RL) and all QC acceptance criteria conform to the project QAPP
- Select the preferred result when multiple analyses are reported (e.g., if there is a dilution, which results from the two analyses should be reported.)

A detailed description of the data validation results is included as Appendix G.

## 7.2 Deviations from the Workplan

Overall, the procedures outlined in the workplan were followed during the course of the SI field work. This section identifies the deviations from the work plan.

**Table 7-2**
**Deviations from the Workplan**

| Site Description | Work Plan | Field Work | Rationale |
|---|---|---|---|
| Barracks Building 242, North Garrison | Four borings to 15 feet bgs with direct push rig | One boring with hand auger to 5.5 feet bgs | Due to steep slope, the site was inaccessible with the both the truck and track mounted rigs. |
| Deer Pen Tank, East Garrison | Two borings to 15 feet bgs | One boring to 12 feet bgs | No tank was located during the geophysical survey or subsequent backhoe investigation. Because of a prior report that the tank may have rusted away, one boring was advanced in the general vicinity of the suspected tank location. |
| Mount Livermore Nike Control Station Possible UST Location | Geophysical Survey | Site reconnaissance only. | A construction project was underway on Mount Livermore to reconstruct the natural contour of the peak. The site was inaccessible during the field work, and the regrading may have covered the suspected tank location. |
| West Garrison Lighthouse Possible UST | Geophysical Survey | Site reconnaissance only. | The geophysical crew attempted to climb down the cliff to reach the lighthouse site, but could not reach the site safely. No survey was conducted. |
| Central Heating Plant ASTS, North Garrison | Four hand auger samples | Three hand auger samples | Due to concrete paving east of the tanks, two of the planned auger locates could not be used. Instead, one sample was collected along the pipeline toward the beach. |
| Incinerator, East Garrison | Three samples analyzed for PCBS, VOCs, and SVOCS analysis | No samples collected for PCBS, VOCs, and SVOCS analysis | The samples were inadvertently omitted. The analysis will be performed during the RI phase. |

# 8.0 Investigation Derived Waste

Investigation derived waste (IDW) was generated during the course of the fieldwork including personal protective equipment (PPE), disposable sampling equipment, and drill cuttings. Drill cuttings were collected in a 55-gallon DOT–approved steel drum. The drum was stored at the Motor Pool in East Garrison at the staging area for the project located in the Engineering Building. Other wastes including PPE and disposable sampling equipment were collected and bagged during the course of the project. The IDW drum was labeled and stored at the staging area until the laboratory analysis was complete. Because the soil samples contained metals in excess of regulatory limits, the waste was disposed of as hazardous waste. TN&A subcontracted with Hazardous Disposal Specialists, Inc. to haul and dispose of the waste. The waste was shipped under a Uniform Waste Manifest, transported by a fully licensed waste transporter, and delivered to a disposal facility fully insured and permitted for this specific type of waste.

Sampling decontamination fluids generated during the project consisted of deionized water, residual contaminants, and water with non-phosphate detergent. The volume and concentration of the decontamination fluid was sufficiently low to allow disposal at the site or sampling area. The water (and water with detergent) was poured onto the ground at the sample location.

# 9.0 Summary and Conclusions

## 9.1 Summary

The results of sampling activities conducted during the Site Investigation at Fort McDowell indicate that constituents of concern exist at several sites at concentrations exceeding the regulatory comparison values established for the project. Table 8-1 summarized these sites. A discussion of each type of contaminant follows.

**Table 8-1**
**Summary of Constituents Exceeding Comparison Values**

| Site Name | Parameter | Media | Units | Result | *Comparison Value* |
|---|---|---|---|---|---|
| Building 242 UST | Diesel | Soil | MG/KG | 4,700 (Dupl 6,500) | *500 (1)* |
| Building 205 UST | Diesel | Soil | MG/KG | 150 mg/kg | *100 (2)* |
| North Garrison AST | Diesel | Soil | MG/KG | 2,400 | *500* |
| | Motor Oil | Soil | MG/KG | 2,700 | *500* |
| Ayala Cove Dump Site | Lead | Soil | MG/KG | 460 | *400* |
| | Arsenic | Soil | MG/KG | 6 to 9.6 | *8* |
| | Diesel | Soil | MG/KG | 2,700 to 3,800 | *500* |
| | Benzo(a)pyrene | Soil | UG/KG | 74 to82 | *62* |
| | Diesel | Water | UG/L | 3,600,000 | *640* |
| | Motor Oil | Water | UG/L | 93,000 | *640* |
| | Gasoline | Water | UG/L | 1,100 | *500* |
| | Lead | Water | UG/L | 23 | *15* |
| Drum Storage Area | Lead | Soil | MG/KG | 1,500 | *400* |
| Oil Change Rack | Lead | Soil | MG/KG | 760 | *400* |
| Incinerator | Arsenic (Method 6010) | Soil | MG/KG | 28 | *8* |
| | Cadmium (Method 6010) | Soil | MG/KG | 26 | *9* |
| | Lead (Method 6010) | Soil | MG/KG | 3,100 J | *400* |
| | Cadmium (EDXRF) | Soil | MG/KG | 16 to 24 | *9* |
| | Lead (EDXRF) | Soil | MG/KG | 440 to 6,200 | *400* |
| | Copper (EDXRF) | Soil | MG/KG | 16,000 | *2,900* |
| Former Ship Fueling | Diesel | Soil | MG/KG | 600 to 10,000 | *500* |
| | Motor Oil | Soil | MG/KG | 750 to 8,700 | *500* |
| Electrical Substation | Aroclor-1260 | Soil | UG/KG | 340,000 to 2,400,000 | *220* |
| Paint Shop | Lead | Soil | MG/KG | 1,900 J | *400* |
| Former Boiler Stack | Lead | Soil | MG/KG | 500 to 940 J | *400* |
| Electrical Eq. Storage | Aroclor-1260 | Oil | UG/KG | 560,000 | *50,000* |
| Rifle Range | Lead | Soil | MG/KG | 660 to 680 | *400* |

Note: J = Estimated value.
(1) RBSL where groundwater is not a potential source of drinking water.
(2) RBSL where groundwater is a potential source of drinking water.

Metals

The primary metals of concern at Fort McDowell are lead and arsenic, which were found at many sites around the island. Discussion of the specific metals follows.

*Arsenic*

Arsenic concentrations in the SI samples range: from 5.5 to 28 mg/kg, compared to the Residential PRG of 2.7 mg/kg, the Presidio ambient level of 2.5 to 5.4 mg/kg for serpentinite, and the SF RWQCB average background concentration of 8 mg/kg for Bay Area alluvium and fill (background could range to 20+ in some areas) (Ref. 13).

- Arsenic and cadmium detected at the incinerator ash are most likely a direct result of the incinerator use (28 and 26 mg/kg, respectively).
- Arsenic at the Ayala Cove dump site, oil change rack, and rifle range are close to the ambient concentrations, ranging from 5.5 to 9.6 mg/kg.
- Arsenic was detected in one pistol range sample at 20 mg/kg. No other significant concentrations of other metals were detected at this site. The source of arsenic at the pistol range is unknown. Arsenic is not typically associated with fire range operations.

*Lead*

Lead was detected at a range of 460 to 3,100 J mg/kg as shown below.

- The source of lead (23 ug/L) in water samples at the Ayala Cove Dump Site is uncertain. The fact that it was found with high concentrations of petroleum hydrocarbons indicate that it could have been present in leaded gasoline.
- The drum storage area and oil change rack are both located east of Motor Pool Building 130. Lead was detected at the drum storage area at 1,500 mg/kg, and at the oil change rack at 760 mg/kg. The samples were collected approximately 60 feet apart at a depth of 6 feet bgs.
- Lead at the incinerator (3,100 J mg/kg) is most likely from the incinerator ash.
- The lead found at the rifle range was at fairly low concentrations (600 and 680 mg/kg), in a fairly limited area, in two samples approximately 20 feet apart.
- Lead at the paint shop (1,900 mg/kg) in West Garrison was detected in a composite sample taken from an area approximately 75' by 50'.

Petroleum Hydrocarbons

Petroleum hydrocarbons were detected in samples from a number of sites. The comparison values for petroleum hydrocarbons were taken from the SF RWQCB's *The Application of Risk-Based Screening Levels and Decision Making To Sites With Impacted Soils And Groundwater, Interim Final,* December 2001.

- The Ayala Cove dump site samples from the second test pit had obvious petroleum hydrocarbon staining. Analytical results indicated high levels of both heavy (diesel, motor oil) and light (gasoline) petroleum hydrocarbons in soil and water samples. The presence of lead in the water samples may indicate that leaded gasoline is present. The source of the petroleum hydrocarbons is unknown. Potential sources include three former aboveground fuel tanks, fuel spills in the bay that may have washed on shore, and fuel spills in the boat ramp area adjacent to the dump site.
- Similarly, the origin of the petroleum hydrocarbons found in the beach sands at North Garrison is unknown. Possible sources include fuel spills in the bay, the former ship fueling operations at North Garrison, and the four above ground tanks located behind the power plant building adjacent to the beach. Fingerprinting samples were collected from the above ground tanks in order to compare the results to the beach sand samples. The

comparison was inconclusive, indicating only that the samples are of similar heavy-end products. See Appendix F for details.

- Petroleum hydrocarbons were detected in one sample collected approximately 10 feet north of the North Garrison aboveground fuel tanks at 2,700 mg/kg at a depth of five feet.
- No significant concentrations of petroleum hydrocarbons were detected at seven of the eight former UST sites included in the SI. A sample collected at the former tank location at Barracks Building 442 in North Garrison had TPH-D at a maximum concentration of 6,000 mg/kg. Only one sample was collected at this site due to rig inaccessibility (truck and track-mounted rigs), and refusal with the hand auger.

## 9.2 Recommendations

Each potential source area has been evaluated based on the results of the SI and previous investigation results. Based on this analysis, recommendations for further investigation or no further action are presented in Table 8-2 for each potential source area at Fort McDowell. A table summarizing the progress of each site through the investigation and remedial process for petroleum and non-petroleum sites is located in Appendix I.

# Table 8-2
# Recommendations for Further Investigation
# North Garrison

| Location | Potential Source | Size | Constituents Exceeding Comparison Values | Recommendations |
|---|---|---|---|---|
| Beach Area | Former ship fueling operations | 12,000 square feet (300' x 40') at a depth of 4 to 6 feet bgs | SI Results<br>TPH-D – 600 to 10,000 mg/kg<br>TPH-MO – 750 to 8700 mg/kg<br><br>Previous Investigation<br>Lead – 99.1-485 mg/kg[a]<br>Benzo(a)pyrene – 1.650 mg/kg[a] | The source of the fuel on beach is not certain.<br><br>Recommend Corrective Action Study to address the beach contamination. |
| Barracks Building 241 | Former UST location | 500-gallon heating oil | SI Results<br>No additional contamination found.<br>Previous Investigation<br>TPH-D – 1,500-3,600 mg/kg[b] (collected 6' bgs during tank removal, approx. 1' below bottom of excavation) | Recommend site closure. Sampling conducted during the SI did not locate any petroleum contamination at or near the former tank location. |
| Barracks Building 242 | Former UST Location | 300-gallon heating oil | SI Results<br>TPH-D – 4,700 to 6,000<br>Previous Investigation<br>TPH-diesel 5,300-7,700 mg/kg[b] | Recommend Corrective Action Study to assess remediation options. |
| East of the water tank | Former UST Location | 500-gallon heating oil | SI Results<br>No additional contamination found.<br>Previous Investigation<br>TPH-D – 150-11,000 mg/kg[b] (collected 4.5' bgs during tank removal, approx 1' below bottom of excavation) | Recommend site closure. Sampling conducted during the SI did not locate any petroleum contamination at or near the former tank location. |

## Table 8-2, Continued
## Recommendations for Further Investigation
## North Garrison

| Location | Potential Source | Size | Potential Constituents/ Known Concentrations[a] | Recommendations |
|---|---|---|---|---|
| Building 205 | Former UST Location | 500-gallon heating oil | SI Results<br>TPH-D – 150 mg/kg<br>Previous Investigation<br>TPH-D – 150-380 mg/kg [b]<br>(collected 9' bgs during tank removal, approx. 1' below bottom of excavation) | Recommend site closure. The site is a low-risk site, given the relatively low concentration of diesel, and the fact that the tank is located 600 feet from the nearest water well. |
| Park Maintenance Warehouse, Building 228 | Former UST Location | 2,000-gallon unleaded gasoline | Previous Investigation<br>TPH-G – ND [b]<br>Purgeable Organics - ND [b] | Recommend site closure. |
| Hospital, Building 316 | Two possible USTs | Unknown | No tank was located. | No further action. |
| Fire House, Building 231 | Possible UST | 6' long, approx. 36" diameter | Tank location confirmed. | Tank removal and confirmation sampling. |
| Building 80, west of Park Residence | UST | Unknown | No tank was located. | No further action. |
| Behind Central Heating Plant, Building 314 | Aboveground fuel tanks | Unknown | SI Results<br>TPH-D – 2,400 mg/kg<br>TPH-MO – 2,700 mg/kg | Corrective Action Study to assess remediation options, including soil borings next to tanks. |
| 1,000-inch Rifle Range | UST | 6' long, approx. 36" diameter | Tank location confirmed. | Tank removal and confirmation sampling. |
| | Rifle Range | Approximately 100' x 100' | SI Results<br>Lead – 660 to 680 mg/kg | RI/FS to assess remediation options. |

# Table 8-2, Continued
# Recommendations for Further Investigation
# North Garrison

| Location | Potential Source | Size | Potential Constituents/ Known Concentrations[a] | Recommendations |
|---|---|---|---|---|
| P-100 Pistol Range / Sunrise Campsite | P-100 Pistol Range | Approximately 100' x 100' | SI Results<br>No analytical results over the comparison values. | No further action. |

Notes:
a Screening Assessment Report East Garrison Motorpool (Ref. 10)
b Limited Scope Site Investigation (Ref. 4).
c Report of Underground Storage Tank Closure, DGS (Ref. 12)

# Table 8-3
# Recommendations for Further Investigation
# East Garrison

| Location | Potential Source | Size | Potential Constituents/ Known Concentrations | Recommendations |
|---|---|---|---|---|
| Motor Pool Area | Hazardous Waste Drum Storage Area | Approximate 20' x 20' area inside motorpool building (lead found outside of building) | SI Results<br>Lead – 1,500 mg/kg<br><br>Previous Investigation<br>Arsenic – 3.3-8.2 mg/kg[a]<br>TRPH – ND-520 mg/kg[a]<br>TPH-diesel – 4.4-690 mg/kg[a]<br>Benzo(a)pyrene – 1.28-9.45 mg/kg[a] | RI/FS to assess remediation options. |
| | Vehicle Lift Rack | 5' x 5' | SI Results<br>No additional contamination detected.<br><br>Previous Investigation<br>Lead – 1,200-7,280 mg/kg[b]<br>Benzo(k)fluoranthene – ND-1.29 mg/kg[b]<br>Benzo(a)pyrene – ND- 1.28 mg/kg[b]<br>Pyrene – ND-1.11 mg/kg[b] | RI/FS to assess remediation options. Note: the contamination appears to be associated primarily with the drop inlets, which are potential culturally significant structures. |

## Table 8-3, Continued
## Recommendations for Further Investigation
## East Garrison

| Location | Potential Source | Size | Potential Constituents/ Known Concentrations | Recommendations |
|---|---|---|---|---|
| Motor Pool Area | Oil Change Rack | 20' x 60' | SI Results<br>Lead - 760 mg/kg<br><br>Previous Investigation<br>Lead – 2,560 mg/kg[b]<br>Benzo(k)Fluoranthene – ND-7.55 mg/kg[b]<br>Benzo(a)pyrene – ND-9.45 mg/kg[b] | RI/FS to assess remediation options. Additional investigation to delineate extent of lead east of Building 130. |
| | Incinerator | Approximately 50' x 75' | SI Results<br>Arsenic – 28 mg/kg (6010)<br>Cadmium – 26 mg/kg (6010)<br>Lead – 3,100 J mg/kg (6010)<br>Nickel – 200 mg/kg (6010)<br>Cadmium – 24 mg/kg (EDXRF)<br>Chromium – 290 (EDXRF)<br>Copper – 16,000 (EDXRF)<br>Lead – 6,200 mg/kg (EDXRF)<br>Zinc – 23,000(EDXRF)<br><br>Previous Investigation<br>Lead – 280-1150 mg/kg[b] | RI/FS to assess remediation options. Additional investigation to delineate the extent of metals contamination. |

## Table 8-3, Continued
## Recommendations for Further Investigation
## East Garrison

| Location | Potential Source | Size | Potential Constituents/ Known Concentrations | Recommendations |
|---|---|---|---|---|
| Motor Pool, Continued | Former UST Location | 10,000-gallon gasoline | Previous Investigation<br>TPH-gasoline – ND[c]<br>Purgeable Organics - ND[c] | Recommend site closure. |
| | Wash Rack at Building 64 | 30' x 40' | SI Results<br>None detected. | No further action. |
| | Warehouse, Engineer's Building, Gymnasium | 2 transformers, 2 oil filled containers, one circuit breaker, one hopper | SI Results<br>PCBs 560,000 ug/kg in transformer oil | Remove and dispose of transformers. Drain oil from other equipment. |

## Table 8-3, Continued
## Recommendations for Further Investigation
## East Garrison

| Location | Potential Source | Size | Potential Constituents/ Known Concentrations | Recommendations |
|---|---|---|---|---|
| Southeast of Post Exchange | UST | Unknown | Tank location confirmed. | Abandon tank in place and collect confirmation samples. |
| Power Plant west of Gymnasium | Aboveground fuel tanks | 30,000-gallon<br>31,000-gallon | SI Results<br>No constituents detected above comparison values. | No further action. |
| Northwest of Gymnasium | Former Boiler Stack Location | 100' x 150' | SI Results<br>Chromium 300 J to 310 J<br>Lead - 500 to 940 mg/kg<br>Nickel – 320 to 710 mg/kg | RI/FS. Additional investigation to delineate the extent of metals contamination. |
| Northwest of Gymnasium | Photo Shop | 10' x 12' | SI Results<br>No constituents detected above comparison values. | No further action. |
| Deer Pen Tank | Possible UST | Unknown | SI Results<br>No constituents detected above comparison values. (The tank was not located.) | No further action. |
| East of Hospital Building | Electrical Substation | 15' x 20' | SI Results<br>PCBs – 340,000 to 2,400,000 ug/kg | Determine source of PCBs and potentially responsible parties. Conduct RI/FS to assess remediation options, if necessary. |
| Transformer pad | Former transformer location | 12' x 12' pad surrounded by fence. | SI Results<br>No constituents detected above comparison values. | No further action. |

Notes:
a Screening Assessment Report East Garrison Motorpool (Ref. 10)
b Limited Scope Site Investigation (Ref. 4).
c Report of Underground Storage Tank Closure, DGS (Ref. 12)

# Table 8-4
# Recommendations for Further Investigation
# Ayala Cove

| Location | Potential Source | Size | Potential Constituents/ Known Concentrations | Recommendations |
|---|---|---|---|---|
| Visitor's Center, 10 SW of Building 328 | Former UST Location – Abandoned in place | Unknown | SI Results<br>No constituents detected above comparison values | Recommend tank closure. |
| Residence, Building 329 | Former UST Location | 1,000-gallon heating oil | Previous Investigation<br>TPH-diesel – ND[a] | No further action. |
| Residence Area, 80' southwest of Visitor's Center | Former UST Location | 1,000-gallon heating oil | SI Results<br>No constituents detected above comparison values<br>Previous Investigation<br>TPH-diesel – ND-17 mg/kg[a] | Recommend tank closure. |
| Residence, between Buildings 331 and 332 | Former UST Location | Unknown | SI Results<br>No constituents detected above comparison values | Recommend tank closure. |
| Near State Boat Ramp | Three former ASTs | Unknown | SI Results<br>No constituents detected above comparison values | No further action. |
| Boat Landing Dock | Former disinfection building | Approximately 30' x 40' | SI Results<br>No constituents detected above comparison values | No further action. |

## Table 8-4, Continued
## Recommendations for Further Investigation
## Ayala Cove

| Location | Potential Source | Size | Potential Constituents/ Known Concentrations | Recommendations |
|---|---|---|---|---|
| North of Boat Dock | Possible dump site | Approximately 40' x 100' | SI Results<br>Beryllium 160 to 540 mg/kg<br>Lead - 460 mg/kg<br>Mercury 24 to 460 mg/kg<br>TPH-D - 2,700 to 3,800 mg/kg<br><br>TPH-D - 3,600,000 ug/l (water sample)<br>TPH-MO - 93,000 ug/l (water sample)<br>TPH-G - 1,100 ug/l (water sample)<br>Lead - 23 ug/l (water sample)<br><br>Previous Investigation<br>Lead – 423 mg/kg[b] | The source of the detected constituents is uncertain.<br><br>Recommend Remedial Investigation/Feasibility Study (RI/FS) to address the dump site area. |

Notes:
[a] Report of Underground Storage Tank Removal, Nov 3, 2000 (Ref. 12).

## Table 8-5
## Recommendations for Further Investigation
## West Garrison

| Location | Potential Source | Size | Potential Constituents/ Known Concentrations | Recommendations |
|---|---|---|---|---|
| Parade grounds near flagpole | Possible Dump Site | Approximately 200' x 400' | SI Results<br>No constituents detected above comparison values except nickel at 160 to 260 mg/kg, which is suspected to be within ambient concentrations. | No further action. |
| Electrical Substation | Electrical Substation | Approximately 20' by 20' | Previous Investigation<br>PCBs – ND[a] | No further action. |
| North of Mule Barn | Paint Shop | Unknown | SI Results<br>Lead – 1,900 J mg/kg | Recommend RI/FS to address the metal contamination. |

Notes:
[a] Limited Scope Site Investigation (Ref. 4).

## Table 8-6
## Recommendations for Further Investigation
## Point Blunt

| Location | Potential Source | Size | Potential Constituents/ Known Concentrations | |
|---|---|---|---|---|
| Sand Springs Beach, "Grand Canyon" | Possible cannonball disposal area | Approximately ¼ mile of beach. | Two cannonballs found along beach. | The cannonball site will be referred to the USACE Huntsville Division for an OE investigation. The Huntsville Division will direct any ordnance investigations at the site. |
| Nike Battery Generator Pad | Possible UST | Unknown | No tank was found. | No further action. |
| Mount Livermore IFC | Possible UST | Unknown | No tank was found. | No further action. |

## 9.3 Conclusions

The Site Investigation conducted at Fort McDowell in June 2002 helped to further define the extent of environmental contaminants at several sites around the island. In general, the concentrations of constituents detected during the SI are fairly low, with the exception of the petroleum hydrocarbons found at the beach in North Garrison and the dump site at West Garrison. The sites recommended for further investigation are summarized below:

| Petroleum Program | Non-Petroleum Program |
|---|---|
| Corrective Action<br>• UST at Barracks Building 242<br>• Former Ship Fueling Area<br>• Aboveground Tanks at North Garrison Central Heating Plant<br><br>Tank Removal and Confirmation Sampling<br>• Fire House Building 231 UST<br>• Rifle Range House UST<br>• UST South of Post Exchange<br><br>Site Closures<br>• UST at Barracks Building 241<br>• UST East of Water Tank<br>• UST at Building 205<br>• UST at Residence Building 332<br>• UST at Visitor's Center Building 328<br>• UST Park Maintenance Warehouse<br>• UST at Motor Pool Building 130<br>• UST at Building 329<br>• UST at the residence southwest of the Visitor's Center<br><br>No Further Action<br>• ASTs at Gymnasium/East Garrison<br>• Possible UST Hospital Building 316<br>• Possible UST Building 80<br>• Possible UST Deer Pen<br>• Possible UST Nike Generator<br>• Possible UST Mount Livermore | Remedial Investigation/Feasibility Study<br>• Rifle Range<br>• Ayala Cove Dump Site and ASTs<br>• West Garrison Paint Shop<br>• Former Boiler Stack Location<br>• Motor Pool<br>- Drum Storage Area<br>- Oil Change Rack<br>- Vehicle Lift Rack<br>- Incinerator<br><br>PCB Item Removal<br>• Transformers in the Gymnasium<br><br>Ordnance Evaluation/Removal<br>▪ Cannonballs at Sands Springs Beach<br><br>Evaluate Source of Constituents<br>• Former Ship Fueling<br>• Ayala Cove Dump Site<br><br>No Further Action<br>• Pistol Range<br>• Wash Rack, Building 64<br>• Photo Shop<br>• Transformer Pad<br>• Former disinfection building<br>• Dump Site at West Garrison<br>• Electrical Substation at West Garrison |

In addition, three sites were found after the SI work plans were developed. These sites should be included in the next round of investigation at Fort McDowell:

Additional Sites for Investigation
- Possible dump site at the Pistol Range
- Possible dump site at Pearl's Beach
- Possible dump site at the West Garrison Hospital

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# APPENDIX A

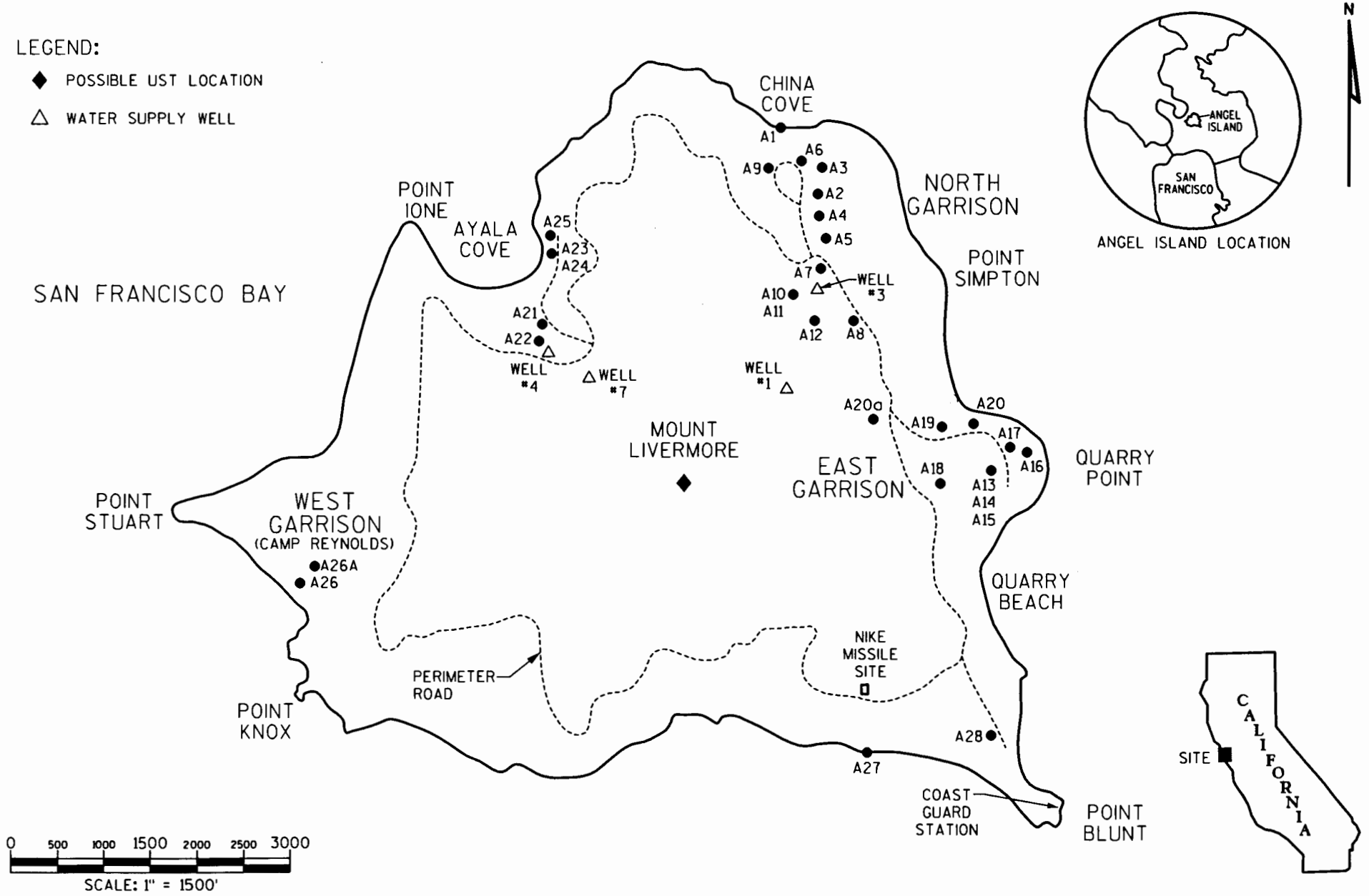
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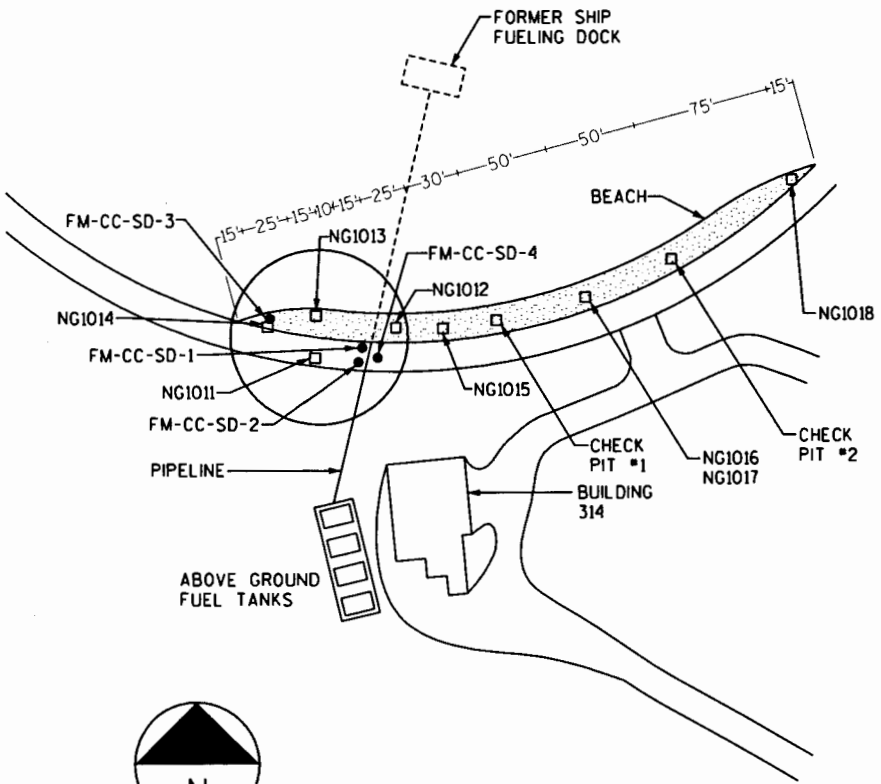

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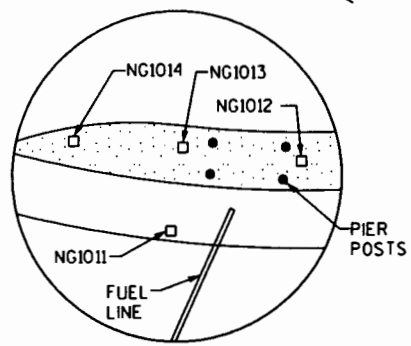
FIGURE A-INDEX
FORT MCDOWELL / ANGEL ISLAND
SITE LOCATIONS

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

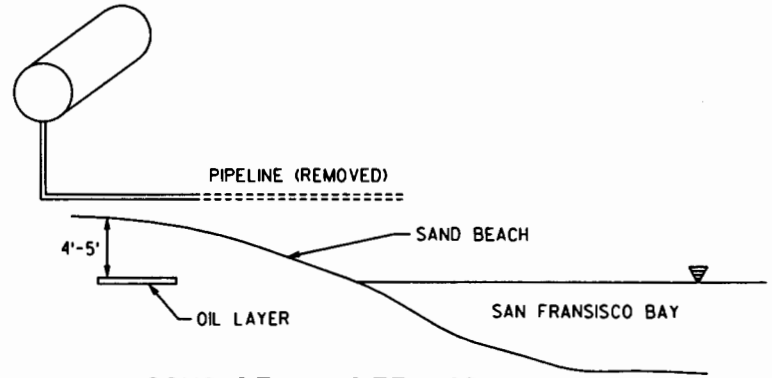
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DATE: 12/06/2002




SITE LAYOUT & SAMPLE LOCATIONS




CONCEPTUAL SITE MODEL

SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | NG1011 | NG1012 | NG1013 | NG1014 | NG1015 | NG1016 | NG1017 | NG1018 |
|---|---|---|---|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | T-NG-FSF-11 (Beach Pits) | T-NG-FSF-12 (Beach Pits) | T-NG-FSF-13 (Beach Pits) | T-NG-FSF-14 (Beach Pits) | T-NG-FSF-15 (Beach Pits) | T-NG-FSF-16 (Beach Pits) | T-NG-FSF-16 (Beach Pits) | T-NG-FSF-18 (Beach Pits) |
| SAMPLE PURPOSE: | | N | N | N | N | N | N | FD-NG1018 | N |
| SAMPLING DEPTH (ft): | | 3' | 5.5' | 5.5' | 5.5' | 5.5' | 5.5' | 5.5' | 5.5' |
| Analysis | Units | | | | | | | | |
| TPH | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | **1200** | **940** | **600** | 16 | **4300** | **7800** | **10000** | 70 |
| Motor Oil C24-C36(SGCU) | MG/KG | **5000** | **890** | **750** | 60 | **4100** | **7100** | **8700** | 120 |
| VOCs | | | | | | | | | |
| Carbon Disulfide | UG/KG | | | | | | 6.7 J | 5.5 U | |
| Toluene | UG/KG | | | | | | 5.4 U | 0.57 J | |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

| PREVIOUS SOIL SAMPLE RESULTS | | | | | |
|---|---|---|---|---|---|
| ANALYTE | FM-CC-SD-1 | FM-CC-SD-2 | FM-CC-SD-3 | FM-CC-SD-4 | FM-CC-SD-5 |
| BERYLLIUM | 0.368 mg/kg | 0.350 mg/kg | 0.350 mg/kg | 0.567 mg/kg | 0.337 mg/kg |
| CHROMIUM | 52.1 mg/kg | 31.9 mg/kg | 38.2 mg/kg | 41.0 mg/kg | 44.9 mg/kg |
| COPPER | 50.2 mg/kg | 42.2 mg/kg | 33.4 mg/kg | 62.7 mg/kg | 47.7 mg/kg |
| LEAD | 287 mg/kg | 162 mg/kg | 99.1 mg/kg | 485 mg/kg | 340 mg/kg |
| NICKEL | 60.1 mg/kg | 41.5 mg/kg | 45.8 mg/kg | 60.1 mg/kg | 71.0 mg/kg |
| ZINC | 124 mg/kg | 86.5 mg/kg | 123 mg/kg | 105 mg/kg | 99.4 mg/kg |
| MERCURY | 0.0894 mg/kg | 0.0628 mg/kg | 0.0562 mg/kg | 0.0909 mg/kg | 0.0556 mg/kg |
| BENZO (k) FLUORANTHENE | 1.65 mg/kg | ND | ND | ND | ND |
| BENZO (a) PYRENE | 1.65 mg/kg | ND | ND | ND | ND |
| PYRENE | 8.44 mg/kg | ND | ND | ND | ND |

ND - NON DETECT
SAMPLES COLLECTED AT 4'BGS

SOURCE: LIMITED SCOPE SITE INVESTIGATION, MARCH 2000

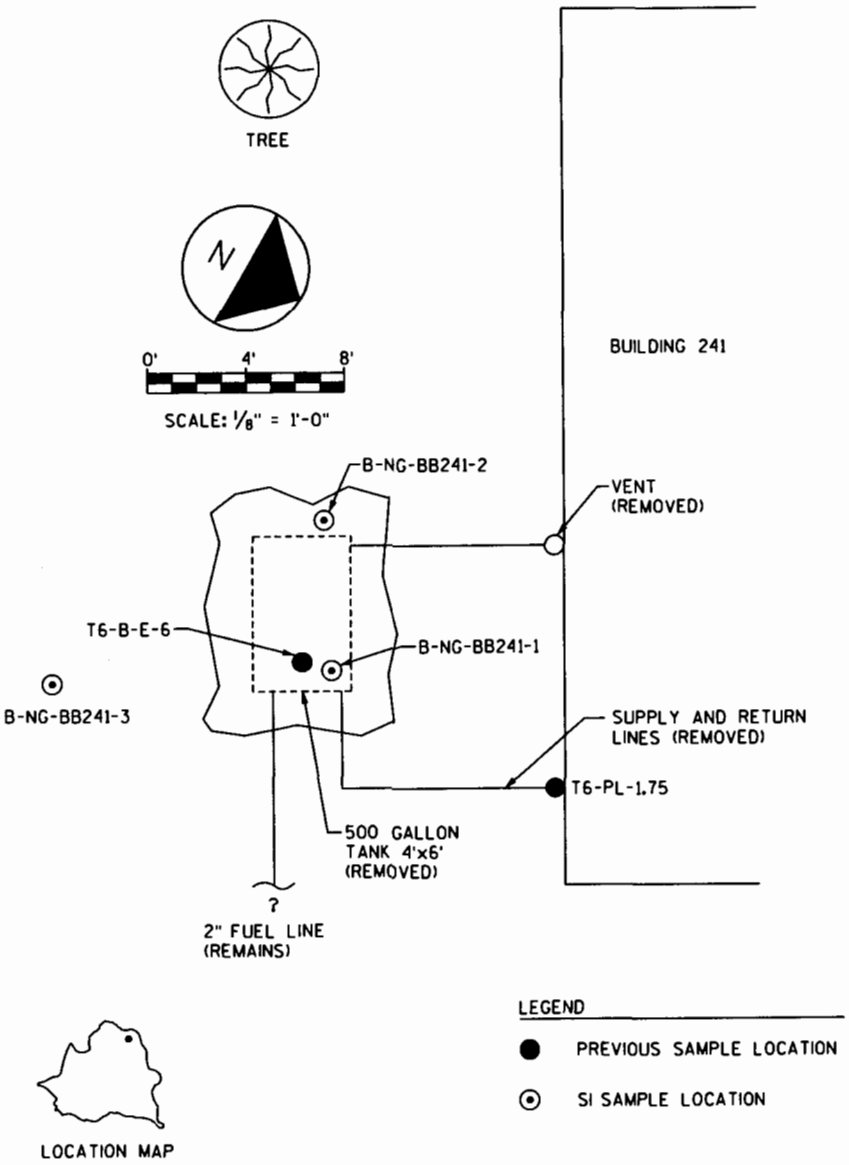
TN & Associates, Inc.
Engineering and Science

FIGURE A1
NORTH GARRISON - FORT MCDOWELL/ANGEL ISLAND
FORMER SHIP FUELING OPERATIONS
BEACH AREA

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a1.dgn

DATE: 12/04/2002




SITE LAYOUT & SAMPLE LOCATIONS

## SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | NG1142 | NG1143 | NG1144 |
|---|---|---|---|---|
| LOCATION DESCRIPTION: | | B-NG-BB241-3 (12' south of fill) | B-NG-BB241-1 (fill port) | B-NG-BB241-2 (opposite end of tank) |
| SAMPLE PURPOSE: | | N | N | N |
| SAMPLING DEPTH (ft): | | 9' | 11' | 1' |
| Analysis | Units | | | |
| TPH | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 21 | 2.2 | 1.1 J |
| Motor Oil C24-C38(SGCU) | MG/KG | 6.8 | 6.2 | 5.8 U |
| VOCs | | | | |
| No VOCs Detected | | | | |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

| PREVIOUS SOIL SAMPLE RESULTS | | | |
|---|---|---|---|
| SAMPLE I.D. | DESCRIPTION | SAMPLE DEPTH BELOW GROUND SURFACE | TPH-DIESEL EPA 8015M (mg/kg) |
| T6-B-E-6 | EXCAVATION BOTTOM SAMPLE COLLECTED 1 FOOT BELOW REMOVED UST, EAST END | 6 | 3,600 |
| T6-PL-1.75 | PIPELINE SAMPLE COLLECTED 1 FOOT EAST OF BUILDING FOUNDATION | 1.75' | 150 |
| T6-SP-COMP | EXCAVATED SOIL STOCKPILE COMPOSITE COMPRISED OF THREE RANDOMLY SELECTED DISCRETE SAMPLES | N/A | 4,400 |

SOURCE: REPORT OF UNDERGROUND TANK CLOSURE, NOVEMBER 2000

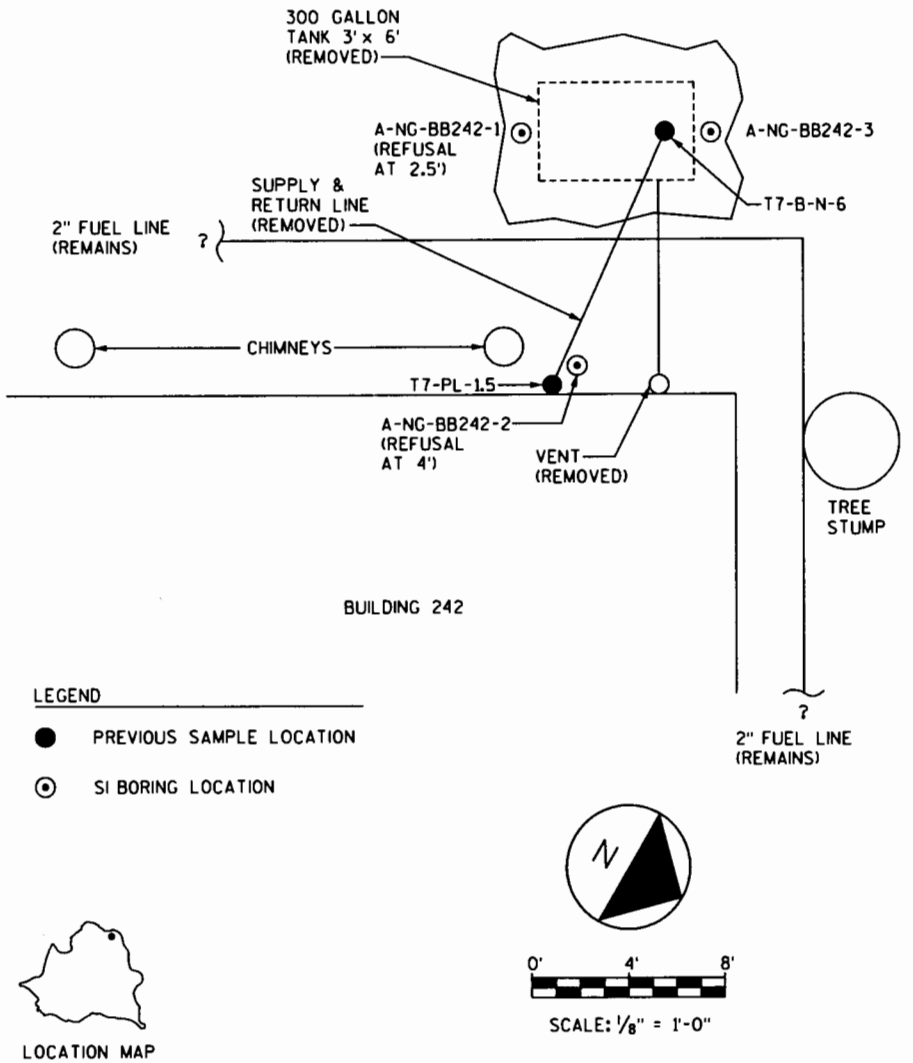
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Engineering and Science

FIGURE A2
NORTH GARRISON · FORT MCDOWELL/ANGEL ISLAND
FORMER UST LOCATION
BARRACKS BUILDING 241

DSGN MB
DR MW
CHK MB
PROJ ID 2001070

FILE NAME: D:\2001projects\2001070 - angelisland\figure_a2.dgn

DATE: 12/04/2002




SITE LAYOUT & SAMPLE LOCATIONS

## SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | NG1148 | NG1149 |
|---|---|---|---|
| LOCATION DESCRIPTION: | | B-NG-BB242-3 (near fill HA) | B-NG-BB242-3 (near fill HA) |
| SAMPLE PURPOSE: | | N | FD-NG1148 |
| SAMPLING DEPTH (ft): | | 5' | 5' |
| **Analysis** | **Units** | | |
| **TPH** | | | |
| Diesel C12-C24(SGCU) | MG/KG | **4700** | **6500** |
| Motor Oil C24-C36(SGCU) | MG/KG | 240 | 250 |
| **VOCs** | | | |
| 1,2,4-Trimethylbenzene | UG/KG | 99 | 88 |
| 1,3,5-Trimethylbenzene | UG/KG | 47 | 45 |
| 2-Butanone | UG/KG | 1.3 J | 9.1 U |
| Carbon Disulfide | UG/KG | 5.1 U | 0.28 J |
| Ethylbenzene | UG/KG | 4.6 J | 4 |
| Isopropylbenzene | UG/KG | 7.1 | 6.8 |
| m,p-Xylenes | UG/KG | 15 | 13 |
| Naphthalene | UG/KG | 86 | 75 |
| n-Butylbenzene | UG/KG | 20 | 18 |
| o-Xylene | UG/KG | 23 | 22 |
| para-Isopropyl Toluene | UG/KG | 20 | 19 |
| Propylbenzene | UG/KG | 13 | 12 |
| sec-Butylbenzene | UG/KG | 11 | 11 |
| tert-Butylbenzene | UG/KG | 0.64 J | 0.76 J |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

| PREVIOUS SOIL SAMPLE RESULTS | | | |
|---|---|---|---|
| SAMPLE I.D. | DESCRIPTION | SAMPLE DEPTH BELOW GROUND SURFACE | TPH-DIESEL EPA 8015M (mg/kg) |
| T7-B-N-6 | EXCAVATION BOTTOM SAMPLE COLLECTED 1 FOOT BELOW REMOVED UST, NORTH END | 6 | 7,700 |
| T7-PL-1.5 | PIPELINE SAMPLE COLLECTED 1 FOOT WEST OF BUILDING FOUNDATION | 1.75' | 5,300 |
| T7-SP-COMP | EXCAVATED SOIL STOCKPILE COMPOSITE COMPRISED OF THREE RANDOMLY SELECTED DISCRETE SAMPLES | N/A | 6,300 |

SOURCE: REPORT OF UNDERGROUND TANK CLOSURE, NOVEMBER 2000

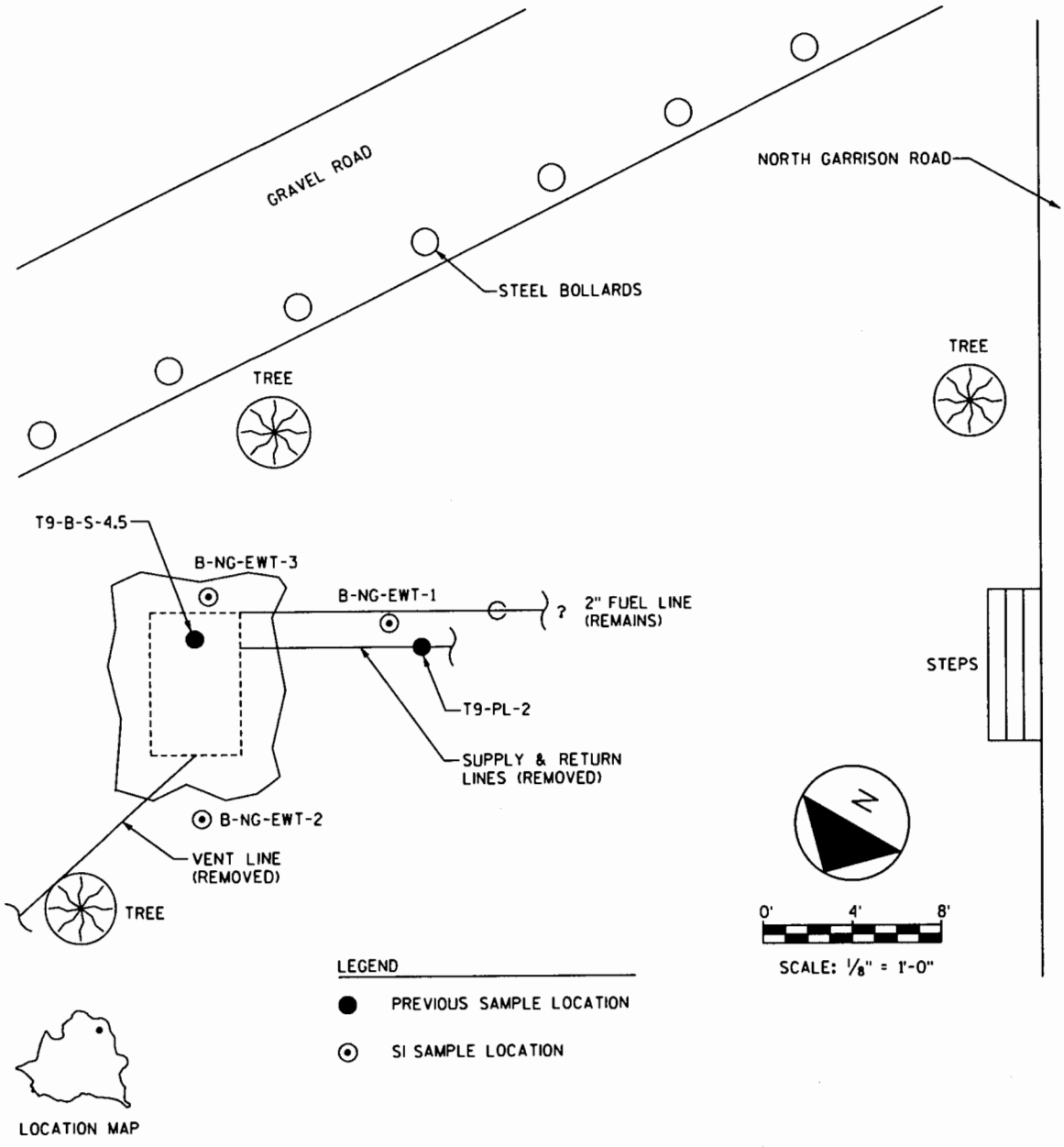
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FIGURE A3
NORTH GARRISON - FORT MCDOWELL/ANGEL ISLAND
FORMER UST LOCATION
BARRACKS BUILDING 242

DSGN MB
DR MW
CHK MB
PROJ ID 2001070

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a3.dgn

DATE: 12/04/2002




SITE LAYOUT & SAMPLE LOCATIONS

SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | NG1154 | NG1155 | NG1156 | NG1157 |
|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | B-NG-EWT-3 | B-NG-EWT-3 | B-NG-EWT-2 | B-NG-EWT-1 |
| SAMPLE PURPOSE: | | N | N | N | N |
| SAMPLING DEPTH (ft): | | 5' | 5' | 9' | 10' |
| Analysis | Units | | | | |
| TPH | | | | | |
| None Detected | MG/KG | | -- | -- | -- |
| VOCs | | | | | |
| tert-Butylbenzene | UG/KG | 6.1 J | | | |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

| PREVIOUS SOIL SAMPLE RESULTS | | | |
|---|---|---|---|
| SAMPLE I.D. | DESCRIPTION | SAMPLE DEPTH BELOW GROUND SURFACE | TPH-DIESEL EPA 8015M (mg/kg) |
| T9-B-S-4.5 | EXCAVATION BOTTOM SAMPLE COLLECTED 1 FOOT BELOW REMOVED UST, SOUTH END | 4.5 | 11,000 |
| T9-PL-2 | PIPELINE SAMPLE COLLECTED 12 FOOT WEST OF UST | 2' | 150 |
| T9-SP-COMP | EXCAVATED SOIL STOCKPILE COMPOSITE COMPRISED OF THREE RANDOMLY SELECTED DISCRETE SAMPLES | N/A | 87 |

SOURCE: REPORT OF UNDERGROUND TANK CLOSURE, NOVEMBER 2000

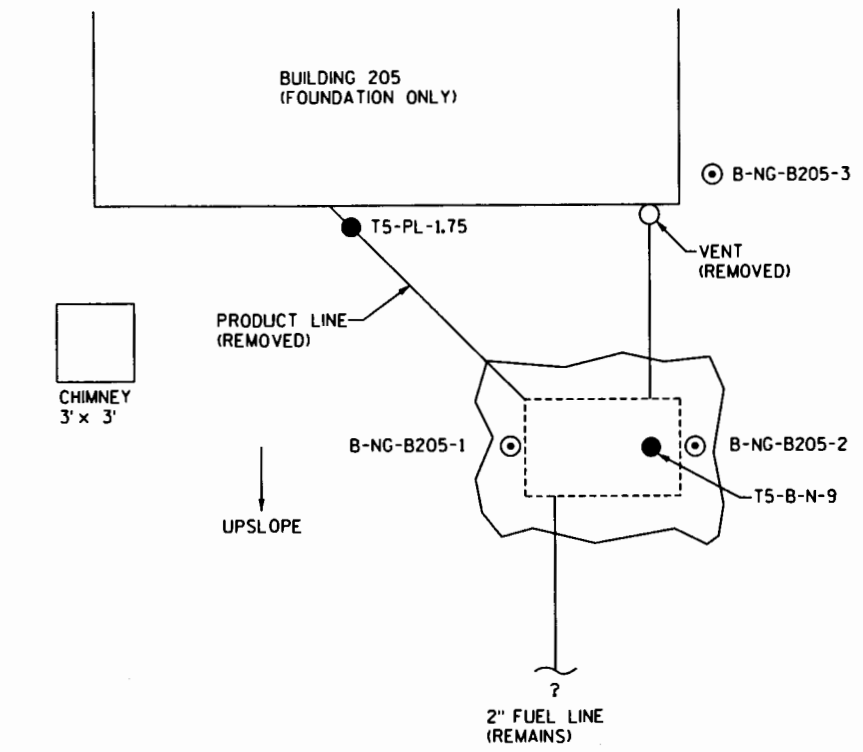
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FIGURE A4
NORTH GARRISON - FORT MCDOWELL/ANGEL ISLAND
FORMER UST LOCATION
EAST OF THE WATER TANK

DSGN MB
DR MW
CHK MB
PROJ ID 2001070

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a4.dgn

DATE: 12/04/2002

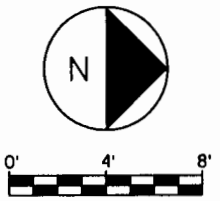



LEGEND

- ● PREVIOUS SAMPLE LOCATION
- ⊙ SI SAMPLE LOCATION



LOCATION MAP




SCALE: 1/8" = 1'-0"

## SITE LAYOUT & SAMPLE LOCATIONS

SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | NG1136 | NG1137 | NG1138 | NG1139 |
|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | B-NG-B205-3 | B-NG-B205-1 | B-NG-B205-2 | B-NG-B205-3 |
| SAMPLE PURPOSE: | | N | N | N | N |
| SAMPLING DEPTH (ft): | | 1' | 8' | 9' | 8' |
| Analysis | Units | | | | |
| TPH | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 60 | **150** | 1.1 U | 1.1 U |
| Motor Oil C24-C36(SGCU) | MG/KG | 58 | 27 | 5.3 U | 5.6 U |
| VOCs | | | | | |
| None Detected | UG/KG | -- | | | |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

| PREVIOUS SOIL SAMPLE RESULTS | | | |
|---|---|---|---|
| SAMPLE I.D. | DESCRIPTION | SAMPLE DEPTH BELOW GROUND SURFACE | TPH-DIESEL EPA 8015M (mg/kg) |
| T5-B-N-9 | EXCAVATION BOTTOM SAMPLE COLLECTED 1 FOOT BELOW REMOVED UST, NORTH END | 9' | 380 |
| T5-PL-1.75 | PIPELINE SAMPLE COLLECTED 1 FOOT EAST OF BUILDING FOUNDATION | 1.75' | 150 |
| T5-SP1-COMP | SUSPECTED CLEAN STOCKPILE COMPOSITE COMPRISED OF THREE RANDOMLY SELECTED DISCRETE SAMPLES | N/A | 260 |
| T5-SP2-GRAB | DISCRETE SAMPLE OF KNOWN CONTAMINATED SOIL STOCKPILE | N/A | 18,000 |

SOURCE: REPORT OF UNDERGROUND TANK CLOSURE, NOVEMBER 2000

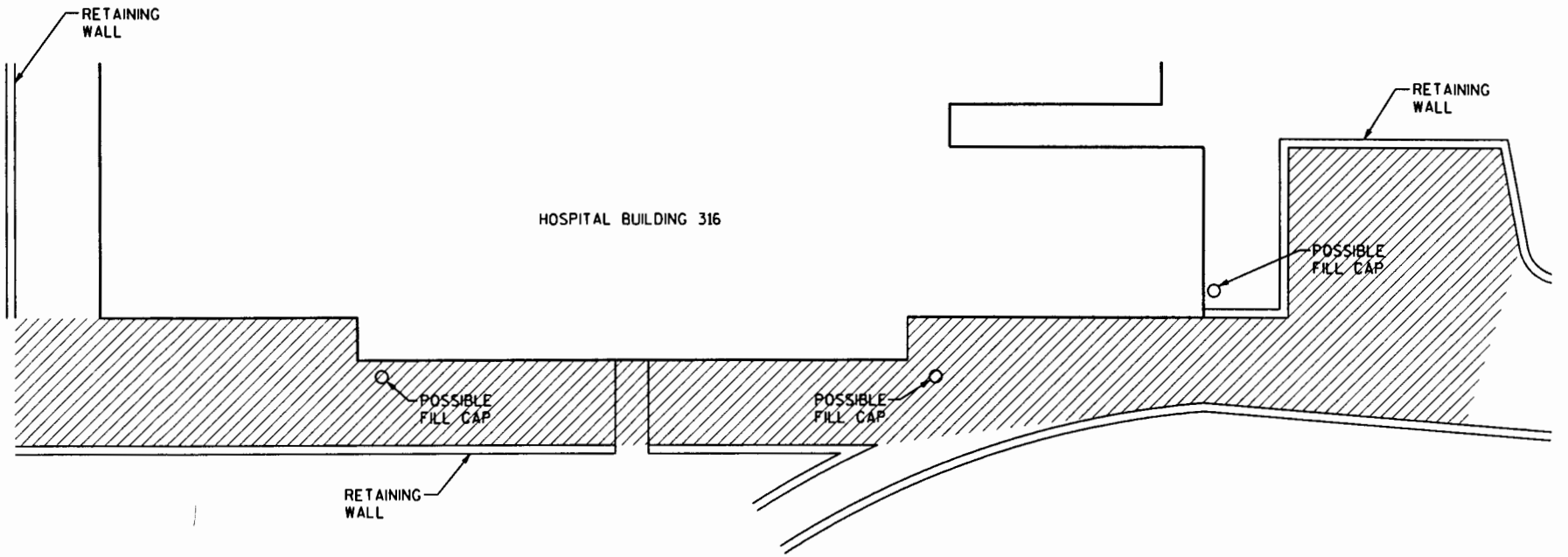
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FIGURE A5
NORTH GARRISON - FORT MCDOWELL/ANGEL ISLAND
FORMER UST LOCATION
BUILDING 205 (FOUNDATION ONLY)

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a5.dgn

DATE: 12/04/2002




SITE LAYOUT

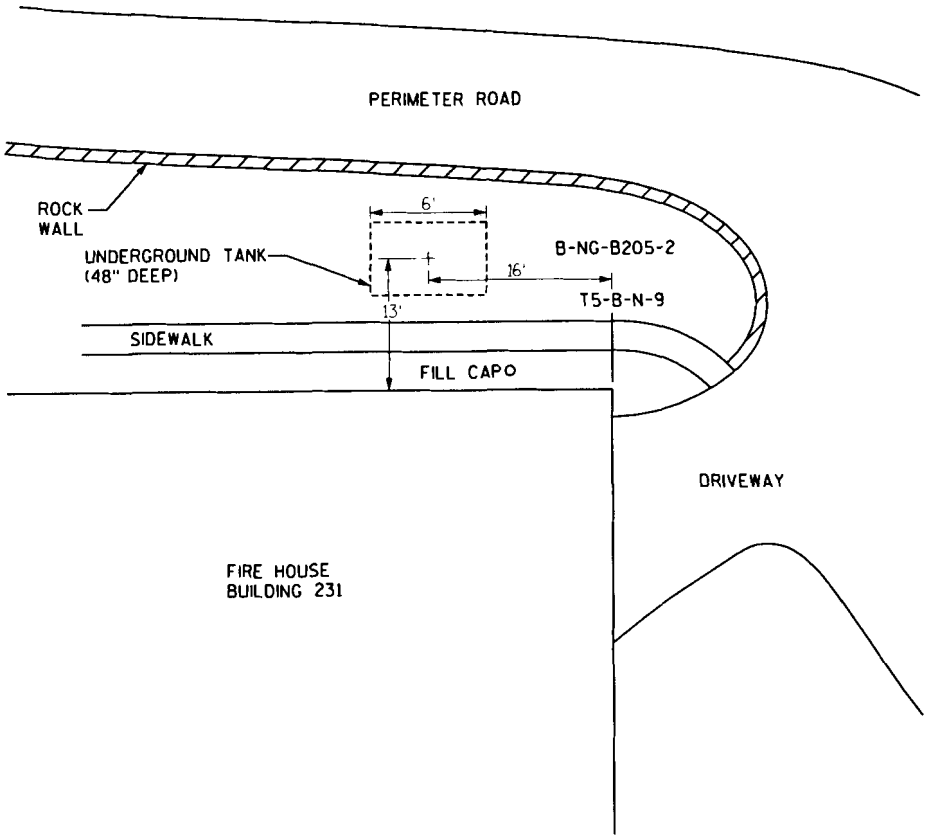
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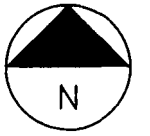
FIGURE A6
NORTH GARRISON - FORT MCDOWELL/ANGEL ISLAND
TWO POSSIBLE USTS
HOSPITAL, BUILDING 316

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a6.dgn

DATE: 12/04/2002




SCALE: NTS

NOTE:

1. A GEOPHYSICAL SURVEY WAS CONDUCTED TO LOCATE THE TANK. POTHOLING WITH A BACKHOE CONFIRMED THE TANK LOCATION.



LOCATION MAP

SITE LAYOUT

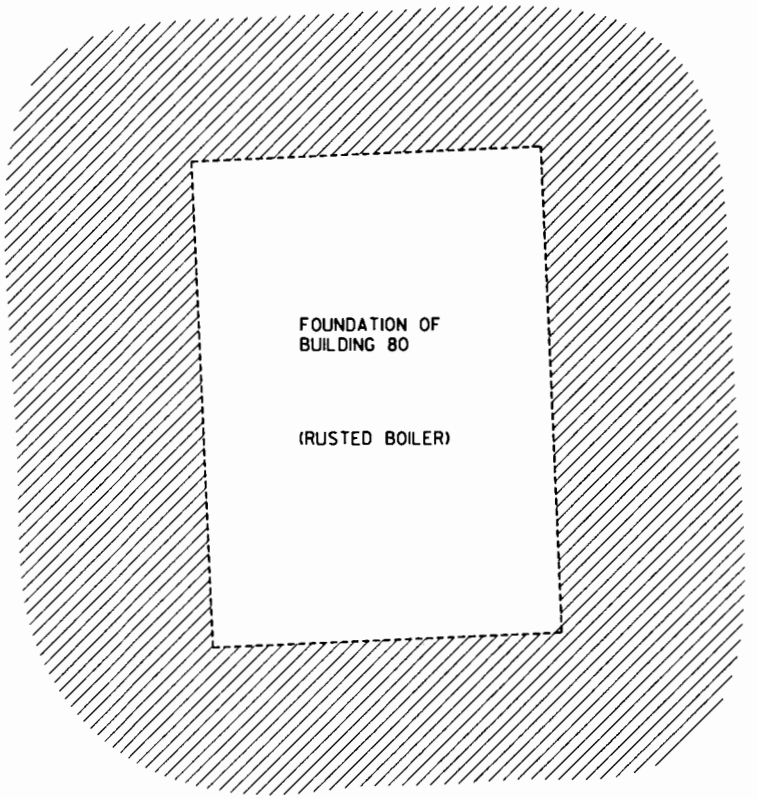
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FIGURE A7
NORTH GARRISON - FORT MCDOWELL/ANGEL ISLAND
UST LOCATION
FIRE HOUSE, BUILDING 231

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: D:\2001projects\2001070 - angelisland\figure_a7.dgn

DATE: 12/04/2002




LEGEND

GEOPHYSICAL ASSESSMENT AREA

NOTE:

DUE TO EXTENSIVE METAL DEBRIS AROUND THE FOUNDATION, A LIMITED GEOPHYSICAL SURVEY WAS CONDUCTED.



LOCATION MAP

N

SCALE: NTS

SITE LAYOUT

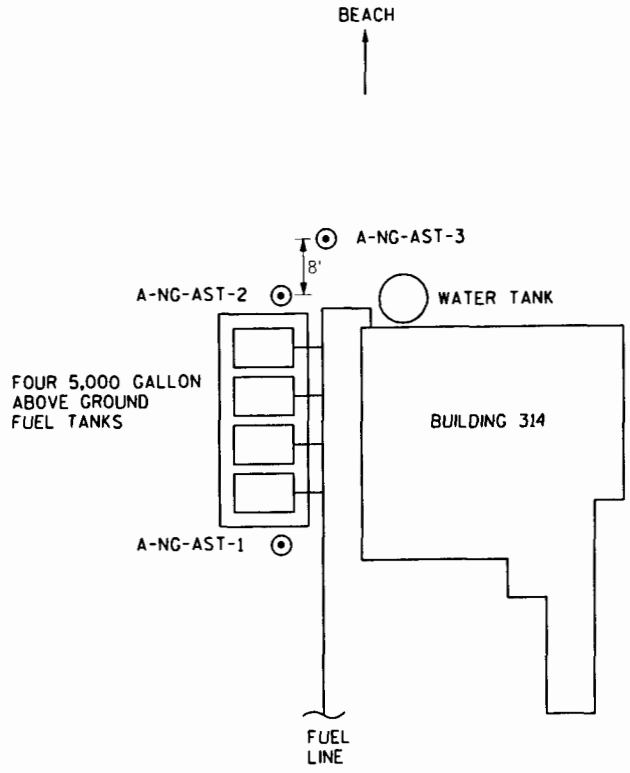
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FIGURE A8
NORTH GARRISON - FORT MCDOWELL/ANGEL ISLAND
POSSIBLE UST
BUILDING 80, WEST OF PARK RESIDENCE

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a8.dgn

DATE: 12/04/2002




LEGEND

⊙ SI SAMPLE LOCATION

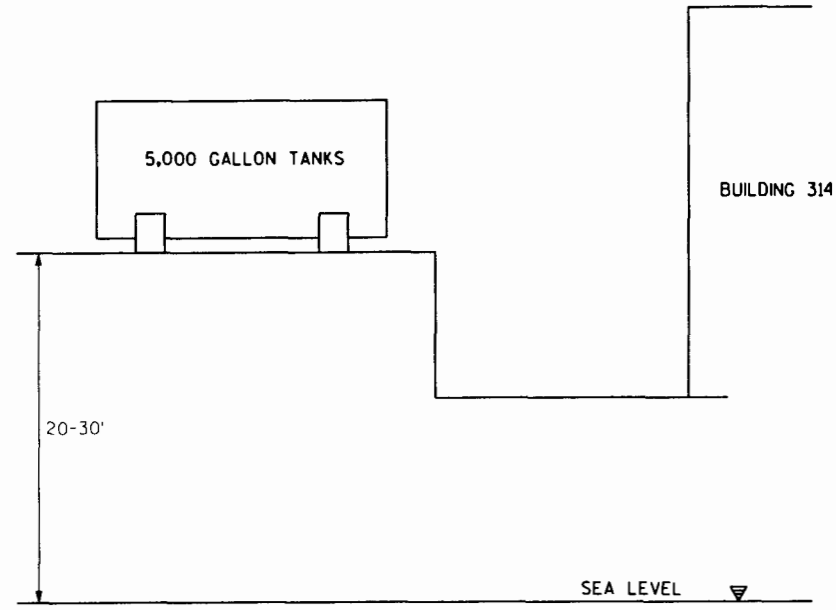


LOCATION MAP




SCALE: NTS

SITE LAYOUT & SAMPLE LOCATIONS




SIDE VIEW

SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | NG1001 | NG1003 | NG1005 |
|---|---|---|---|---|
| LOCATION DESCRIPTION: | | A-NG-AST-1 | A-NG-AST-2 | A-NG-AST-3 |
| SAMPLE PURPOSE: | | N | N | N |
| SAMPLING DEPTH (ft): | | 5' | 5' | 5' |
| Analysis | Units | | | |
| TPH | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 1.1 | **2400** | 0.98 |
| Motor Oil C24-C36(SGCU) | MG/KG | 5.6 U | **2700** | 2.4 |
| VOCs | | | | |
| Benzene | UG/KG | | 0.6 J | |
| para-Isopropyl Toluene | UG/KG | | 2.8 J | |
| Toluene | UG/KG | | 0.4 J | |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

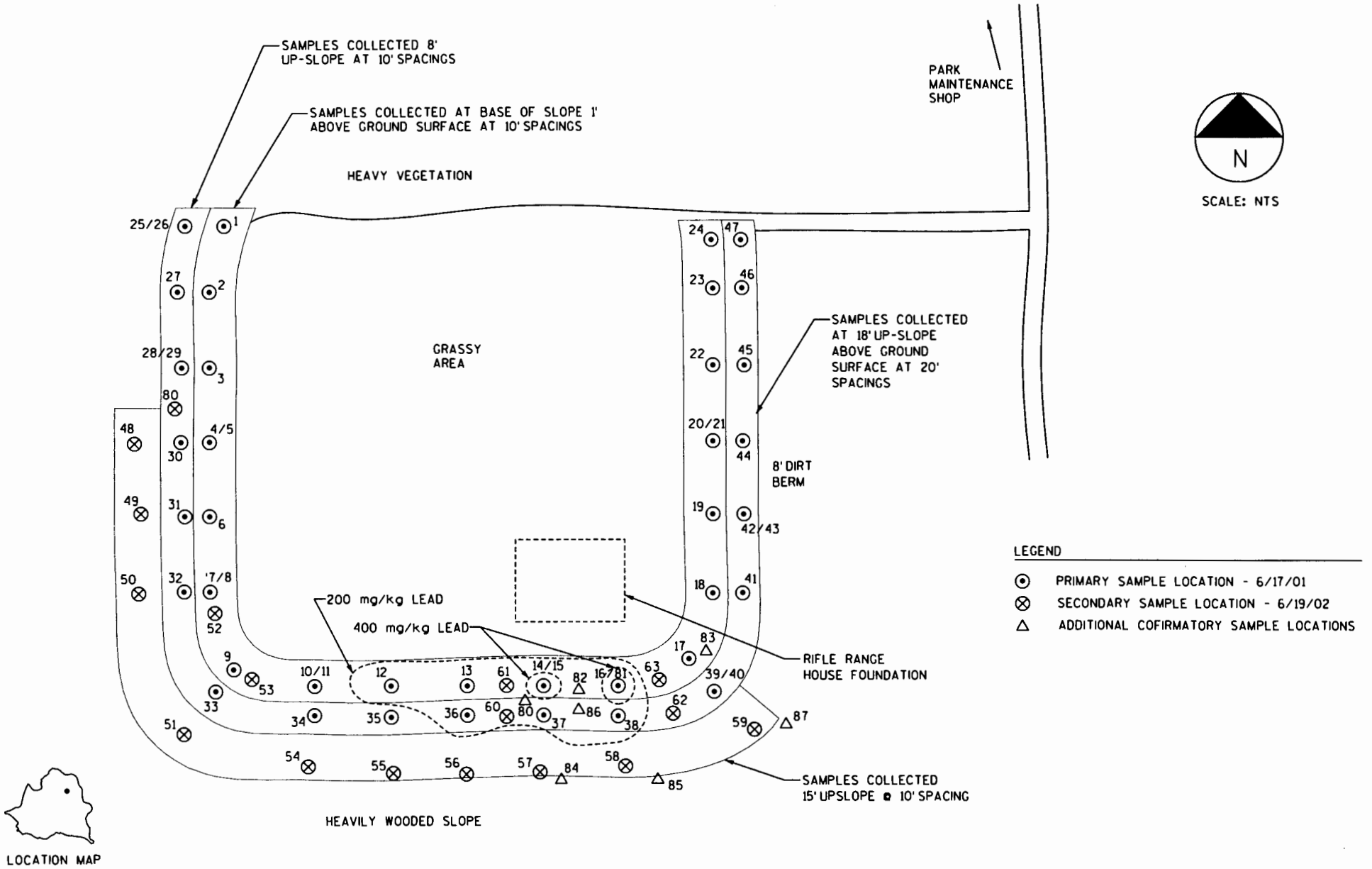
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FIGURE A9
NORTH GARRISON - FORT MCDOWELL/ANGEL ISLAND
ABOVE GROUND FUEL TANKS
BEHIND CENTRAL HEATING PLANT, BUILDING 314

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a9.dgn

DATE: 12/04/2002




SITE LAYOUT & SAMPLE LOCATIONS

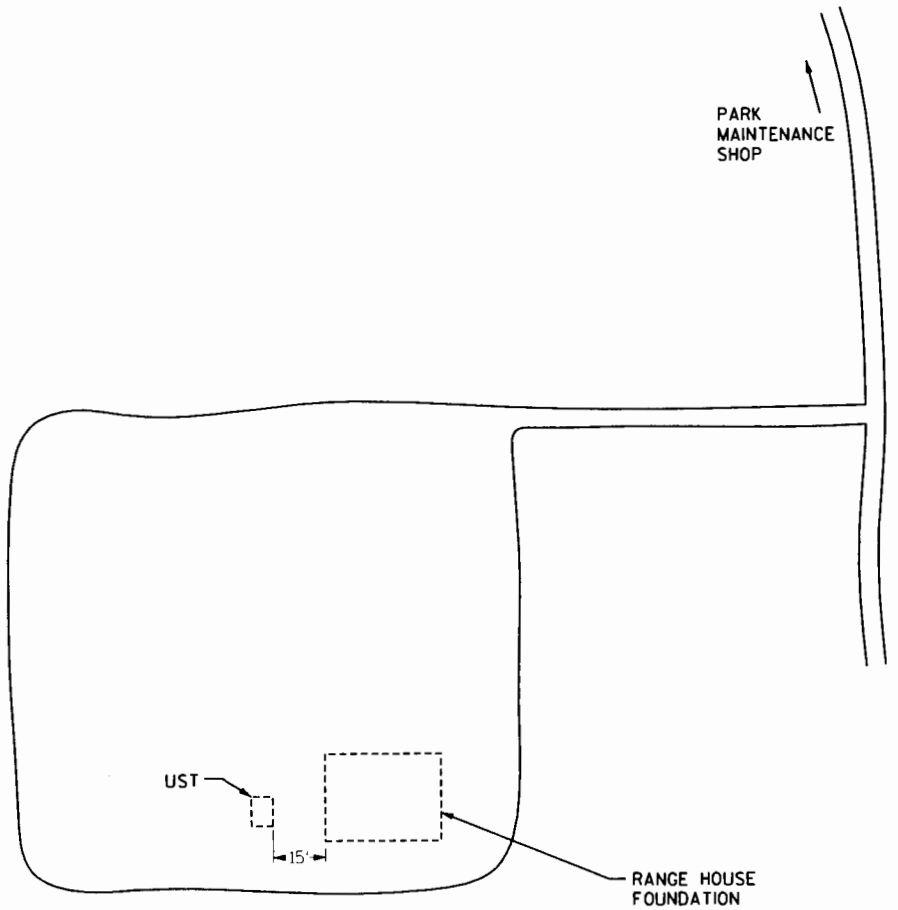
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FIGURE A10
NORTH GARRISON · FORT MCDOWELL/ANGEL ISLAND
RIFLE RANGE
1,000-INCH RIFLE RANGE/BOY SCOUT CAMP

DSGN MB
DR MW
CHK MB
PROJ 10 2001070

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a10.dgn

DATE: 12/04/2002



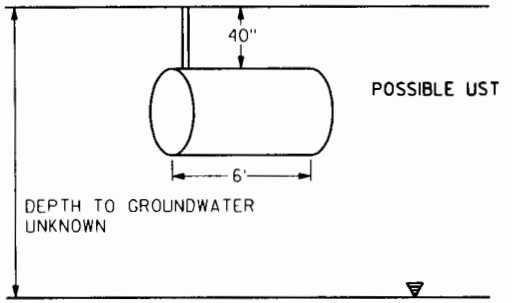



LOCATION MAP




SCALE: NTS

SITE LAYOUT




NOTES:

1. TANK WAS FULL OF WATER. WATER HAD A FUEL ODOR.
2. A GEOPHYSICAL SURVEY WAS CONDUCTED TO LOCATE THE TANK. POTHOLING WITH A BACKHOE CONFIRMED THE TANK LOCATION.

CONCEPTUAL SITE MODEL

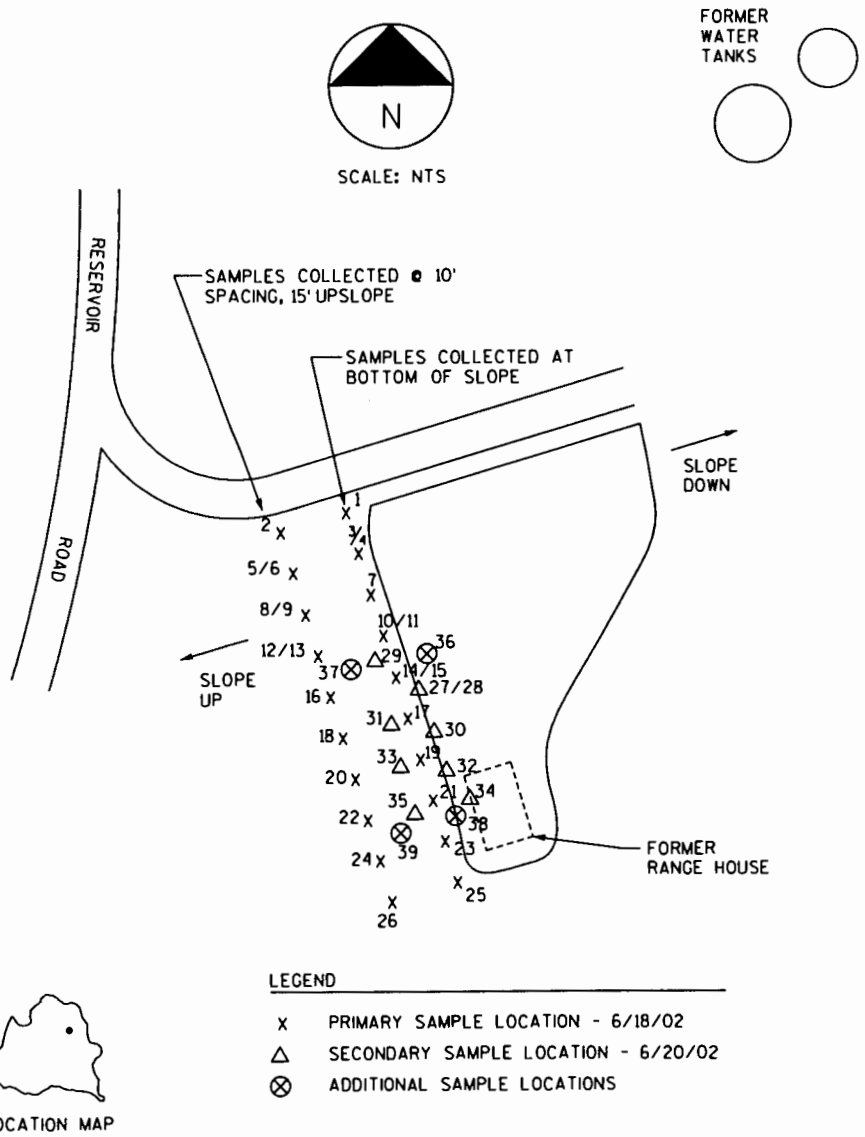
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FIGURE A11
NORTH GARRISON • FORT MCDOWELL/ANGEL ISLAND
UST LOCATION
1,000-INCH RIFLE RANGE/BOY SCOUT CAMP

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_all.dgn

DATE: 12/04/2002




SITE LAYOUT & SAMPLE LOCATIONS

| Total Metals by EDXRF | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Field Sample ID | Units | Date Sampled | As | Ba | Cr | Pb | Cu | Zn |
| NG4001 | mg/kg | 06/19/02 | <15 | 370 | 260 | 19 | 79 | 100 |
| NG4002 | mg/kg | 06/19/02 | <15 | 250 | 270 | 17 | 100 | 94 |
| NG4003 | mg/kg | 06/19/02 | <15 | 140 | 190 | 32 | 94 | 120 |
| NG4004 | mg/kg | 06/19/02 | <15 | 120 | 250 | 44 | 92 | 150 |
| NG4005 | mg/kg | 06/19/02 | <15 | 180 | 260 | 25 | 100 | 120 |
| NG4006 | mg/kg | 06/19/02 | <15 | 93 | 280 | 26 | 110 | 110 |
| NG4007 | mg/kg | 06/19/02 | <15 | 360 | 260 | <15 | 65 | 82 |
| NG4008 | mg/kg | 06/19/02 | <15 | 260 | 230 | <15 | 73 | 100 |
| NG4009 | mg/kg | 06/19/02 | <15 | 400 | 260 | <15 | 86 | 110 |
| NG4010 | mg/kg | 06/19/02 | <15 | 400 | 250 | <15 | 91 | 100 |
| NG4011 | mg/kg | 06/19/02 | <15 | 210 | 290 | <15 | 80 | 110 |
| NG4012 | mg/kg | 06/19/02 | <15 | 350 | 330 | <15 | 100 | 100 |
| NG4013 | mg/kg | 06/19/02 | <15 | 160 | 320 | <15 | 93 | 97 |
| NG4014 | mg/kg | 06/19/02 | <15 | 250 | 220 | 33 | 100 | 120 |
| NG4015 | mg/kg | 06/19/02 | <15 | 370 | 270 | 27 | 78 | 120 |
| NG4016 | mg/kg | 06/19/02 | <15 | 370 | 260 | <15 | 83 | 95 |
| NG4017 | mg/kg | 06/19/02 | <19 | 240 | 290 | 190 | 79 | 140 |
| NG4018 | mg/kg | 06/19/02 | <15 | 310 | 280 | <15 | 77 | 100 |
| NG4019 | mg/kg | 06/19/02 | <15 | 190 | 250 | 28 | 86 | 110 |
| NG4020 | mg/kg | 06/19/02 | <15 | 150 | 250 | <15 | 93 | 110 |
| NG4021 | mg/kg | 06/19/02 | <15 | 230 | 280 | 29 | 100 | 130 |
| NG4022 | mg/kg | 06/19/02 | <15 | 240 | 250 | 21 | 78 | 100 |
| NG4023 | mg/kg | 06/19/02 | <15 | 310 | 300 | 20 | 70 | 99 |
| NG4024 | mg/kg | 06/19/02 | <15 | 250 | 240 | <15 | 81 | 110 |
| NG4025 | mg/kg | 06/19/02 | <15 | 260 | 210 | <15 | 93 | 97 |
| NG4026 | mg/kg | 06/19/02 | <15 | 260 | 270 | 18 | 79 | 98 |
| NG4027 | mg/kg | 06/21/02 | 37 | NA | 230 | 20 | 170 | 210 |
| NG4028 | mg/kg | 06/21/02 | 38 | NA | 220 | 24 | 210 | 240 |
| NG4029 | mg/kg | 06/21/02 | <15 | NA | 340 | <15 | 95 | 110 |
| NG4030 | mg/kg | 06/21/02 | <15 | NA | 250 | 44 | 120 | 140 |
| NG4031 | mg/kg | 06/21/02 | <15 | NA | 270 | <15 | 94 | 110 |
| NG4032 | mg/kg | 06/21/02 | <15 | NA | 280 | 35 | 100 | 100 |
| NG4033 | mg/kg | 06/21/02 | <15 | NA | 340 | <15 | 98 | 97 |
| NG4034 | mg/kg | 06/21/02 | <15 | NA | 300 | 22 | 89 | 90 |
| NG4035 | mg/kg | 06/21/02 | <15 | NA | 250 | 34 | 74 | 97 |
| NG4036 | mg/kg | 06/21/02 | <15 | NA | 300 | 15 | 90 | 100 |
| NG4037 | mg/kg | 06/21/02 | <15 | NA | 300 | 22 | 90 | 99 |
| NG4038 | mg/kg | 06/21/02 | <15 | NA | 300 | <15 | 74 | 98 |
| NG4039 | mg/kg | 06/21/02 | <15 | NA | 230 | 20 | 89 | 120 |

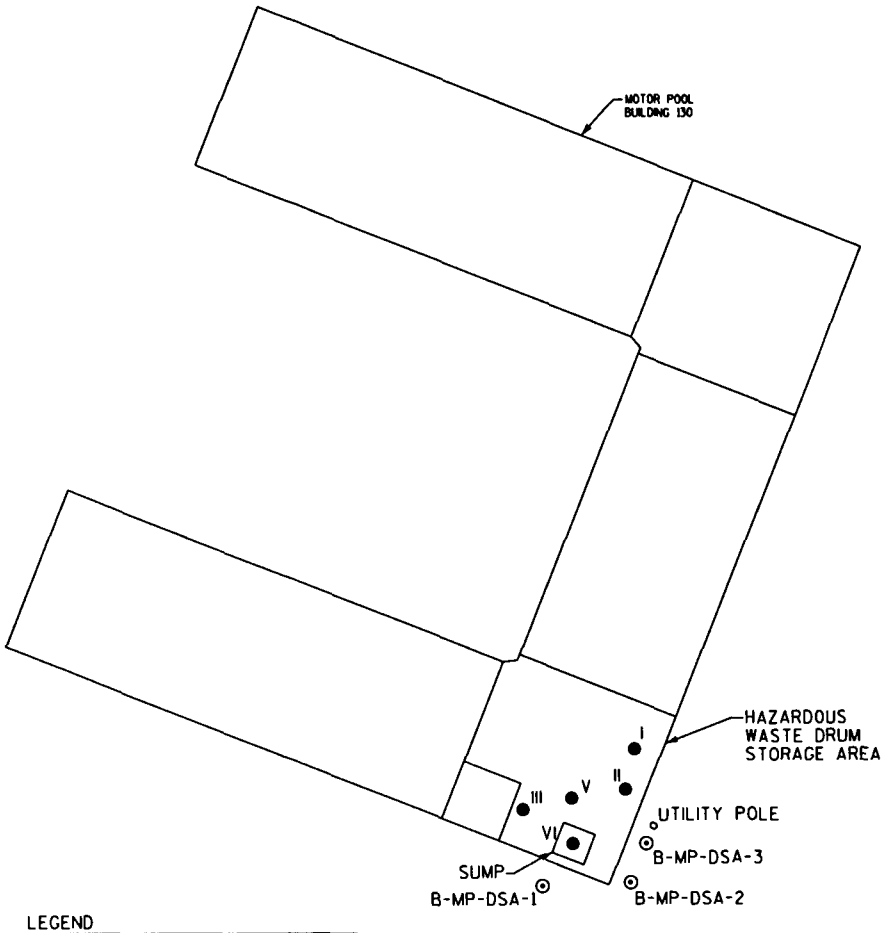
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FIGURE A12
NORTH GARRISON - FORT MCDOWELL/ANGEL ISLAND
P-100 PISTOL RANGE/SUNRISE CAMPSITE

DSGN MB
DR MW
CHK MB
PROJ ID 2001070

FILE NAME: P:\2001Projects\2001070 - AngelIsland\figure_a12.dgn

DATE: 12/06/2002

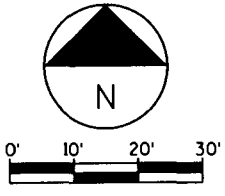



LEGEND

- PREVIOUS SAMPLE LOCATION
- SI SAMPLE LOCATION



LOCATION MAP




SCALE: 1" = 30'-0"

## SITE LAYOUT & SAMPLE LOCATIONS

### SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | MP1002 | MP1003 | MP1004 | MP1005 | MP1006 | MP1007 |
|---|---|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | B-MP-DSA-1 | B-MP-DSA-1 | B-MP-DSA-2 | B-MP-DSA-2 | B-MP-DSA-3 | B-MP-DSA-3 |
| SAMPLE PURPOSE: | | N | N | N | N | N | N |
| SAMPLING DEPTH (ft): | | 6' | 12' | 6' | 12' | 6' | 12' |
| Analysis | Units | | | | | | |
| Metals | | | | | | | |
| Arsenic | MG/KG | 3.3 U | 3.8 U | 4.6 | 3.4 U | 3.3 U | 3.2 U |
| Barium | MG/KG | 140 | 160 | 220 | 65 | 160 | 100 |
| Beryllium | MG/KG | 0.66 | 0.76 | 0.67 | 0.66 | 0.68 | 0.65 |
| Cadmium | MG/KG | 1.1 | 1.1 | 1.5 | 1.1 | 1.1 | 1 |
| Chromium | MG/KG | 30 | 32 | 59 | 36 | 30 | 28 |
| Cobalt | MG/KG | 11 | 10 | 15 | 11 | 11 | 13 |
| Copper | MG/KG | 14 | 15 | 22 | 15 | 18 | 14 |
| Lead | MG/KG | 12 | 19 | **1500** | 44 | 20 | 13 |
| Mercury | MG/KG | 0.15 | 0.12 U | 0.12 U | 0.11 U | 0.1 U | 0.11 U |
| Nickel | MG/KG | 42 | 47 | 110 | 66 | 49 | 44 |
| Selenium | MG/KG | 0.4 | 0.26 U | 0.41 | 0.31 | 0.33 | 0.25 U |
| Thallium | MG/KG | 0.56 U | 0.51 | 0.86 U | 0.72 U | 0.48 U | 0.79 U |
| Vanadium | MG/KG | 37 | 39 | 39 | 35 | 36 | 34 |
| Zinc | MG/KG | 37 | 46 | 180 | 48 | 43 | 37 |
| PCBs | | | | | | | |
| None Detected | UG/KG | -- | -- | -- | -- | -- | -- |
| VOCs | | | | | | | |
| Toluene | UG/KG | 1.4 J | 4.2 U | 0.44 J | 2 J | 4.4 U | 4.5 U |
| SVOCs | | | | | | | |
| Acenaphthylene | UG/KG | 350 U | 350 U | 350 U | 350 U | 43 J | 350 U |
| Benzo(a)anthracene | UG/KG | 350 U | 350 U | 350 U | 350 U | 60 J | 350 U |
| Benzo(a)pyrene | UG/KG | 350 U | 350 U | 350 U | 350 U | 59 J | 42 J |
| Benzo(b)fluoranthene | UG/KG | 350 U | 350 U | 350 U | 350 U | 49 J | 50 J |
| Chrysene | UG/KG | 350 U | 350 U | 350 U | 350 U | 57 J | 41 J |
| Fluoranthene | UG/KG | 350 U | 350 U | 350 U | 350 U | 65 J | 350 U |

*Note: See Analytical Tables in Appendix B for full results.*
Bold = Concentration above Comparison Value.

| PREVIOUS SOIL SAMPLE RESULTS (mg/kg)[1] | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | I | | II | | III | | IV [2] | V | | VI | |
| TEST METHOD | 0.5 | 3.0 | 0.5 | 2.5 | 0.5 | 3.0 | 0.5 | 0.5 | 3.0 | 0.5 | 2.5 |
| DHS 8015M-D | 4.4 | 3.9 | 690 | 390 | 150 | 44 | - | 380 | 330 | 11 | 13 |
| EPA 418.1 | 31 | - | 290 | 210 | 520 | 150 | - | 150 | 240 | 34 | 38 |
| EPA 8260 | - | - | - | - | - | - | - | - | - | - | - |
| EPA 8080-PCB | - | - | 0.190 | 0.310 | 2.0 | 0.43 | 0.039 | 27 | 56 | 0.5 | 1.3 |
| EPA-8270 | - | - | * | * | - | - | - | - | * | - | * |
| EPA 6010 (LEAD | 17 | 34 | 19 | 16 | 23 | 12 | 29 | 240 | 110 | 19 | 19 |
| EPA 6010 (ARSENIC) | 5.5 | 7.1 | 5.0 | 4.5 | 5.2 | 4.6 | 3.3 | 8.2 | 6.8 | 3.3 | 5.6 |

* VERY LOW CONCENTRATIONS

NOTES

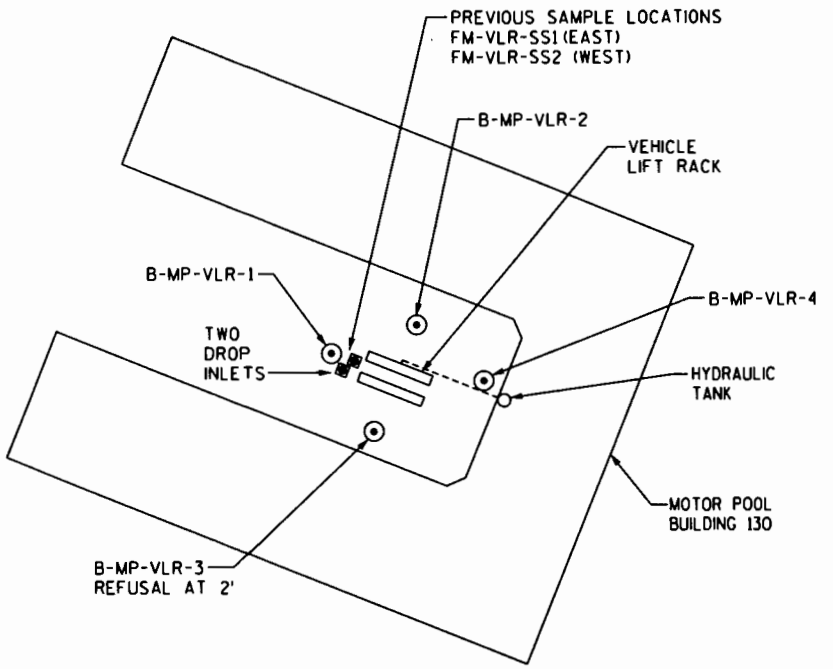
1. SCREENING ASSESSMENT REPORT, USACE 1998.
2. SAMPLE IV IS A BACKGROUND SAMPLE.

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FIGURE A13
EAST GARRISON - FORT MCDOWELL/ANGEL ISLAND
HAZARDOUS WASTE DRUM STORAGE AREA
MOTOR POOL AREA

DSGN MB
DR MW
CHK MB
PROJ ID 2001070

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a13.dgn
DATE: 12/04/2002

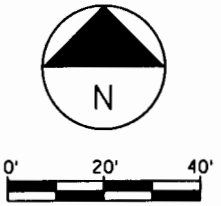



LEGEND

- ● PREVIOUS SAMPLE LOCATION
- ⊙ SI SAMPLE LOCATION



LOCATION MAP




SCALE: 1" = 40'-0"

SITE LAYOUT & SAMPLE LOCATIONS

## SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | MP1066 | MP1067 | MP1069 | MP1059 |
|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | B-MP-VLR-1 | B-MP-VLR-2 | B-MP-VLR-4 | B-MP-VLR-4 |
| SAMPLE PURPOSE: | | N | N | N | FD-MP1069 |
| SAMPLING DEPTH (ft): | | 5' | 3' | 5' | 5' |
| Analysis | Units | | | | |
| TPH | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 20 | 4.8 | 8 | |
| Motor Oil C24-C36(SGCU) | MG/KG | 150 | 19 | 12 | |
| No Gasoline Detected | MG/KG | -- | -- | -- | |
| Metals | | | | | |
| Arsenic | MG/KG | 4 | 3.1 | 4.3 U | |
| Barium | MG/KG | 130 | 88 | 120 | |
| Beryllium | MG/KG | 0.6 | 0.57 | 0.61 | |
| Cadmium | MG/KG | 1.1 | 0.82 | 1.2 | |
| Chromium | MG/KG | 31 | 24 | 28 | |
| Cobalt | MG/KG | 10 | 8.3 | 9.5 | |
| Copper | MG/KG | 15 | 12 | 15 | |
| Lead | MG/KG | 32 | 6.8 | 8.4 U | |
| Mercury | MG/KG | 0.14 | 0.056 | 0.12 U | |
| Nickel | MG/KG | 46 | 38 | 42 | |
| Selenium | MG/KG | 0.47 | 0.21 J | 0.39 | |
| Vanadium | MG/KG | 33 | 30 | 36 | |
| Zinc | MG/KG | 57 | 36 | 42 | |
| PCBs | | | | | |
| None Detected | UG/KG | | | -- | |
| VOCs | | | | | |
| None Detected | UG/KG | -- | -- | -- | -- |
| SVOCs | | | | | |
| 2-Methyinaphthalene | UG/KG | | | 28 J | |
| Benzo(a)pyrene | UG/KG | | | 16 J | |
| Phenanthrene | UG/KG | | | 33 J | |
| Pyrene | UG/KG | | | 33 J | |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

| PREVIOUS SOIL SAMPLE RESULTS | | | |
|---|---|---|---|
| ANALYTE | FM-VLR-SS-1 | FM-VLR-SS-2 | FM-VLR-SS-3 * |
| BERYLLIUM | 0.466 mg/kg | 0.654 mg/kg | ND |
| CADMIUM | ND | ND | 6.43 mg/kg |
| CHROMIUM | 397 mg/kg | 76.5 mg/kg | 76.4 mg/kg |
| COPPER | 44.3 mg/kg | 66.2 mg/kg | 145 mg/kg |
| LEAD | 173 mg/kg | 1260 mg/kg | 1280 mg/kg |
| NICKEL | 806 mg/kg | 160 mg/kg | 107 mg/kg |
| ZINC | 103 mg/kg | 1410 mg/kg | 1360 mg/kg |
| MERCURY | 0.195 mg/kg | 0.117 mg/kg | 0.158 mg/kg |
| ANTHRACENE | ND | ND | ND |
| BENZO (k) FLUORANTHENE | NOT ANALYZED | ND | 1.29 mg/kg |
| BENZO (g) PYRENE | NOT ANALYZED | ND | 1.28 mg/kg |
| PYRENE | NOT ANALYZED | ND | 1.11 mg/kg |

* OC SAMPLE

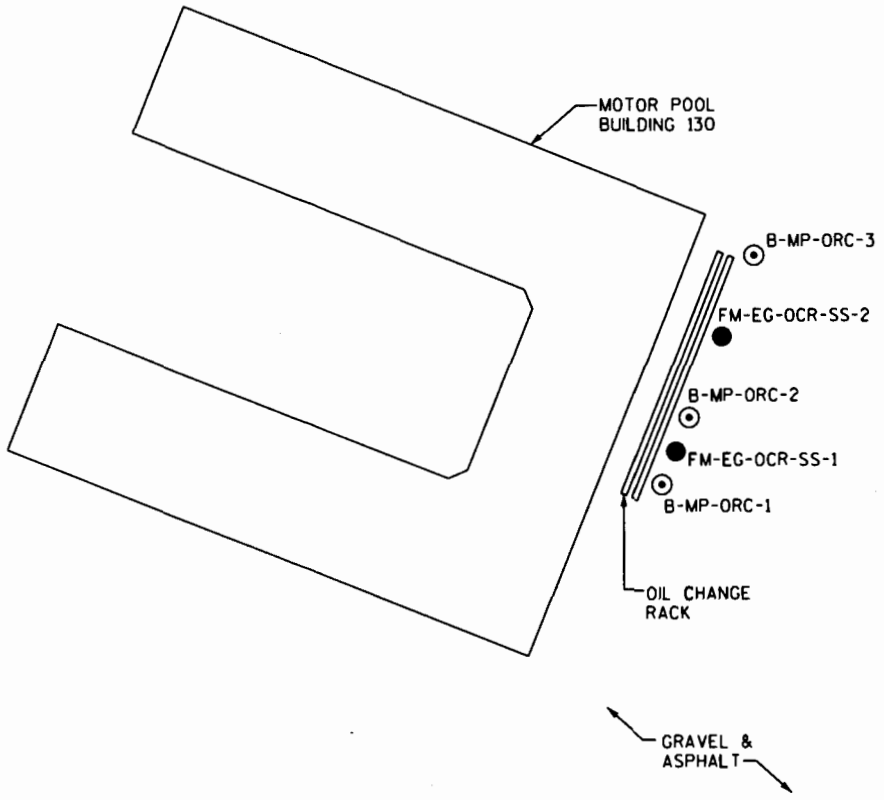
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Engineering and Science

FIGURE A14
EAST GARRISON - FORT MCDOWELL/ANGEL ISLAND
VEHICLE LIFT RACK
MOTOR POOL AREA

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a14.dgn

DATE: 12/04/2002

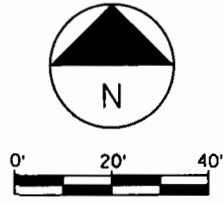



LEGEND

- ● PREVIOUS SAMPLE LOCATION
- ⊙ SI SAMPLE LOCATION



LOCATION MAP




SCALE: 1" = 40'-0"

SITE LAYOUT & SAMPLE LOCATIONS

SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | MP1052 | MP1054 | MP1055 | MP1056 | MP1057 | MP1058 |
|---|---|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | B-MP-OCR-1 | B-MP-OCR-2 | B-MP-OCR-2 | B-MP-OCR-3 | B-MP-OCR-3 | B-MP-OCR-3 |
| SAMPLE PURPOSE: | | N | N | N | N | N | FD-MP1056 |
| SAMPLING DEPTH (ft): | | 5' | 5' | 17' | 5' | 10' | 5' |
| Analysis | Units | | | | | | |
| TPH | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 6.1 | 12 | 15 | 1.4 | 4.8 | |
| Motor Oil C24-C36(SGCU) | MG/KG | 86 | 30 | 66 | 5.2 U | 8.9 | |
| No Gasoline w as detected | MG/KG | -- | -- | -- | -- | -- | -- |
| Metals | | | | | | | |
| Arsenic | MG/KG | 4.2 | **6.5** | 3 | 3.1 | 4 | |
| Barium | MG/KG | 130 | 230 | 84 | 62 | 76 | |
| Beryllium | MG/KG | 0.66 | 1.4 | 0.54 | 0.54 | 0.53 | |
| Cadmium | MG/KG | 1.1 | 2.2 | 0.91 | 1.4 | 0.94 | |
| Chromium | MG/KG | 30 | 59 | 34 | 110 | 26 | |
| Cobalt | MG/KG | 12 | 24 | 9.7 | 18 | 9.3 | |
| Copper | MG/KG | 17 | 29 | 14 | 77 | 18 | |
| Lead | MG/KG | 240 | 35 | 15 | **760** | 6 | |
| Mercury | MG/KG | 0.15 | 0.25 | 0.063 U | 0.056 | 0.12 | |
| Nickel | MG/KG | 45 | 100 | 55 | **210** | 43 | |
| Selenium | MG/KG | 0.65 | 1.1 | 0.25 U | 0.39 | 0.46 | |
| Thallium | MG/KG | 1.1 U | 1.6 | 0.54 | 0.37 U | 0.75 U | |
| Vanadium | MG/KG | 38 | 70 | 29 | 41 | 30 | |
| Zinc | MG/KG | 52 | 67 | 43 | 96 | 37 | |
| PCBs | | | | | | | |
| None Detected | UG/KG | | -- | | -- | | |
| VOCs | | | | | | | |
| None Detected | UG/KG | -- | -- | -- | -- | -- | -- |
| SVOCs | | | | | | | |
| None Detected | UG/KG | | -- | | | | |

| PREVIOUS SOIL SAMPLE RESULTS | | |
|---|---|---|
| ANALYTE | FM-EG-OCR-SS-1 | FM-EG-OCR-SS-2 |
| BERYLLIUM | 0.484 mg/kg | ND |
| CADMIUM | ND | ND |
| CHROMIUM | 179 mg/kg | 168 mg/kg |
| COPPER | 134 mg/kg | 148 mg/kg |
| LEAD | 1150 mg/kg | 2560 mg/kg |
| NICKEL | 288 mg/kg | 298 mg/kg |
| ZINC | 1670 mg/kg | 2440 mg/kg |
| MERCURY | 0.157 mg/kg | 0.181 mg/kg |
| ANTHRACENE | ND | 1.46 mg/kg |
| BENZO (k) FLUORANTHENE | ND | 7.55 mg/kg |
| BENZO (a) PYRENE | ND | 9.45 mg/kg |
| PYRENE | ND | 10.2 mg/kg |

ND - NON DETECT
SAMPLES COLLECTED AT 0.5-1.0' BGS

SOURCE: LIMITED SCOPE SITE INVESTIGATION, MARCH 2000

SUMMARY OF DETECTED RESULTS FOR WATER

| SITE NAME: | | Oil Change Rack | Oil Change Rack |
|---|---|---|---|
| FIELD SAMPLE ID: | | MP1073 | MP1074 |
| LOCATION DESCRIPTION: | | B-MP-ORC-1 - Water | B-MP-ORC-2 - Water |
| SAMPLE PURPOSE: | | N | N |
| SAMPLING DEPTH (ft): | | WATER | WATER |
| Analysis | Units | | |
| TPH | | | |
| Diesel C12-C24(SGCU) | UG/L | 50 U | 50 U |
| Motor Oil C24-C36(SGCU) | UG/L | 300 U | 300 U |
| Gasoline C7-C12 | UG/L | 24 J | 50 U |
| Metals | | | |
| Arsenic | UG/L | 3.7 J | 5 U |
| Barium | UG/L | 53 | 78 |
| Beryllium | UG/L | 0.54 J | 2 U |
| Cadmium | UG/L | 5 U | 0.8 J |
| Chromium | UG/L | 2.7 J | 8.9 J |
| Cobalt | UG/L | 1.3 J | 2.7 J |
| Copper | UG/L | 3 J | 7.1 J |
| Lead | UG/L | 4.4 | 2.5 J |
| Mercury | UG/L | 0.058 J | 0.20 U |
| Nickel | UG/L | 3.1 J | 12 J |
| Selenium | UG/L | 5.2 | 5 U |
| Vanadium | UG/L | 3.5 J | 8.7 J |
| Zinc | UG/L | 17 | 32 |
| VOCs | | | |
| 2-Butanone | UG/L | 10 U | 10 U |
| Carbon Disulfide | UG/L | 5 U | 5 U |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

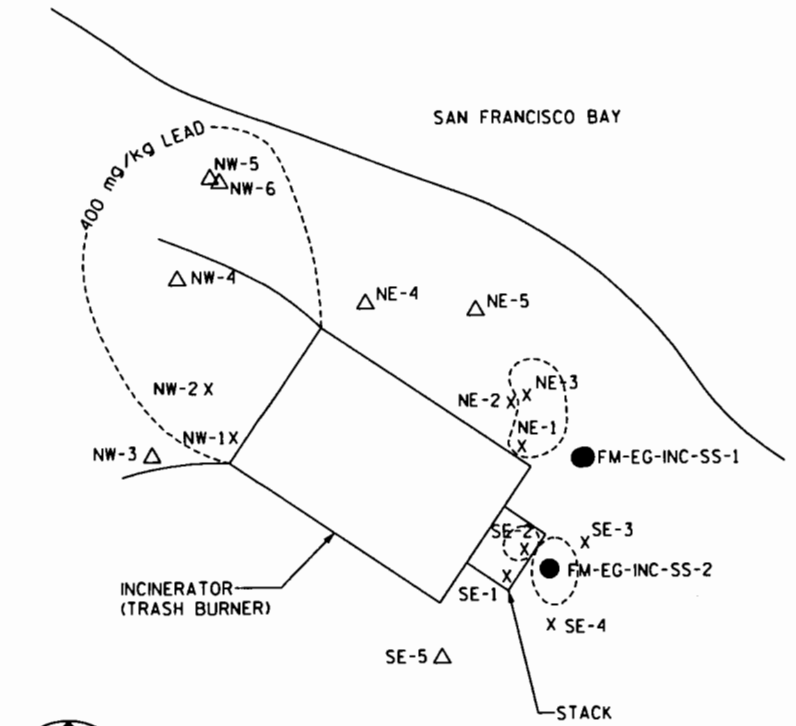
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FIGURE A15
EAST GARRISON - FORT MCDOWELL/ANGEL ISLAND
OIL CHANGE RACK
MOTOR POOL AREA

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a15.dgn

DATE: 12/04/2002




NOTE: NW-6 IS A DUPLICATE FOR NW-5

N

SCALE: NTS

LEGEND

- ● PREVIOUS SAMPLE LOCATION
- X PRIMARY SAMPLE LOCATION-6/19/02
- △ SECONDARY SAMPLE LOCATION-6/20/02
- 400 mg/kg LEAD



LOCATION MAP

## SITE LAYOUT & SAMPLE LOCATIONS

**Total Metals by EDXRF**

| Field Sample ID | Units | Date Sampled | As | Ba | Cd | Cr | Pb | Hg | Se | Ag | Cu | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| INCNW-1 | mg/kg | 06/19/02 | <85 | 780 | <15 | 200 | 850 | <15 | <15 | <15 | 88 | 1100 |
| INCNW-2 | mg/kg | 06/19/02 | <120 | 850 | <15 | 160 | 1200 | <15 | <15 | <15 | 150 | 1500 |
| INCNE-1 | mg/kg | 06/19/02 | <820 | 1100 | 24 | 150 | 6200 | <15 | <15 | <15 | 980 | 23000 |
| INCNE-2 | mg/kg | 06/19/02 | <33 | 710 | <15 | 220 | 330 | <15 | <15 | <15 | 69 | 840 |
| INCNE-3 | mg/kg | 06/19/02 | <560 | 1000 | 16 | 140 | 5600 | <15 | <15 | <15 | 760 | 23000 |
| INCSE-1 | mg/kg | 06/19/02 | <15 | 840 | <15 | 82 | 140 | <15 | <15 | <15 | 68 | 250 |
| INCSE-2 | mg/kg | 06/19/02 | <48 | 73 | <15 | 26 | 480 | <15 | <15 | <15 | 16000 | 6800 |
| INCSE-3 | mg/kg | 06/19/02 | <27 | 440 | <15 | 230 | 270 | <15 | <15 | <15 | 65 | 820 |
| INCSE-4 | mg/kg | 06/19/02 | <15 | 870 | <15 | 160 | 110 | <15 | <15 | <15 | 51 | 230 |
| INCNW-3 | mg/kg | 06/20/02 | <29 | NA | NA | 240 | 290 | <15 | <15 | NA | 48 | 280 |
| INCNW-4 | mg/kg | 06/20/02 | <71 | NA | NA | 240 | 710 | <15 | <15 | NA | 88 | 720 |
| INCNW-5 | mg/kg | 06/20/02 | <60 | NA | NA | 230 | 600 | <15 | <15 | NA | 110 | 790 |
| INCNW-6 | mg/kg | 06/20/02 | <44 | NA | NA | 230 | 440 | <15 | <15 | NA | 68 | 650 |
| INCNE-4 | mg/kg | 06/20/02 | <37 | NA | NA | 230 | 370 | <15 | <15 | NA | 33 | 400 |
| INCNE-5 | mg/kg | 06/20/02 | <15 | NA | NA | 24 | 29 | <15 | <15 | NA | <15 | 32 |
| INCSE-5 | mg/kg | 06/20/02 | <22 | NA | NA | 290 | 220 | <15 | <15 | NA | 41 | 370 |

| PREVIOUS SOIL SAMPLE RESULTS | | |
|---|---|---|
| ANALYTE | FM-EG-INC-SS-1 | FM-EG-INC-SS-2 |
| BERYLLIUM | 0.619 mg/kg | 0.753 mg/kg |
| CADMIUM | ND | ND |
| CHROMIUM | 39.1 mg/kg | 66.3 mg/kg |
| COPPER | 52.1 mg/kg | 77.3 mg/kg |
| LEAD | 280 mg/kg | 733 mg/kg |
| NICKEL | 61.4 mg/kg | 88.6 mg/kg |
| ZINC | 63 mg/kg | 923 mg/kg |
| MERCURY | 0.640 mg/kg | 0.394 mg/kg |
| ANTHRACENE | ND | ND |
| BENZO (k) FLUORANTHENE | ND | ND |
| BENZO (a) PYRENE | ND | ND |
| PYRENE | ND | ND |

ND - NON DETECT
SAMPLES COLLECTED AT 0.5-1.0' BGS

SOURCE: LIMITED SCOPE SITE INVESTIGATION, MARCH 2000

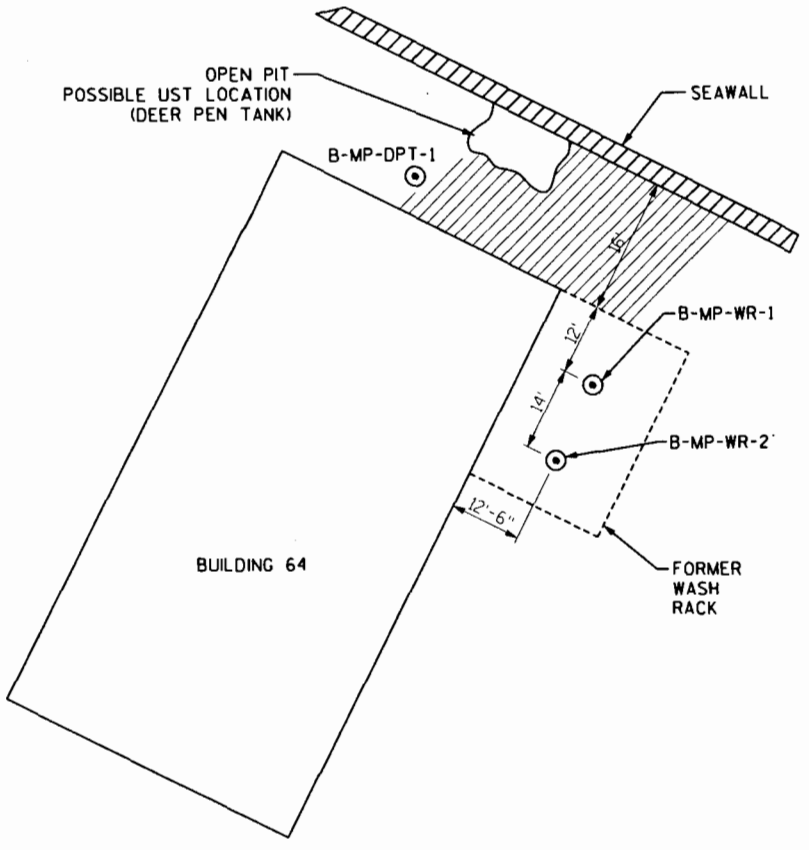
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FIGURE A16
EAST GARRISON - FORT MCDOWELL/ANGEL ISLAND
INCINERATOR
MOTOR POOL AREA

DSGN MB
DR MW
CHK MB
PROJ ID 2001070

FILE NAME: p:\2001projects\2001070 - angelIsland\figure_a16.dgn

DATE: 12/04/2002




LEGEND

⊙ PROPOSED SAMPLE LOCATION

▨ GEOPHYSICAL SURVEY AREA

N

SCALE: NTS



LOCATION MAP

SITE LAYOUT & SAMPLE LOCATIONS

SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | MP1071 | MP1072 | MP2001 |
|---|---|---|---|---|
| LOCATION DESCRIPTION: | | B-MP-WR-1 | B-MP-WR-2 | B-MP-DPT-1 (EG2026) |
| SAMPLE PURPOSE: | | N | N | N |
| SAMPLING DEPTH (ft): | | 6' | 6' | 6' |
| Analysis | Units | | | |
| TPH | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 2.1 | 20 | 5 |
| Motor Oil C24-C36(SGCU) | MG/KG | 5.8 | 56 | 7.7 |
| *No Gasoline Detected* | MG/KG | -- | -- | |
| Metals | | | | |
| Arsenic | MG/KG | 4.4 | 4.3 | |
| Barium | MG/KG | 140 | 120 | |
| Beryllium | MG/KG | 0.69 | 0.52 | |
| Cadmium | MG/KG | 1.3 | 1.4 | |
| Chromium | MG/KG | 36 | 46 | |
| Cobalt | MG/KG | 12 | 17 | |
| Copper | MG/KG | 25 | 25 | |
| Lead | MG/KG | 140 | 24 | |
| Mercury | MG/KG | 0.099 | 0.12 | |
| Nickel | MG/KG | 57 | 70 | |
| Selenium | MG/KG | 0.46 | 1.1 | |
| Vanadium | MG/KG | 41 | 36 | |
| Zinc | MG/KG | 65 | 61 | |
| PCBs | | | | |
| None Detected | UG/KG | -- | | |
| VOCs | | | | |
| None Detected | UG/KG | -- | -- | -- |
| SVOCs | | | | |
| None Detected | UG/KG | -- | | |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

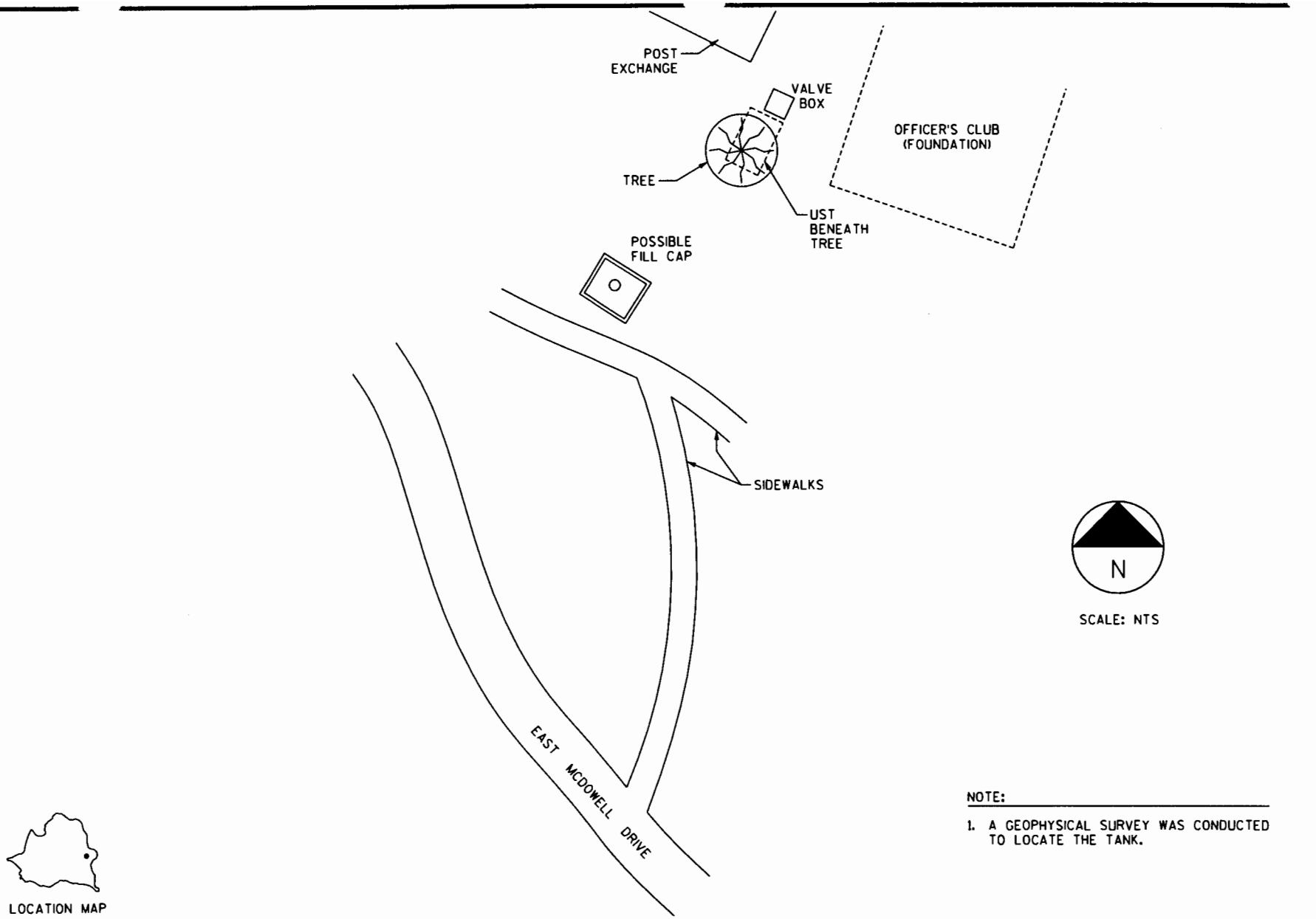
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FIGURE A17
EAST GARRISON - FORT MCDOWELL/ANGEL ISLAND
WASH RACK AT BUILDING 64, POSSIBLE DEER TANK PEN
MOTOR POOL AREA

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: D:\2001projects\2001070 - angelisland\figure_a17.dgn

DATE: 12/04/2002




SITE LAYOUT

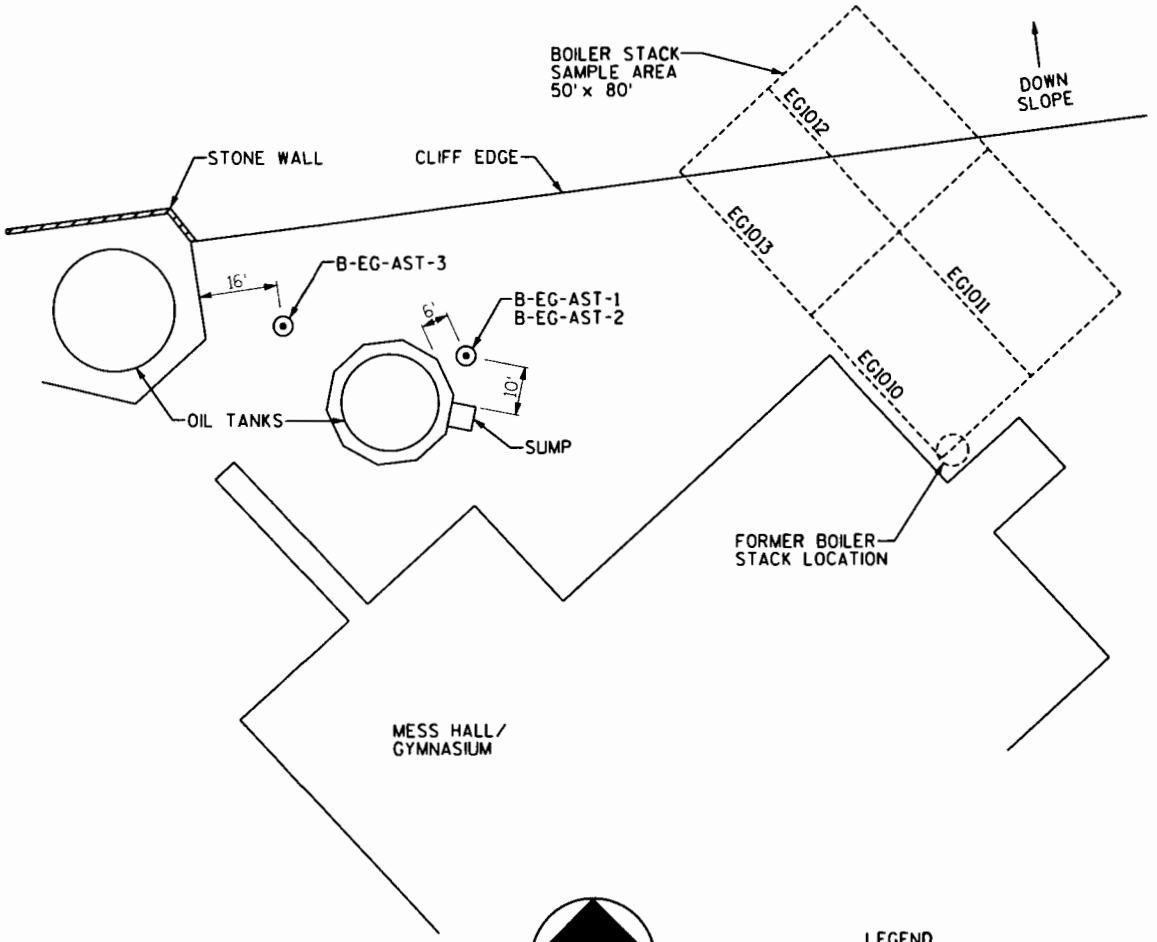
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FIGURE A18
EAST GARRISON • FORT MCDOWELL/ANGEL ISLAND
UST LOCATION
SOUTHEAST OF POST EXCHANGE

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a18.dgn

DATE: 12/04/2002




# SITE LAYOUT & SAMPLE LOCATIONS

## SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | EG1010 | EG1011 | EG1012 | EG1013 | EG1014 |
|---|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | H-EG-FBS-S | H-EG-FBS-E | H-EG-FBS-N | H-EG-FBS-W | H-EG-FBS-W |
| SAMPLE PURPOSE: | | N | N | N | N | FD-EG1013 |
| SAMPLING DEPTH (ft): | | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' |
| Analysis | Units | | | | | |
| Metals | | | | | | |
| Antimony | MG/KG | 3.2 UJ | 3.2 | 3.6 UJ | 2.9 U | 2.9 UJ |
| Arsenic | MG/KG | 3.9 | 3.2 UJ | 2 | 1.5 J | 2.2 J |
| Barium | MG/KG | 220 | 91 | 120 | 100 J | 210 J |
| Beryllium | MG/KG | 0.29 | 0.3 | 0.23 | 0.14 | 0.18 |
| Cadmium | MG/KG | 1.9 | 1.6 | 1.6 | 1.1 | 1.3 |
| Chromium | MG/KG | 300 J | 190 J | 310 J | 150 J | 190 J |
| Cobalt | MG/KG | 34 | 22 | 28 | 14 | 17 |
| Copper | MG/KG | 34 | 27 | 64 | 36 | 36 |
| Lead | MG/KG | **940 J** | 180 J | **500** | **720 J** | **640 J** |
| Mercury | MG/KG | 0.28 | 0.2 | 0.17 | 0.14 | 0.099 |
| Molybdenum | MG/KG | 0.91 J | 0.41 J | 0.68 J | 0.47 J | 0.75 J |
| Nickel | MG/KG | **710** | **370** | **650** | **320** | **390** |
| Selenium | MG/KG | 2.5 | 1.2 | 1.2 | 0.89 UJ | 1.1 J |
| Silver | MG/KG | 0.25 U | 0.24 U | 0.088 J | 0.24 U | 0.24 U |
| Thallium | MG/KG | 0.63 | 0.85 | 0.36 | 0.36 | 0.24 U |
| Vanadium | MG/KG | 120 | 42 | 81 | 42 | 55 |
| Zinc | MG/KG | 300 | 150 | 270 | 190 | 280 |

| FIELD SAMPLE ID: | | EG1001 | EG1003 | EG1006W |
|---|---|---|---|---|
| LOCATION DESCRIPTION: | | B-EG-AST-1 (PP) | B-EG-AST-3 (PP) | B-EG-AST-2 (PP) |
| SAMPLE PURPOSE: | | N | N | N |
| SAMPLING DEPTH (ft): | | 10' | 15' | 0.5' - 1' |
| Analysis | Units | | | |
| TPH | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 3.8 | 1.3 | 4.5 |
| Motor Oil C24-C36(SGCU) | MG/KG | 7.9 | 19 | 6 U |
| VOCs | | | | |
| Isopropylbenzene | UG/KG | 2.3 J | | |
| n-Butylbenzene | UG/KG | 6.2 | | |
| o-Xylene | UG/KG | 3 J | | |
| para-Isopropyl Toluene | UG/KG | 2.8 J | | |
| Propylbenzene | UG/KG | 1.8 J | | |
| sec-Butylbenzene | UG/KG | 2.4 J | | |

## SUMMARY OF DETECTED RESULTS FOR WATER

| SITE NAME: | | Power Plant AST | Power Plant AST |
|---|---|---|---|
| FIELD SAMPLE ID: | | EG1007W | EG1008W |
| LOCATION DESCRIPTION: | | B-EG-AST-2 (PP-water) | B-EG-AST-2 (PP-water) |
| SAMPLE PURPOSE: | | N | FD-EG1007W |
| SAMPLING DEPTH (ft): | | WATER | WATER |
| Analysis | Units | | |
| TPH | | | |
| Diesel C12-C24(SGCU) | UG/L | 86 | 66 |
| Motor Oil C24-C38(SGCU) | UG/L | 300 | 200 |
| VOCs | | | |
| 2-Butanone | UG/L | 3.1 J | 1.4 J |
| Carbon Disulfide | UG/L | 1 J | 0.4 J |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

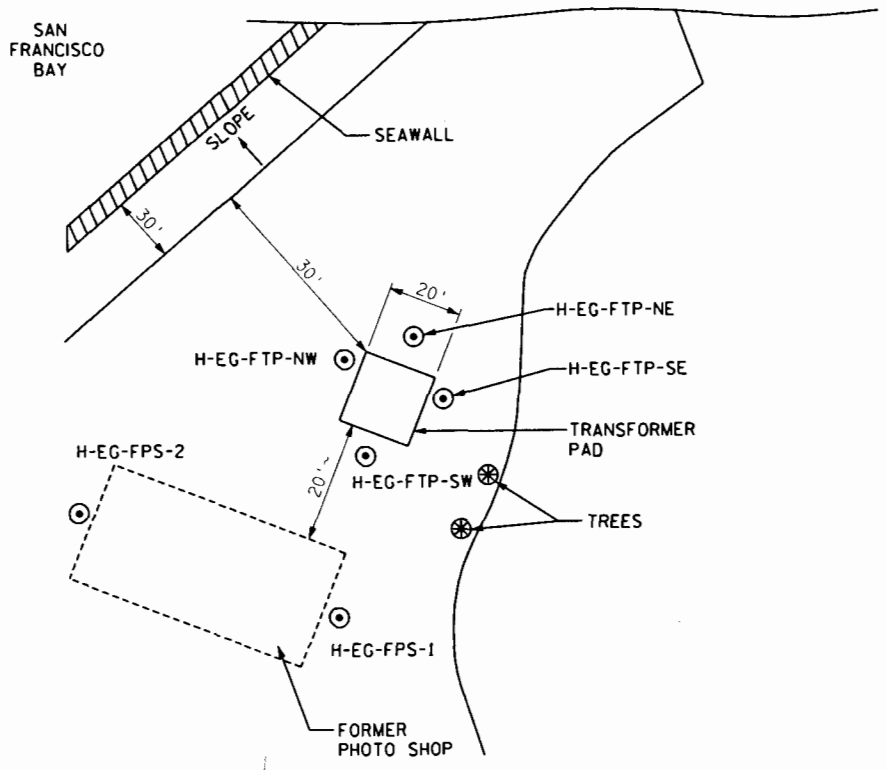
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FIGURE A19
EAST GARRISON - FORT MCDOWELL/ANGEL ISLAND
ABOVE GROUND FUEL TANKS AND FORMER BOILER STACK LOCATION
POWER PLANT WEST OF GYMNASIUM

DSGN MB
DR MW
CHK MB
PROJ ID 2001070

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a19.dgn

DATE: 12/04/2002




LEGEND

⊙ SI SAMPLE LOCATION



LOCATION MAP




SCALE: NTS

SITE LAYOUT & SAMPLE LOCATIONS

SUMMARY OF DETECTED RESULTS FOR SOIL
FORMER PHOTO SHOP

| FIELD SAMPLE ID: | | EG1015 | EG1016 | EG1028 |
|---|---|---|---|---|
| LOCATION DESCRIPTION: | | H-EG-FPS-1 | H-EG-FPS-2 | H-EG-FPS-2 |
| SAMPLE PURPOSE: | | N | N | FD-EG1018 |
| SAMPLING DEPTH (ft): | | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' |
| Analysis | Units | | | |
| **Metals** | | | | |
| Arsenic | MG/KG | 3.4 | 3.8 | 2.9 |
| Barium | MG/KG | 110 | 140 | 130 |
| Beryllium | MG/KG | 0.35 | 0.41 | 0.37 |
| Cadmium | MG/KG | 1.2 | 1.7 | 1.4 |
| Chromium | MG/KG | 43 J | 79 J | 62 J |
| Cobalt | MG/KG | 11 | 16 | 13 |
| Copper | MG/KG | 17 | 25 | 18 |
| Lead | MG/KG | 39 J | 40 J | 31 J |
| Mercury | MG/KG | 0.097 | 0.12 | 0.13 |
| Molybdenum | MG/KG | 1 U | 0.43 J | 0.94 U |
| Nickel | MG/KG | 58 | 120 | 89 |
| Selenium | MG/KG | 1.1 | 1.4 | 1 |
| Thallium | MG/KG | 0.9 | 0.84 | 0.7 |
| Vanadium | MG/KG | 37 | 42 | 35 |
| Zinc | MG/KG | 70 | 76 | 65 |
| **SVOCs** | | | | |
| 2-Methylnaphthalene | UG/KG | 41 J | 1700 U | 1700 U |
| 4-Methylphenol | UG/KG | 50 J | 1700 U | 1700 U |
| Benzo(k)fluoranthene | UG/KG | 16 J | 1700 U | 1700 U |
| Naphthalene | UG/KG | 41 J | 1700 U | 1700 U |

FORMER TRANSFORMER PAD

| FIELD SAMPLE ID: | | FTP1001NE | FTP1002NW | FTP1003SE | FTP1004SW |
|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | FTP1001NE | FTP1002NW | FTP1003SE | FTP1004SW |
| SAMPLE PURPOSE: | | N | N | N | N |
| SAMPLING DEPTH (ft): | | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' |
| Analysis | Units | | | | |
| **PCBs** | | | | | |
| None Detected | UG/KG | -- | -- | -- | -- |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

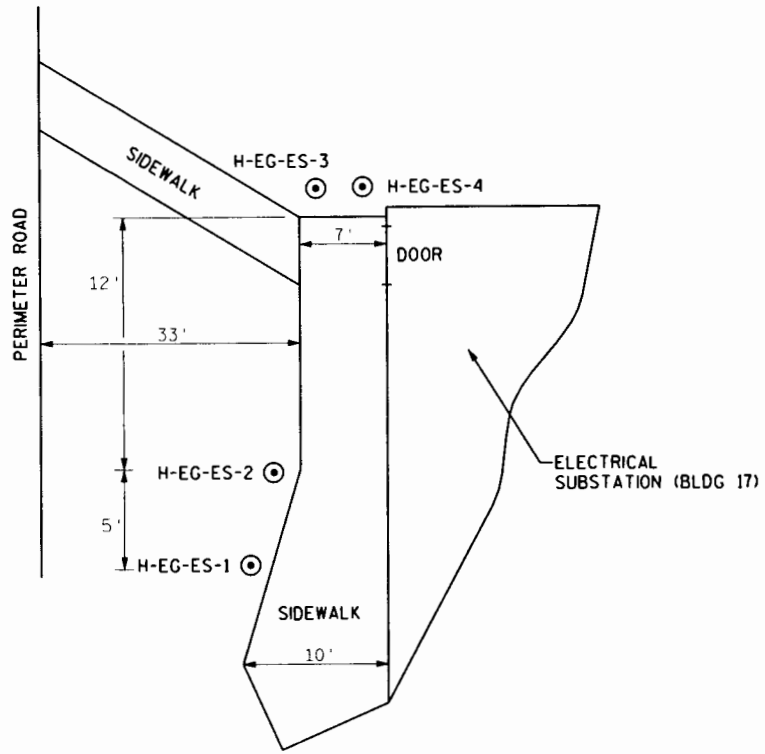
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FIGURE A20
EAST GARRISON - FORT MCDOWELL/ANGEL ISLAND
FORMER TRANSFORMER LOCATION
TRANSFORMER PAD

DSGN MB
DR MW
CHK MB
PROJ ID 2001070

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a20.dgn

DATE: 12/04/2002




LEGEND

⊙ PROPOSED SAMPLE LOCATION



LOCATION MAP




SCALE: NTS

SITE LAYOUT & SAMPLE LOCATIONS

SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | EG1006 | EG1007 | EG1008 | EG1009 |
|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | H-EG-ES-1 | H-EG-ES-2 | H-EG-ES-3 | H-EG-ES-4 |
| SAMPLE PURPOSE: | | N | N | N | N |
| SAMPLING DEPTH (ft): | | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' | 0.5' - 1' |
| Analysis | Units | | | | |
| PCBs | | | | | |
| Aroclor-1280 | UG/KG | **2400000** | **1900000** | **340000** | **1100000** |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

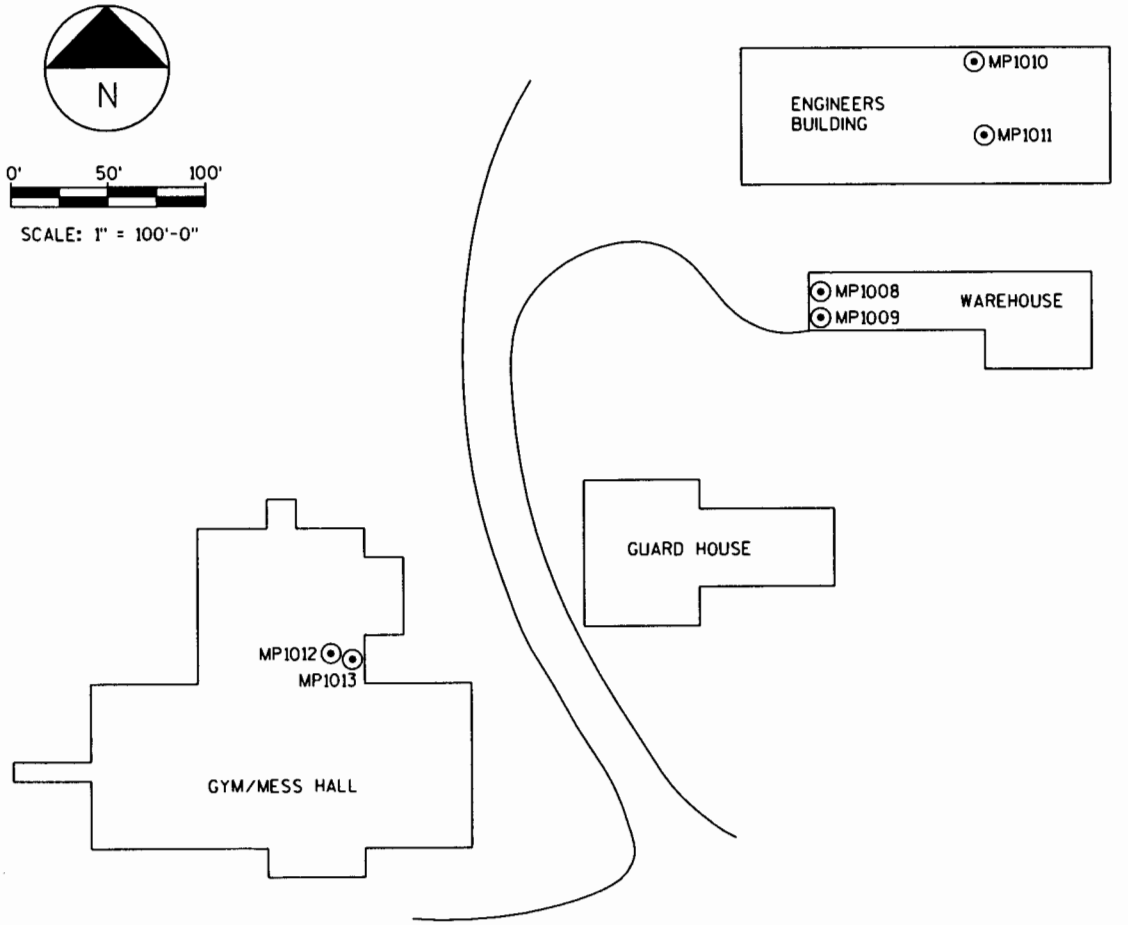
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FIGURE A20A
EAST GARRISON - FORT MCDOWELL/ANGEL ISLAND
ELECTRICAL SUBSTATION
EAST OF HOSPITAL

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a20a.dgn

DATE: 12/04/2002




LEGEND

⊙ SISAMPLE LOCATION



LOCATION MAP

SITE LAYOUT & SAMPLE LOCATIONS

SUMMARY OF PRODUCT SAMPLE RESULTS

| FIELD SAMPLE ID: | DESCRIPTION | PCB MG/KG |
|---|---|---|
| MP1008 | Oil Can #1 | ND |
| MP1009 | Oil Can #2 | ND |
| MP1010 | Oil Circuit Breaker | ND |
| MP1011 | Hopper | ND |
| MP1012 | Transformer #1 | ND |
| MP1013 | Transformer #2 | ND |

ND = None Detected

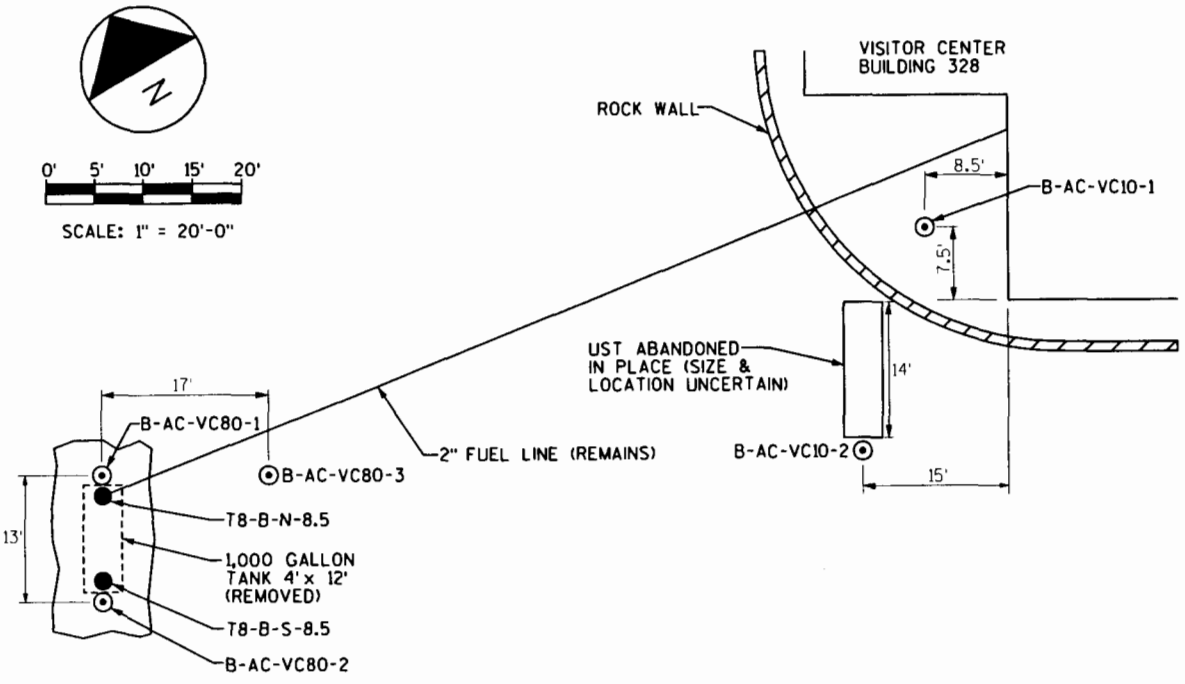
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FIGURE A20B
EAST GARRISON - FORT MCDOWELL/ANGEL ISLAND
ELECTRICAL EQUIPMENT STORAGE

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: P:\2001Projects\2001070 - AngelIsland\figure_a20b.dgn

DATE: 12/06/2002




LEGEND

- ● PREVIOUS SAMPLE LOCATION
- ⊙ SI SAMPLE LOCATION



LOCATION MAP

## SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | AC1025 | AC1026 |
|---|---|---|---|
| LOCATION DESCRIPTION: | | B-AC-VC10-2 | B-AC-VC10-1 |
| SAMPLE PURPOSE: | | N | N |
| SAMPLING DEPTH (ft): | | 4.5' | 10' |
| Analysis | Units | | |
| TPH | | | |
| None Detected | MG/KG | -- | -- |

| FIELD SAMPLE ID: | | AC1030 | AC1031 | AC1032 | AC1033 |
|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | B-AC-VC80-1 | B-AC-VC80-1 | B-AC-VC80-2 | B-AC-VC80-3 |
| SAMPLE PURPOSE: | | N | FD-AC1030 | N | N |
| SAMPLING DEPTH (ft): | | 15' | 15' | 15' | 15' |
| Analysis | Units | | | | |
| TPH | | | | | |
| None Detected | MG/KG | -- | -- | -- | -- |
| VOCs | | | | | |
| None Detected | UG/KG | -- | -- | | |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

| PREVIOUS SAMPLE RESULTS | | | |
|---|---|---|---|
| SAMPLE I.D. | DESCRIPTION | SAMPLE DEPTH BELOW GROUND SURFACE | TPH-DIESEL EPA 8015M (mg/kg) |
| T8-B-S-8.5 | EXCAVATION BOTTOM SAMPLE COLLECTED 1 FOOT BELOW REMOVED UST, SOUTH END | 8.5' | ND |
| T8-B-N-8.5 | EXCAVATION BOTTOM SAMPLE COLLECTED 1 FOOT BELOW REMOVED UST, NORTH END | 8.5' | 17 |
| T8-SP-COMP | EXCAVATED STOCKPILE COMPOSITE COMPRISED OF THREE RANDOMLY SELECTED DISCRETE SAMPLES | N/A | 850 |

SOURCE: REPORT OF UNDERGROUND TANK CLOSURE, NOVEMBER 2000

# SITE LAYOUT & SAMPLE LOCATIONS

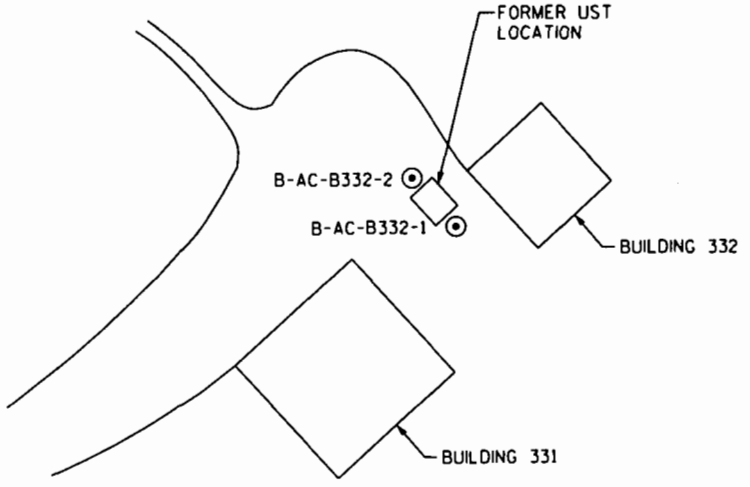
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FIGURE A21
AYALA COVE - FORT MCDOWELL/ANGEL ISLAND
TWO FORMER UST LOCATIONS
VISITOR'S CENTER, BUILDING 328

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure-a21.dgn

DATE: 12/04/2002




LEGEND

⊙ SI SAMPLE LOCATION



LOCATION MAP




SCALE: NTS

SITE LAYOUT

SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | B-332#1@15' | B-332#2@15' |
|---|---|---|---|
| LOCATION DESCRIPTION: | | B-332#1@15' | B-332#2@15' |
| SAMPLE PURPOSE: | | N | N |
| SAMPLING DEPTH (ft): | | 15' | 15' |
| Analysis | Units | | |
| TPH | | | |
| None Detected | MG/KG | -- | -- |
| VOCs | | | |
| None Detected | UG/KG | -- | |

Note: *See Analytical Tables in Appendix B for full results.*
Bold = Concentretion above Comparison Value.

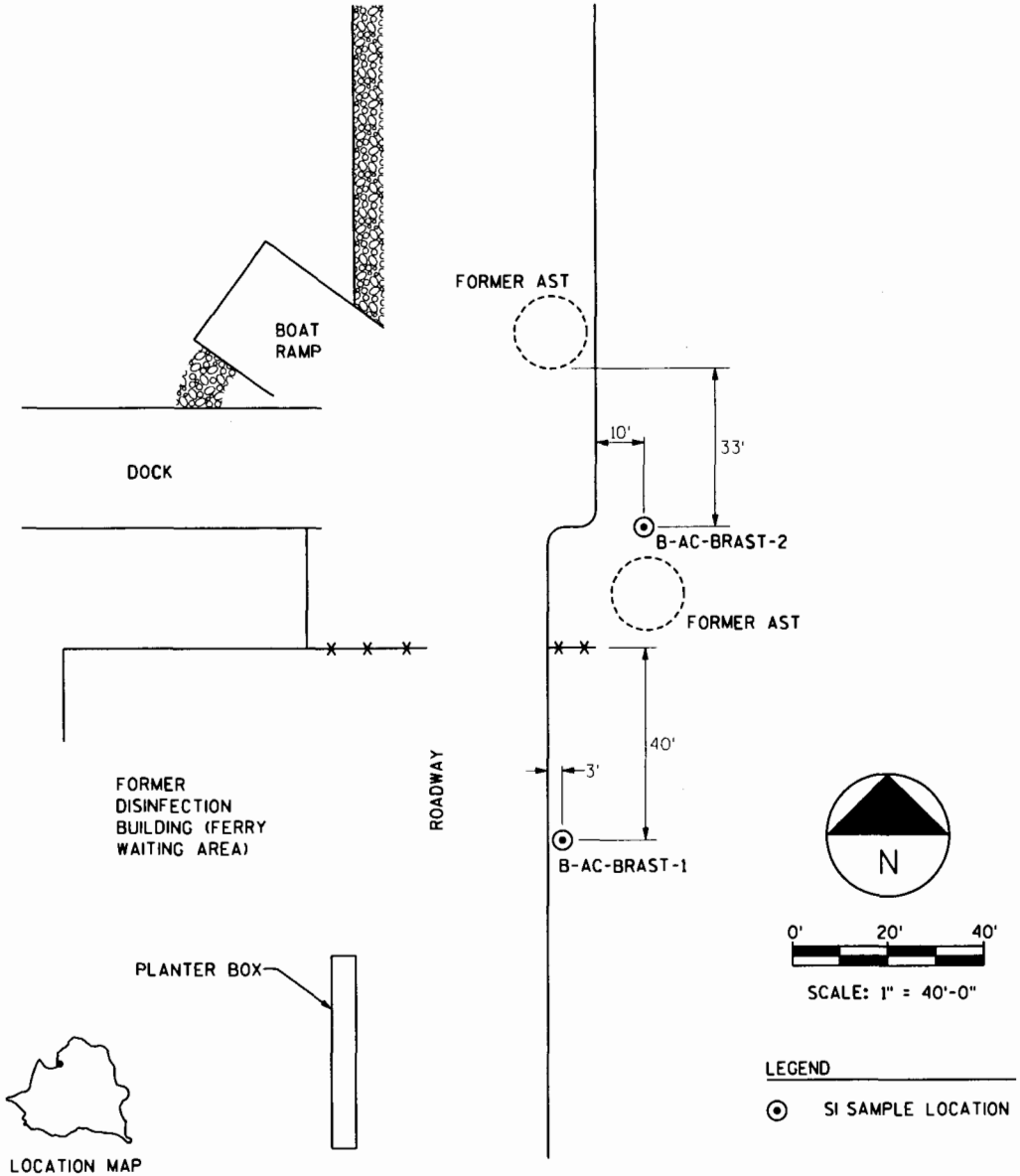
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FIGURE A22
AYALA COVE - FORT MCDOWELL/ANGEL ISLAND
FORMER UST LOCATION
RESIDENCE, BETWEEN BUILDINGS 331 AND 332

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: P:\2001projects\2001070 - angelisland\figure_a22.dgn

DATE: 12/04/2002




SITE LAYOUT & SAMPLE LOCATIONS

SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | AC1001 | AC1001D | AC1003 |
|---|---|---|---|---|
| | | B-AC-BRAST- | B-AC-BRAST- | B-AC-BRAST- |
| LOCATION DESCRIPTION: | | 1 | 1 | 2 |
| SAMPLE PURPOSE: | | N | N | N |
| SAMPLING DEPTH (ft): | | 4' | 5' | 5' |
| Analysis | Units | | | |
| TPH | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 1.1 U | 2.7 | |
| VOCs | | | | |
| None Detected | UG/KG | | | -- |
| SVOCs | | | | |
| None Detected | UG/KG | | | -- |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

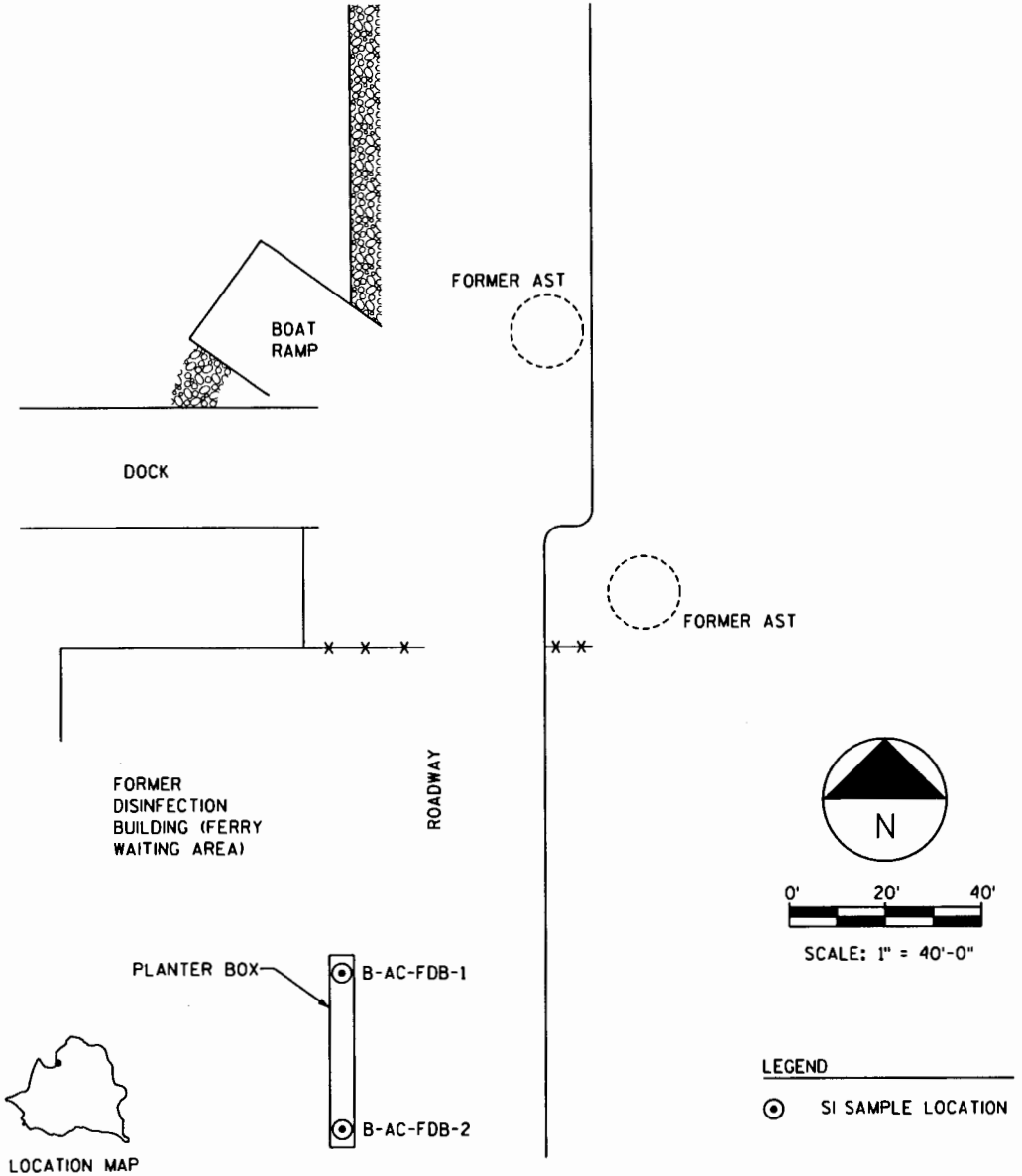
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FIGURE A23
AYALA COVE - FORT MCDOWELL/ANGEL ISLAND
THREE FORMER AST'S
NEAR STATE BOAT RAMP

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a23.dgn

DATE: 12/04/2002




SITE LAYOUT & SAMPLE LOCATIONS

## SUMMARY OF DETECTED RESULTS FOR SOIL

| LOCATION DESCRIPTION: | | Former Disinfection Bldg | Former Disinfection Bldg | Former Disinfection Bldg |
|---|---|---|---|---|
| FIELD SAMPLE ID: | | AC1015 | AC1016 | AC1017 |
| SAMPLE PURPOSE: | | 159341-003 | 159340-002 | 159340-001 |
| SAMPLING DEPTH (ft): | | N | N | FD-AC1016 |
| Analysis | Units | | | |
| **Wet Chemistry** | | | | |
| Cyanide (E335.2) | MG/KG | 1.1 U | -- | -- |
| **Pesticides (SW8081A)** | | | | |
| 4,4'-DDD | UG/KG | 3.8 U | 3.6 U | 3.6 U |
| 4,4'-DDE | UG/KG | 3.8 U | 3.6 U | 3.6 U |
| 4,4'-DDT | UG/KG | 3.8 U | 3.6 U | 3.6 U |
| Aldrin | UG/KG | 2 U | 1.8 U | 1.9 U |
| alpha-BHC | UG/KG | 2 U | 1.8 U | 1.9 U |
| alpha-Chlordane | UG/KG | 1.6 J | 1.8 U | 1.9 U |
| beta-BHC | UG/KG | 2 U | 1.8 U | 1.9 U |
| delta-BHC | UG/KG | 2 U | 1.8 U | 1.9 U |
| Dieldrin | UG/KG | 0.99 J | 3.6 U | 3.6 U |
| Endosulfan I | UG/KG | 2 U | 1.8 U | 1.9 U |
| Endosulfan II | UG/KG | 3.8 U | 3.6 U | 3.6 U |
| Endosulfan sulfate | UG/KG | 3.6 U | 3.6 U | 3.6 U |
| Endrin | UG/KG | 3.8 U | 3.8 U | 3.6 U |
| Endrin aldehyde | UG/KG | 3.8 U | 3.6 U | 3.6 U |
| gamma-BHC | UG/KG | 2 U | 1.6 U | 1.9 U |
| gamma-Chlordane | UG/KG | 2.1 | 1.6 U | 1.9 U |
| Heptachlor | UG/KG | 2 U | 1.8 U | 1.9 U |
| Heptachlor epoxide A | UG/KG | 2 U | 1.8 U | 1.9 U |
| Heptachlor epoxide B | UG/KG | 2 U | 1.8 U | 1.9 U |
| Methoxychlor | UG/KG | 20 U | 18 U | 19 U |
| Toxaphene | UG/KG | 70 U | 65 U | 65 U |
| **PCBs (SW8082)** | | | | |
| Aroclor-1016 | UG/KG | -- | 13 U | 13 U |
| Aroclor-1221 | UG/KG | -- | 27 U | 28 U |
| Aroclor-1232 | UG/KG | -- | 13 U | 13 U |
| Aroclor-1242 | UG/KG | -- | 13 U | 13 U |
| Aroclor-1248 | UG/KG | -- | 13 U | 13 U |
| Aroclor-1254 | UG/KG | -- | 13 U | 13 U |
| Aroclor-1260 | UG/KG | -- | 13 U | 13 U |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

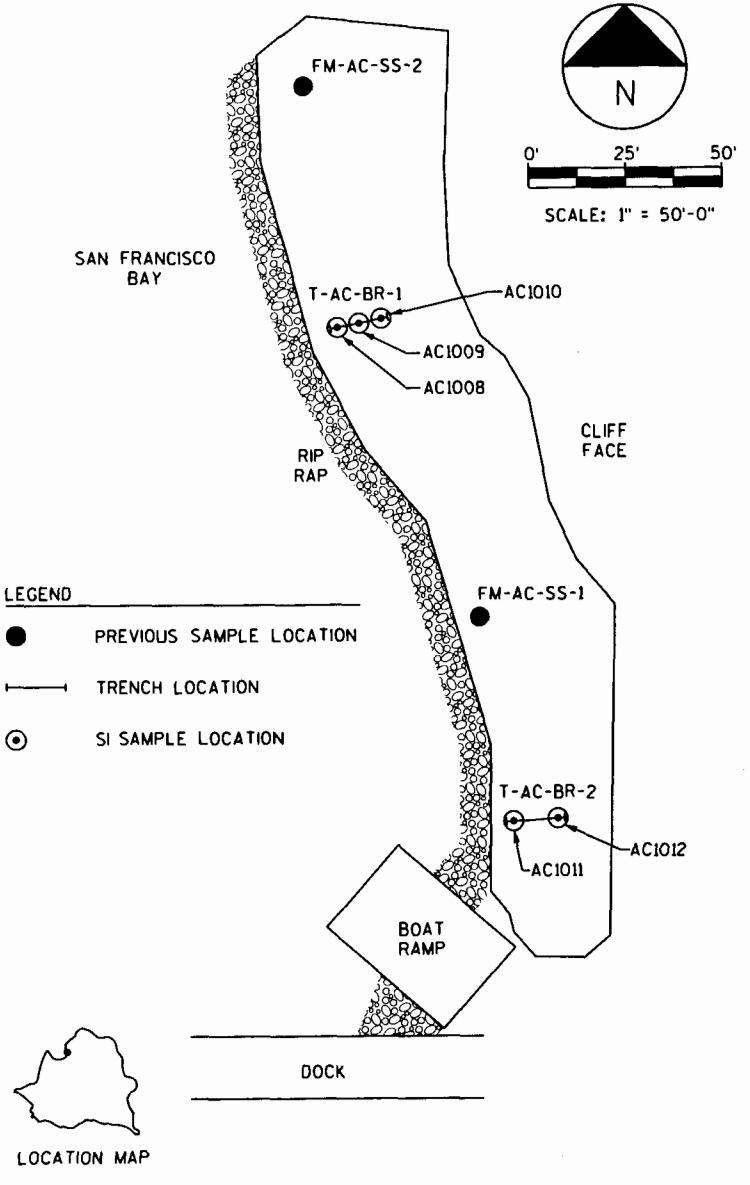
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FIGURE A24
AYALA COVE - FORT MCDOWELL/ANGEL ISLAND
DORMER DISINFECTION BUILDING
NEAR STATE BOAT RAMP

DSGN MB
DR MW
CHK MB
PROJ ID 2001070

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a24.dgn

DATE: 12/04/2002




SITE LAYOUT & SAMPLE LOCATIONS

## SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | AC1008 | AC1009 | AC1010 | AC1011 | AC1012 | AC1013 |
|---|---|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | T-AC-BR-1 (Dump Site) | T-AC-BR-1 (Dump Site) | T-AC-BR-1 (Dump Site) | T-AC-BR-2 (Dump Site) | T-AC-BR-2 (Dump Site) | T-AC-BR-2 (Dump Site) |
| SAMPLE PURPOSE: | | N | N | N | N | N | FD-AC1012 |
| SAMPLING DEPTH (ft): | | 5' | 5' | 5' | 4' | 4' | 4' |
| Analysis | Units | | | | | | |
| TPH | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 29 | 19 | **32** | **3900** | **2700** | **2700** |
| Motor Oil C24-C36(SGCU) | MG/KG | 140 | 35 | 46 | 93 | 61 | 76 |
| Gasoline C7-C12 | MG/KG | 0.3 U | 0.26 U | 0.22 U | 97 | 24 | 94 |
| Metals | | | | | | | |
| Antimony | MG/KG | 3.3 UJ | 2.7 UJ | 3.0 UJ | 4 UJ | 3.2 UJ | 3.2 UJ |
| Arsenic | MG/KG | 5.1 | 7.3 | 9.6 | 6 | 6.2 | 7.6 |
| Barium | MG/KG | 540 | 160 | 150 | 220 | 93 | 130 |
| Beryllium | MG/KG | 0.5 | 0.28 | 0.36 | 0.57 | 0.48 | 0.36 |
| Cadmium | MG/KG | 1.5 | 1.6 | 1.9 | 2.3 | 2 | 1.9 |
| Chromium | MG/KG | 24 | 33 | 37 | 180 | 73 | 51 |
| Cobalt | MG/KG | 9.6 | 12 | 16 | 23 | 16 | 15 |
| Copper | MG/KG | 26 | 22 | 23 | 24 | 19 | 19 |
| Lead | MG/KG | 460 | 58 | 42 | 7.3 | 24 | 18 |
| Mercury | MG/KG | 0.36 | 0.17 | 0.24 | 0.18 | 0.15 | 0.11 |
| Nickel | MG/KG | 53 | 59 | 64 | 270 | 110 | 100 |
| Selenium | MG/KG | 0.28 U | 0.74 | 0.6 | 0.45 | 0.81 | 0.88 |
| Vanadium | MG/KG | 36 | 27 | 32 | 46 | 39 | 27 |
| Zinc | MG/KG | 270 | 90 | 80 | 67 | 67 | 59 |
| Pest\PCB\Cyanide | | | | | | | |
| None Detected | UG/KG | | | | | | |
| VOCs | | | | | | | |
| 2-Butanone | UG/KG | 27 U | 9.9 U | 10 U | 9.2 U | 10 U | 2.3 J |
| Carbon Disulfide | UG/KG | 14 U | 5 U | 5.2 U | 4.6 U | 5.2 U | 0.61 J |
| Isopropylbenzene | UG/KG | 14 U | 5 U | 5.2 U | 4.6 U | 5.2 U | 2.4 J |
| sec-Butylbenzene | UG/KG | 14 U | 5 U | 5.2 U | 2.1 J | 1.3 J | 34 |
| Tetrachloroethene | UG/KG | 14 U | 5 U | 5.2 U | 4.6 U | 5.2 J | 5.1 U |
| Toluene | UG/KG | 14 U | 5 U | 5.2 U | 4.6 U | 0.75 | 5.1 U |
| SVOCs | | | | | | | |
| 2-Methylnaphthalene | UG/KG | 27 J | 17 J | 110 J | 360 J | 2100 U | 94 J |
| Acenephthene | UG/KG | 380 U | 400 U | 400 U | 360 J | 2100 U | 370 U |
| Anthracene | UG/KG | 23 J | 32 J | 400 U | 4000 U | 2100 U | 370 U |
| Benzo(a)anthracene | UG/KG | 54 J | 65 J | 41 J | 4000 U | 2100 U | 370 U |
| Benzo(a)pyrene | UG/KG | **62 J** | **74 J** | 48 J | 4000 U | 2100 U | 370 U |
| Benzo(b)fluoranthene | UG/KG | 170 J | 47 J | 66 J | 4000 U | 2100 U | 370 U |
| Benzo(g,h,i)perylene | UG/KG | 70 J | 67 J | 68 J | 4000 U | 2100 U | 370 U |
| Benzo(k)fluoranthene | UG/KG | 78 J | 61 J | 21 J | 4000 U | 2100 U | 370 U |
| Chrysene | UG/KG | 120 J | 83 J | 75 J | 4000 U | 2100 U | 27 J |
| Dibenz(a,h)anthracene | UG/KG | 380 U | 29 J | 400 U | 4000 U | 2100 U | 370 U |
| Dibenzofuran | UG/KG | 380 U | 400 U | 400 U | 350 J | 2100 U | 370 U |
| Fluoranthene | UG/KG | 120 J | 130 J | 58 J | 4000 U | 2100 U | 370 U |
| Fluorene | UG/KG | 380 U | 400 U | 25 J | 1900 J | 2100 U | 180 J |
| Indeno(1,2,3-cd)pyrene | UG/KG | 70 J | 55 J | 52 J | 4000 U | 2100 U | 370 U |
| Naphthalene | UG/KG | 380 U | 400 U | 45 J | 4000 U | 2100 U | 82 J |
| Phenanthrene | UG/KG | 65 J | 100 J | 150 J | 3800 J | 220 J | 320 J |
| Pyrene | UG/KG | 120 J | 160 J | 68 J | 4000 U | 140 J | 69 J |

## SUMMARY OF DETECTED RESULTS FOR WATER

| SITE NAME: | | Boat Ramp |
|---|---|---|
| FIELD SAMPLE ID: | | AC1014W |
| LOCATION DESCRIPTION: | | T-AC-BR-2 (Dump Site) |
| SAMPLE PURPOSE: | | N |
| SAMPLING DEPTH (ft): | | WATER |
| Analysis | Units | |
| TPH | | |
| Diesel C12-C24(SGCU) | UG/L | **3600000** |
| Motor Oil C24-C36(SGCU) | UG/L | **93000** |
| Gasoline C7-C12 | UG/L | **1100** |
| Cyanide | | |
| None Detected | UG/L | -- |
| Metals | | |
| Arsenic | UG/L | 5 U |
| Barium | UG/L | 360 |
| Beryllium | UG/L | 1.9 J |
| Cadmium | UG/L | 0.4 J |
| Chromium | UG/L | 46 |
| Cobalt | UG/L | 13 J |
| Copper | UG/L | 3 J |
| Lead | UG/L | 23 |
| Mercury | UG/L | 0.089 J |
| Nickel | UG/L | 92 |
| Selenium | UG/L | 5 U |
| Vanadium | UG/L | 37 |
| Zinc | UG/L | 66 |
| VOCs | | |
| 2-Butanone | UG/L | 1.5 J |
| Carbon Disulfide | UG/L | 13 |
| SVOCs | | |
| Fluorene | UG/L | 500 J |
| Phenanthrene | UG/L | 950 J |
| Pyrene | UG/L | 180 J |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

| PREVIOUS SAMPLE RESULTS | | | | | |
|---|---|---|---|---|---|
| ANALYTE | FM-AC-SS-1 | FM-AC-SS-2 | ANALYTE | FM-AC-SS-1 | FM-AC-SS-2 |
| ARSENIC | NOT ANALYZED | 23.9 mg/kg | BENZENE | 1.00 ug/kg | 0.922 ug/kg |
| BERYLLIUM | NOT ANALYZED | 0.703 mg/kg | 2-BUTANONE | 8.86 ug/kg | 15.7 ug/kg |
| CHROMIUM | NOT ANALYZED | 58.6 mg/kg | CARBON DISULFIDE | 5.69 ug/kg | 3.90 ug/kg |
| COPPER | NOT ANALYZED | 34.2 mg/kg | 4-METHYL 2-PENTANONE | 1.83 ug/kg | ND |
| LEAD | NOT ANALYZED | 423 mg/kg | NAPHTHALENE | 1.16 ug/kg | 1.21 ug/kg |
| NICKEL | NOT ANALYZED | 83.3 mg/kg | TOLUENE | 0.944 ug/kg | 0.671 ug/kg |
| ZINC | NOT ANALYZED | 517 mg/kg | 1,2,4-TRIMETHYLBENZENE | ND | 0.705 ug/kg |
| MERCURY | NOT ANALYZED | 0.249 mg/kg | PYRENE | 986 ug/kg | ND |
| ACETONE | 7.79 ug/kg | 130 ug/kg | BENZO (A) PYRENE | 370 ug/kg | ND |

ND - NON DETECT
SOURCE: LIMITED SCOPE SITE ASSESSMENT, MARCH 2000

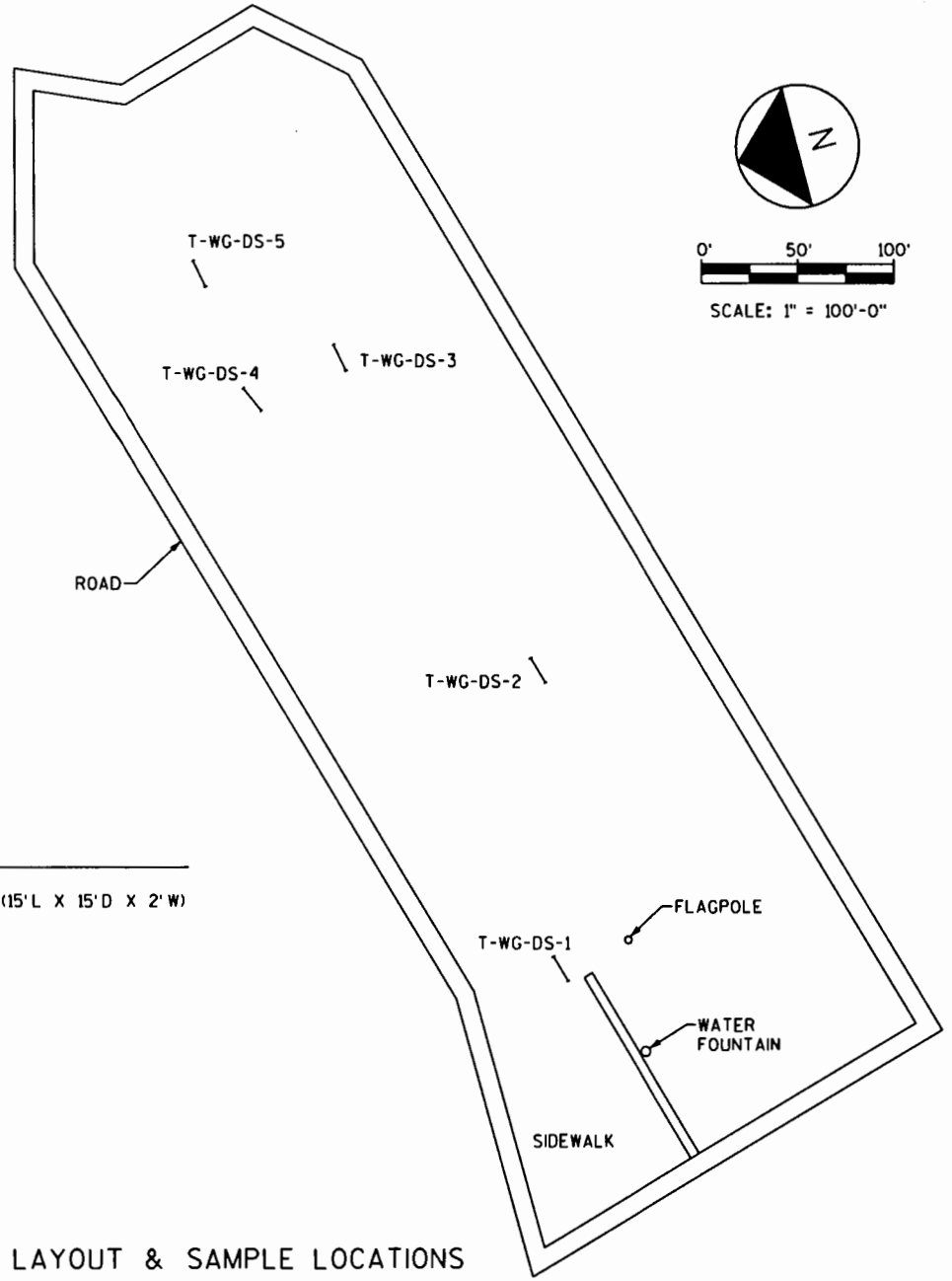
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Engineering and Science

FIGURE A25
AYALA COVE · FORT MCDOWELL/ANGEL ISLAND
POSSIBLE DUMP SITE
NORTH OF BOAT DOCK

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a25.dgn

DATE: 12/04/2002




SITE LAYOUT & SAMPLE LOCATIONS

SUMMARY OF DETECTED RESULTS FOR SOIL

| | FIELD SAMPLE ID: | WG1004 | WG1005 | WG1006 |
|---|---|---|---|---|
| | LOCATION DESCRIPTION: | T-WG-DS-5 (Dump Site) | T-WG-DS-5 (Dump Site) | T-WG-DS-5 (Dump Site) |
| | SAMPLE PURPOSE: | N | N | N |
| | SAMPLING DEPTH (ft): | 15' | 15' | 15' |
| Analysis | Units | | | |
| TPH | | | | |
| None Detected | MG/KG | -- | -- | -- |
| Cyanide | | | | |
| None Detected | MG/KG | -- | -- | -- |
| Metals | | | | |
| Arsenic | MG/KG | 2.3 | 2.4 | 2.4 |
| Barium | MG/KG | 130 | 110 | 120 |
| Beryllium | MG/KG | 0.46 | 0.41 | 0.44 |
| Cadmium | MG/KG | 1.5 | 1.5 | 1.4 |
| Chromium | MG/KG | 120 | 190 | 94 |
| Cobalt | MG/KG | 19 | 26 | 12 |
| Copper | MG/KG | 23 | 25 | 20 |
| Lead | MG/KG | 5.1 | 7.6 | 3.8 |
| Mercury | MG/KG | 0.058 U | 0.038 U | 0.064 |
| Nickel | MG/KG | **160** | **260** | 120 |
| Selenium | MG/KG | 0.36 | 0.73 | 0.27 J |
| Thallium | MG/KG | 1 | 1.4 | 0.63 |
| Vanadium | MG/KG | 45 | 50 | 44 |
| Zinc | MG/KG | 43 | 45 | 48 |
| PCBs | | | | |
| None Detected | UG/KG | -- | -- | -- |
| VOCs | | | | |
| Toluene | UG/KG | 10 U | 13 U | 5.2 J |
| SVOCs | | | | |
| None Detected | UG/KG | -- | -- | -- |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentration above Comparison Value.

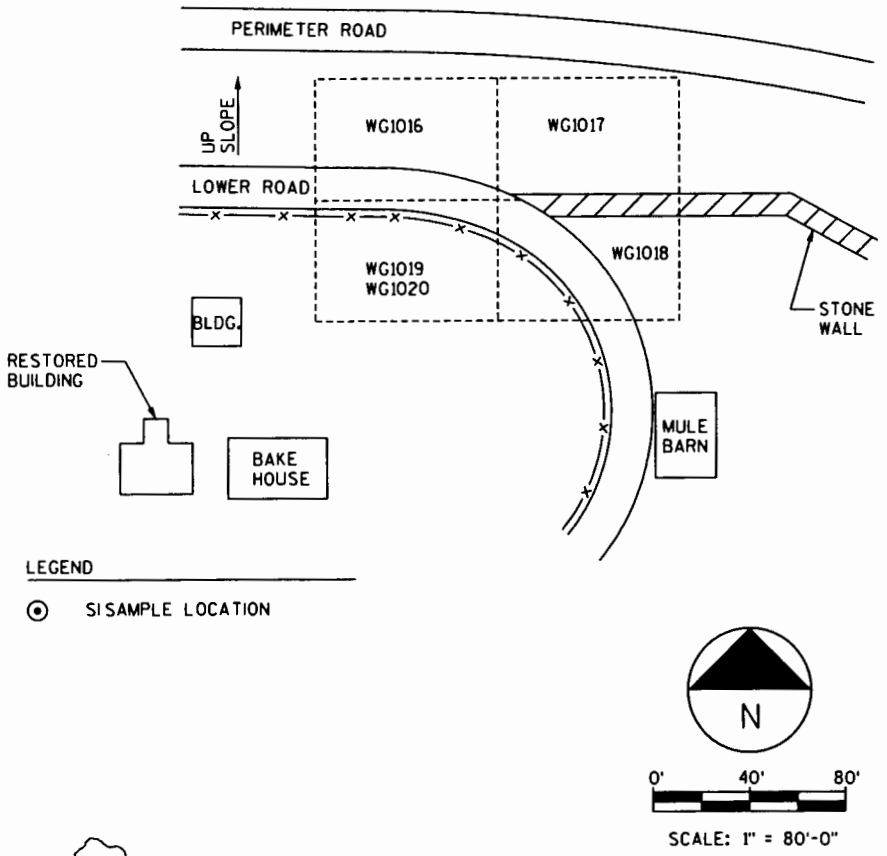
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FIGURE A26
WEST GARRISON - FORT MCDOWELL/ANGEL ISLAND
POSSIBLE DUMP SITE
PARADE GROUNDS NEAR FLAGPOLE

DSGN MB
DR MW
CHK MB
PROJ ID 2001070

FILE NAME: p:\2001projects\2001070 - angelisland\figure_a26.dgn

DATE: 12/04/2002





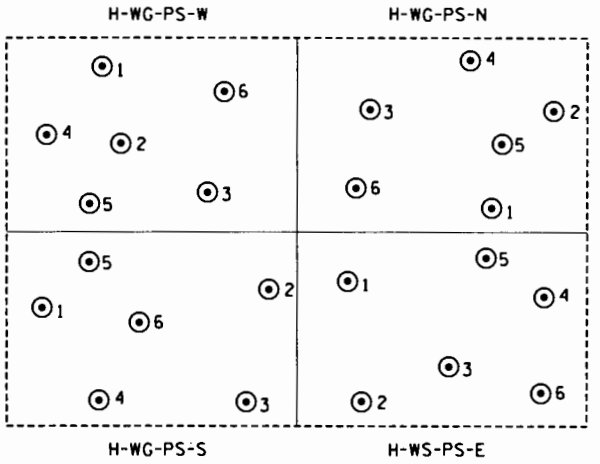


SITE LAYOUT

SUMMARY OF DETECTED RESULTS FOR SOIL

| FIELD SAMPLE ID: | | WG1016 | WG1017 | WG1018 | WG1019 | WG1020 |
|---|---|---|---|---|---|---|
| LOCATION DESCRIPTION: | | H-WG-PS-W | H-WG-PS-N | H-WG-PS-E | H-WH-PS-S | H-WG-PS-N |
| SAMPLE PURPOSE: | | N | N | N | N | FD-WG1017 |
| SAMPLING DEPTH (ft): | | 1' | 1' | 1' | 1' | 0.5' - 1' |
| Analysis | Units | | | | | |
| **Metals** | | | | | | |
| Arsenic | MG/KG | 2.1 | 1.3 | 2.2 | 1.7 | 1.7 |
| Barium | MG/KG | 77 | 100 | 120 | 150 | 130 |
| Beryllium | MG/KG | 0.2 | 0.22 | 0.26 | 0.2 J | 0.31 J |
| Cadmium | MG/KG | 1.6 | 1.3 | 1.7 | 2 | 1.9 |
| Chromium | MG/KG | 200 J | 89 J | 120 J | 110 J | 100 J |
| Cobalt | MG/KG | 27 | 21 | 23 | 23 | 24 |
| Copper | MG/KG | 19 | 19 | 32 | 29 | 25 |
| Lead | MG/KG | 110 J | 46 J | 97 | **1900 J** | 70 J |
| Mercury | MG/KG | 0.28 | 0.1 | 0.17 | 0.2 J | 0.099 J |
| Nickel | MG/KG | **380** | **180** | **220** | **190** | **190** |
| Selenium | MG/KG | 1.1 | 1.1 | 1.3 | 1.4 | 1.3 |
| Silver | MG/KG | 0.22 U | 0.25 U | 0.24 U | 0.13 J | 0.25 U |
| Thallium | MG/KG | 0.93 | 0.72 | 0.98 | 0.85 J | 0.57 J |
| Vanadium | MG/KG | 42 | 40 | 48 | 53 | 61 |
| Zinc | MG/KG | 66 | 56 | 99 | 280 J | 76 J |

Note: See Analytical Tables in Appendix B for full results.
Bold = Concentretion above Comparison Value.




NOTE:
SIX SAMPLE WERE COLLECTED FROM RANDOM LOCATIONS WITHIN EACH QUADRANT, FOR A TOTAL OF FOUR COMPOSITE SAMPLES FOR ANALYSIS.

SAMPLE LAYOUT DETAIL

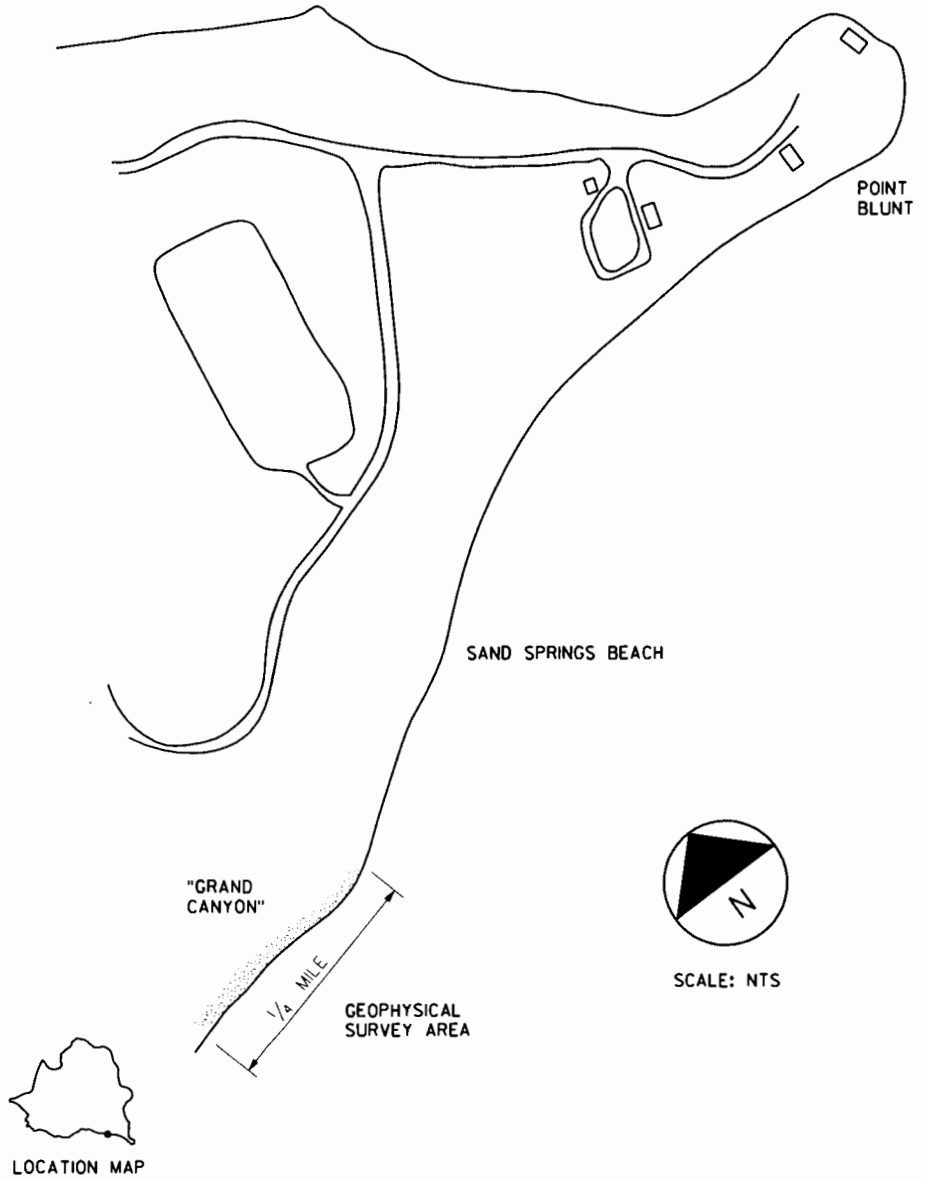
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FIGURE A26a
WEST GARRISON - FORT MCDOWELL/ANGEL ISLAND
FORMER PAINT SHOP

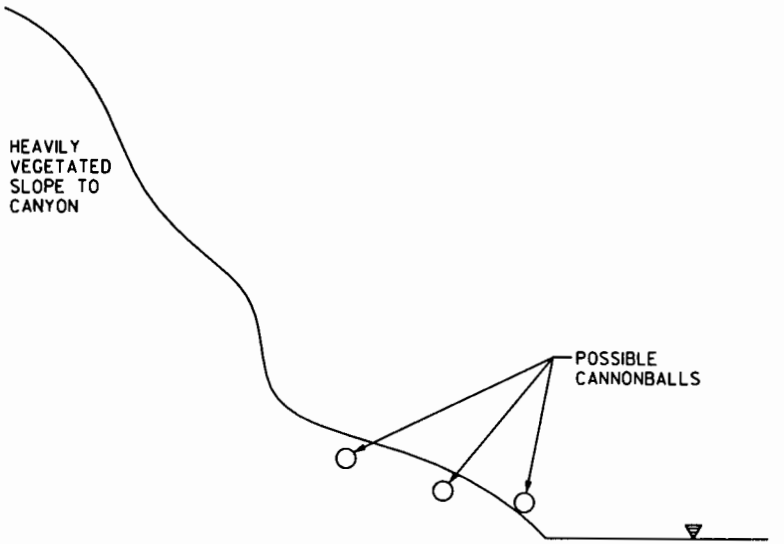
| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

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DATE: 12/04/2002




SITE LAYOUT




CONCEPTUAL SITE MODEL

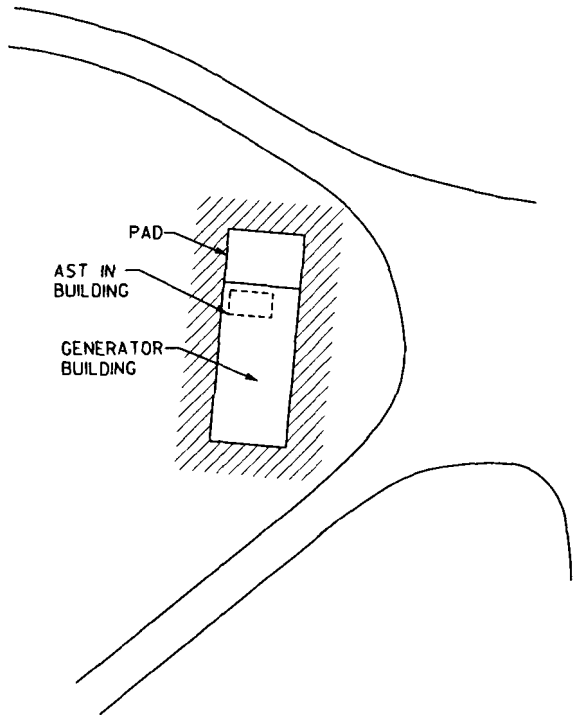
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FIGURE A27
POINT BLUNT - FORT MCDOWELL/ANGEL ISLAND
POSSIBLE CANNONBALL DISPOSAL AREA
SAND SPRINGS BEACH, "GRAND CANYON"

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

FILE NAME: p:\2001projects\2001070 - angelIsland\figure_a27.dgn

DATE: 12/04/2002




LEGEND

GEOPHYSICAL SURVEY AREA

N

SCALE: NTS



LOCATION MAP

SITE LAYOUT

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FIGURE A28
POINT BLUNT - FORT MCDOWELL/ANGEL ISLAND
UST SEARCH LOCATION
NIKE BATTERY GENERATOR PAD

| | |
|---|---|
| DSGN | MB |
| DR | MW |
| CHK | MB |
| PROJ ID | 2001070 |

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DATE: 12/04/2002

# APPENDIX B

# ANALYTICAL RESULTS TABLES

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | | North Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Barracks Bldg 241 | Barracks Bldg 241 | Barracks Bldg 241 |
| | | **FIELD SAMPLE ID:** | | NG1011 | NG1012 | NG1013 | NG1014 | NG1015 | NG1016 | NG1017 | NG1018 | NG1142 | NG1143 | NG1144 |
| | | **LOCATION ID:** | | T-NG-FSF-11 | T-NG-FSF-12 | T-NG-FSF-13 | T-NG-FSF-14 | T-NG-FSF-15 | T-NG-FSF-16 | T-NG-FSF-16 | T-NG-FSF-18 | B-NG-BB241-3 | B-NG-BB241-1 | B-NG-BB241-2 |
| | | **LABORATORY SAMPLE ID:** | | 159328-001 | 159328-002 | 159328-003 | 159328-004 | 159328-005 | 159328-006 | 159328-007 | 159328-008 | 159404-002 | 159404-003 | 159404-004 |
| | | **SAMPLE PURPOSE:** | | N | N | N | N | N | N | FD-NG1016 | N | N | N | N |
| **Analysis** | **Units** | **Comparison Value (1)** | | | | | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **TPH (SW8015)** | | | | | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* | (3) | 1200 | 940 | 600 | 16 | 4300 | 7800 | 10000 | 70 | 21 | 2.2 | 1.1 J |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* | (3) | 5000 | 890 | 750 | 60 | 4100 | 7100 | 8700 | 120 | 6.8 | 6.2 | 5.8 U |
| Gasoline C7-C12 | MG/KG | *100 to 400* | (3) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Metals (SW6010/7471)** | | | | | | | | | | | | | | |
| Antimony | MG/KG | *31* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Arsenic | MG/KG | *2.7* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Barium | MG/KG | *5,400* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Beryllium | MG/KG | *150* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium | MG/KG | *9* | (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chromium | MG/KG | *210* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cobalt | MG/KG | *4,700* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper | MG/KG | *2,900* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Lead | MG/KG | *400* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Mercury | MG/KG | *23* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Molybdenum | MG/KG | *390* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nickel | MG/KG | *150* | (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Selenium | MG/KG | *390* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Silver | MG/KG | *390* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Thallium | MG/KG | *5.2* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Vanadium | MG/KG | *550* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Zinc | MG/KG | *23,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Pesticides (SW8081A)** | | | | | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDE | UG/KG | *1,700* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDT | UG/KG | *1,700* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aldrin | UG/KG | *29* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-BHC | UG/KG | *90* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-Chlordane | UG/KG | *1,600* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| beta-BHC | UG/KG | *320* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| delta-BHC | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dieldrin | UG/KG | *30* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan I | UG/KG | *370,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan II | UG/KG | *370,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan sulfate | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin | UG/KG | *18,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin aldehyde | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-BHC | UG/KG | *440* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-Chlordane | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor | UG/KG | *110* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide A | UG/KG | *53* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide B | UG/KG | *53* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methoxychlor | UG/KG | *310,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toxaphene | UG/KG | *440* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | North Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Barracks Bldg 241 | Barracks Bldg 241 | Barracks Bldg 241 |
| | | FIELD SAMPLE ID: | NG1011 | NG1012 | NG1013 | NG1014 | NG1015 | NG1016 | NG1017 | NG1018 | NG1142 | NG1143 | NG1144 |
| | | LOCATION ID: | T-NG-FSF-11 | T-NG-FSF-12 | T-NG-FSF-13 | T-NG-FSF-14 | T-NG-FSF-15 | T-NG-FSF-16 | T-NG-FSF-16 | T-NG-FSF-18 | B-NG-BB241-3 | B-NG-BB241-1 | B-NG-BB241-2 |
| | | LABORATORY SAMPLE ID: | 159328-001 | 159328-002 | 159328-003 | 159328-004 | 159328-005 | 159328-006 | 159328-007 | 159328-008 | 159404-002 | 159404-003 | 159404-004 |
| | | SAMPLE PURPOSE: | N | N | N | N | N | N | FD-NG1016 | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1221 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1232 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1242 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1248 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1254 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1260 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,1,2-Trichloroethane | UG/KG | *840* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,1-Dichloroethene | UG/KG | *54* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,1-Dichloropropene | UG/KG | *NE* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,2-Dibromoethane | UG/KG | *52,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,2-Dichloroethane | UG/KG | *350* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,2-Dichloropropane | UG/KG | *350* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,3-Dichloropropane | UG/KG | *700* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 2,2-Dichloropropane | UG/KG | *NE* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 2-Butanone | UG/KG | *7,300,000* | -- | -- | -- | -- | -- | 11 U | 11 U | -- | -- | -- | -- |
| 2-Chlorotoluene | UG/KG | *160,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 2-Hexanone | UG/KG | *NE* | -- | -- | -- | -- | -- | 11 U | 11 U | -- | -- | -- | -- |
| 4-Chlorotoluene | UG/KG | *NE* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | -- | -- | -- | -- | -- | 11 U | 11 U | -- | -- | -- | -- |
| Acetone | UG/KG | *3,400* | -- | -- | -- | -- | -- | 21 U | 22 U | -- | -- | -- | -- |
| Benzene | UG/KG | *650* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Bromobenzene | UG/KG | *28,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Bromochloromethane | UG/KG | *NE* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Bromodichloromethane | UG/KG | *1,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Bromoform | UG/KG | *62,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Bromomethane | UG/KG | *62,000* | -- | -- | -- | -- | -- | 11 U | 11 U | -- | -- | -- | -- |
| Carbon Disulfide | UG/KG | *360,000* | -- | -- | -- | -- | -- | 6.7 J | 5.5 U | -- | -- | -- | -- |
| Carbon Tetrachloride | UG/KG | *240* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Chlorobenzene | UG/KG | *150,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Chloroethane | UG/KG | *3,000* | -- | -- | -- | -- | -- | 11 U | 11 U | -- | -- | -- | -- |
| Chloroform | UG/KG | *240* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Chloromethane | UG/KG | *1,200* | -- | -- | -- | -- | -- | 11 U | 11 U | -- | -- | -- | -- |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | North Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Barracks Bldg 241 | Barracks Bldg 241 | Barracks Bldg 241 |
| | | **FIELD SAMPLE ID:** | NG1011 | NG1012 | NG1013 | NG1014 | NG1015 | NG1016 | NG1017 | NG1018 | NG1142 | NG1143 | NG1144 |
| | | **LOCATION ID:** | T-NG-FSF-11 | T-NG-FSF-12 | T-NG-FSF-13 | T-NG-FSF-14 | T-NG-FSF-15 | T-NG-FSF-16 | T-NG-FSF-16 | T-NG-FSF-18 | B-NG-BB241-3 | B-NG-BB241-1 | B-NG-BB241-2 |
| | | **LABORATORY SAMPLE ID:** | 159328-001 | 159328-002 | 159328-003 | 159328-004 | 159328-005 | 159328-006 | 159328-007 | 159328-008 | 159404-002 | 159404-003 | 159404-004 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | FD-NG1016 | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Dibromochloromethane | UG/KG | *1,100* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Dibromomethane | UG/KG | *67,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Ethylbenzene | UG/KG | *230,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Freon 113 | UG/KG | *5,600,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Freon 12 | UG/KG | *94,000* | -- | -- | -- | -- | -- | 11 U | 11 U | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Isopropylbenzene | UG/KG | *160,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| m,p-Xylenes | UG/KG | *210,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Methylene Chloride | UG/KG | *8,900* | -- | -- | -- | -- | -- | 21 U | 22 U | -- | -- | -- | -- |
| MTBE | UG/KG | *17,000* (2) | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| n-Butylbenzene | UG/KG | *140,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| o-Xylene | UG/KG | *210,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| para-Isopropyl Toluene | UG/KG | *NE* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Propylbenzene | UG/KG | *NE* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| sec-Butylbenzene | UG/KG | *110,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Styrene | UG/KG | *1,700,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| tert-Butylbenzene | UG/KG | *130,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Tetrachloroethene | UG/KG | *5,700* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Toluene | UG/KG | *520,000* | -- | -- | -- | -- | -- | 5.4 U | 0.57 J | -- | -- | -- | -- |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| trans-1,3-Dichloropropene | UG/KG | *700* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Trichloroethene | UG/KG | *2,800* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Trichlorofluoromethane | UG/KG | *390,000* | -- | -- | -- | -- | -- | 5.4 U | 5.5 U | -- | -- | -- | -- |
| Vinyl Acetate | UG/KG | *430,000* | -- | -- | -- | -- | -- | 54 U | 55 U | -- | -- | -- | -- |
| Vinyl Chloride | UG/KG | *150* | -- | -- | -- | -- | -- | 11 U | 11 U | -- | -- | -- | -- |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dichlorophenol | UG/KG | *180,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrophenol | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorophenol | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylnaphthalene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylphenol | UG/KG | *3,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitroaniline | UG/KG | *3,500* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitrophenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3,3'-Dichlorobenzidine | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3-Nitroaniline | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | North Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Former Ship Fueling | Barracks Bldg 241 | Barracks Bldg 241 | Barracks Bldg 241 |
| | | **FIELD SAMPLE ID:** | NG1011 | NG1012 | NG1013 | NG1014 | NG1015 | NG1016 | NG1017 | NG1018 | NG1142 | NG1143 | NG1144 |
| | | **LOCATION ID:** | T-NG-FSF-11 | T-NG-FSF-12 | T-NG-FSF-13 | T-NG-FSF-14 | T-NG-FSF-15 | T-NG-FSF-16 | T-NG-FSF-16 | T-NG-FSF-18 | B-NG-BB241-3 | B-NG-BB241-1 | B-NG-BB241-2 |
| | | **LABORATORY SAMPLE ID:** | 159328-001 | 159328-002 | 159328-003 | 159328-004 | 159328-005 | 159328-006 | 159328-007 | 159328-008 | 159404-002 | 159404-003 | 159404-004 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | FD-NG1016 | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloroaniline | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitroaniline | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitrophenol | UG/KG | *490,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthylene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Anthracene | UG/KG | *22,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Azobenzene | UG/KG | *4,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)anthracene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)pyrene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(b)fluoranthene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(g,h,i)perylene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzoic acid | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzyl alcohol | UG/KG | *18,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethyl)ether | UG/KG | *210* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Butylbenzylphthalate | UG/KG | *12,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chrysene | UG/KG | *6,100* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenz(a,h)anthracene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenzofuran | UG/KG | *290,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Diethylphthalate | UG/KG | *49,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dimethylphthalate | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-butylphthalate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-octylphthalate | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluoranthene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluorene | UG/KG | *2,600,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobenzene | UG/KG | *300* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachloroethane | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Isophorone | UG/KG | *510,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrobenzene | UG/KG | *20,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodimethylamine | UG/KG | *9.5* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pentachlorophenol | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenanthrene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenol | UG/KG | *37,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pyrene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | | North Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | | Building 242 ASTs | Building 242 ASTs | UST E_ of Water Tank | UST E_ of Water Tank | UST E_ of Water Tank | UST E_ of Water Tank | Building 205 UST | Building 205 UST | Building 205 UST | Building 205 UST | North Garrison AST |
| | | **FIELD SAMPLE ID:** | | NG1148 | NG1149 | NG1154 | NG1155 | NG1156 | NG1157 | NG1136 | NG1137 | NG1138 | NG1139 | NG1001 |
| | | **LOCATION ID:** | | B-NG-BB242-3 | B-NG-BB242-3 | B-NG-EWT-3 | B-NG-EWT-3 | B-NG-EWT-2 | B-NG-EWT-1 | B-NG-B205-3 | B-NG-B205-1 | B-NG-B205-2 | B-NG-B205-3 | A-NG-AST-1 |
| | | **LABORATORY SAMPLE ID:** | | 159382-001 | 159382-002 | 159419-001 | 159419-002 | 159419-003 | 159419-004 | 159267-001 | 159267-002 | 159267-004 | 159267-003 | 159344-002 |
| | | **SAMPLE PURPOSE:** | | N | FD-NG1148 | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison Value (1)** | | | | | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **TPH (SW8015)** | | | | | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* | (3) | 4700 | 6500 | -- | 1.1 U | 1.0 U | 1.1 U | 60 | 150 | 1.1 U | 1.1 U | 1.1 |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* | (3) | 240 | 250 | -- | 5.3 U | 5.2 U | 5.3 U | 58 | 27 | 5.3 U | 5.6 U | 5.6 U |
| Gasoline C7-C12 | MG/KG | *100 to 400* | (3) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Metals (SW6010/7471)** | | | | | | | | | | | | | | |
| Antimony | MG/KG | *31* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Arsenic | MG/KG | *2.7* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Barium | MG/KG | *5,400* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Beryllium | MG/KG | *150* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium | MG/KG | *9* | (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chromium | MG/KG | *210* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cobalt | MG/KG | *4,700* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper | MG/KG | *2,900* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Lead | MG/KG | *400* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Mercury | MG/KG | *23* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Molybdenum | MG/KG | *390* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nickel | MG/KG | *150* | (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Selenium | MG/KG | *390* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Silver | MG/KG | *390* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Thallium | MG/KG | *5.2* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Vanadium | MG/KG | *550* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Zinc | MG/KG | *23,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Pesticides (SW8081A)** | | | | | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDE | UG/KG | *1,700* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDT | UG/KG | *1,700* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aldrin | UG/KG | *29* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-BHC | UG/KG | *90* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-Chlordane | UG/KG | *1,600* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| beta-BHC | UG/KG | *320* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| delta-BHC | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dieldrin | UG/KG | *30* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan I | UG/KG | *370,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan II | UG/KG | *370,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan sulfate | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin | UG/KG | *18,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin aldehyde | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-BHC | UG/KG | *440* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-Chlordane | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor | UG/KG | *110* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide A | UG/KG | *53* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide B | UG/KG | *53* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methoxychlor | UG/KG | *310,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toxaphene | UG/KG | *440* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | North Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Building 242 ASTs | Building 242 ASTs | UST E_of Water Tank | UST E_of Water Tank | UST E_of Water Tank | UST E_of Water Tank | Building 205 UST | Building 205 UST | Building 205 UST | Building 205 UST | North Garrison AST |
| | | **FIELD SAMPLE ID:** | NG1148 | NG1149 | NG1154 | NG1155 | NG1156 | NG1157 | NG1136 | NG1137 | NG1138 | NG1139 | NG1001 |
| | | **LOCATION ID:** | B-NG-BB242-3 | B-NG-BB242-3 | B-NG-EWT-3 | B-NG-EWT-3 | B-NG-EWT-2 | B-NG-EWT-1 | B-NG-B205-3 | B-NG-B205-1 | B-NG-B205-2 | B-NG-B205-3 | A-NG-AST-1 |
| | | **LABORATORY SAMPLE ID:** | 159382-001 | 159382-002 | 159419-001 | 159419-002 | 159419-003 | 159419-004 | 159267-001 | 159267-002 | 159267-004 | 159267-003 | 159344-002 |
| | | **SAMPLE PURPOSE:** | N | FD-NG1148 | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1221 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1232 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1242 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1248 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1254 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1260 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,1,2-Trichloroethane | UG/KG | *840* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,1-Dichloroethene | UG/KG | *54* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,1-Dichloropropene | UG/KG | *NE* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | 99 | 88 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,2-Dibromoethane | UG/KG | *52,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,2-Dichloroethane | UG/KG | *350* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,2-Dichloropropane | UG/KG | *350* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | 47 | 45 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,3-Dichloropropane | UG/KG | *700* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 2,2-Dichloropropane | UG/KG | *NE* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 2-Butanone | UG/KG | *7,300,000* | 1.3 J | 9.1 U | 12 U | -- | -- | -- | 10 U | -- | -- | -- | -- |
| 2-Chlorotoluene | UG/KG | *160,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 2-Hexanone | UG/KG | *NE* | 10 U | 9.1 U | 12 U | -- | -- | -- | 10 U | -- | -- | -- | -- |
| 4-Chlorotoluene | UG/KG | *NE* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | 10 U | 9.1 U | 12 U | -- | -- | -- | 10 U | -- | -- | -- | -- |
| Acetone | UG/KG | *3,400* | 21 U | 18 U | 24 U | -- | -- | -- | 21 U | -- | -- | -- | -- |
| Benzene | UG/KG | *650* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Bromobenzene | UG/KG | *28,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Bromochloromethane | UG/KG | *NE* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Bromodichloromethane | UG/KG | *1,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Bromoform | UG/KG | *62,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Bromomethane | UG/KG | *62,000* | 10 U | 9.1 U | 12 U | -- | -- | -- | 10 U | -- | -- | -- | -- |
| Carbon Disulfide | UG/KG | *360,000* | 5.1 U | 0.28 J | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Carbon Tetrachloride | UG/KG | *240* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Chlorobenzene | UG/KG | *150,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Chloroethane | UG/KG | *3,000* | 10 U | 9.1 U | 12 U | -- | -- | -- | 10 U | -- | -- | -- | -- |
| Chloroform | UG/KG | *240* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Chloromethane | UG/KG | *1,200* | 10 U | 9.1 U | 12 U | -- | -- | -- | 10 U | -- | -- | -- | -- |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | North Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Building 242 ASTs | Building 242 ASTs | UST E_ of Water Tank | UST E_ of Water Tank | UST E_ of Water Tank | UST E_ of Water Tank | Building 205 UST | Building 205 UST | Building 205 UST | Building 205 UST | North Garrison AST |
| | | **FIELD SAMPLE ID:** | NG1148 | NG1149 | NG1154 | NG1155 | NG1156 | NG1157 | NG1136 | NG1137 | NG1138 | NG1139 | NG1001 |
| | | **LOCATION ID:** | B-NG-BB242-3 | B-NG-BB242-3 | B-NG-EWT-3 | B-NG-EWT-3 | B-NG-EWT-2 | B-NG-EWT-1 | B-NG-B205-3 | B-NG-B205-1 | B-NG-B205-2 | B-NG-B205-3 | A-NG-AST-1 |
| | | **LABORATORY SAMPLE ID:** | 159382-001 | 159382-002 | 159419-001 | 159419-002 | 159419-003 | 159419-004 | 159267-001 | 159267-002 | 159267-004 | 159267-003 | 159344-002 |
| | | **SAMPLE PURPOSE:** | N | FD-NG1148 | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Dibromochloromethane | UG/KG | *1,100* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Dibromomethane | UG/KG | *67,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Ethylbenzene | UG/KG | *230,000* | 4.6 J | 4 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Freon 113 | UG/KG | *5,600,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Freon 12 | UG/KG | *94,000* | 10 U | 9.1 U | 12 U | -- | -- | -- | *10 U* | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Isopropylbenzene | UG/KG | *160,000* | 7.1 | 6.8 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| m,p-Xylenes | UG/KG | *210,000* | 15 | 13 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Methylene Chloride | UG/KG | *8,900* | 21 U | 18 U | 24 U | -- | -- | -- | 21 U | -- | -- | -- | -- |
| MTBE | UG/KG | *17,000* (2) | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | 86 | 75 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| n-Butylbenzene | UG/KG | *140,000* | 20 | 18 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| o-Xylene | UG/KG | *210,000* | 23 | 22 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| para-Isopropyl Toluene | UG/KG | *NE* | 20 | 19 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Propylbenzene | UG/KG | *NE* | 13 | 12 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| sec-Butylbenzene | UG/KG | *110,000* | 11 | 11 | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Styrene | UG/KG | *1,700,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| tert-Butylbenzene | UG/KG | *130,000* | 0.64 J | 0.76 J | 6.1 J | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Tetrachloroethene | UG/KG | *5,700* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Toluene | UG/KG | *520,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| trans-1,3-Dichloropropene | UG/KG | *700* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Trichloroethene | UG/KG | *2,800* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Trichlorofluoromethane | UG/KG | *390,000* | 5.1 U | 4.5 U | 6.1 U | -- | -- | -- | 5.1 U | -- | -- | -- | -- |
| Vinyl Acetate | UG/KG | *430,000* | 51 U | 45 U | 61 U | -- | -- | -- | 51 U | -- | -- | -- | -- |
| Vinyl Chloride | UG/KG | *150* | 10 U | 9.1 U | 12 U | -- | -- | -- | 10 U | -- | -- | -- | -- |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dichlorophenol | UG/KG | *180,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrophenol | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorophenol | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylnaphthalene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylphenol | UG/KG | *3,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitroaniline | UG/KG | *3,500* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitrophenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3,3'-Dichlorobenzidine | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3-Nitroaniline | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | North Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Building 242 ASTs | Building 242 ASTs | UST E_ of Water Tank | UST E_ of Water Tank | UST E_ of Water Tank | UST E_ of Water Tank | Building 205 UST | Building 205 UST | Building 205 UST | Building 205 UST | North Garrison AST |
| | | FIELD SAMPLE ID: | NG1148 | NG1149 | NG1154 | NG1155 | NG1156 | NG1157 | NG1136 | NG1137 | NG1138 | NG1139 | NG1001 |
| | | LOCATION ID: | B-NG-BB242-3 | B-NG-BB242-3 | B-NG-EWT-3 | B-NG-EWT-3 | B-NG-EWT-2 | B-NG-EWT-1 | B-NG-B205-3 | B-NG-B205-1 | B-NG-B205-2 | B-NG-B205-3 | A-NG-AST-1 |
| | | LABORATORY SAMPLE ID: | 159382-001 | 159382-002 | 159419-001 | 159419-002 | 159419-003 | 159419-004 | 159267-001 | 159267-002 | 159267-004 | 159267-003 | 159344-002 |
| | | SAMPLE PURPOSE: | N | FD-NG1148 | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloroaniline | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitroaniline | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitrophenol | UG/KG | *490,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthylene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Anthracene | UG/KG | *22,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Azobenzene | UG/KG | *4,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)anthracene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)pyrene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(b)fluoranthene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(g,h,i)perylene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzoic acid | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzyl alcohol | UG/KG | *18,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethyl)ether | UG/KG | *210* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Butylbenzylphthalate | UG/KG | *12,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chrysene | UG/KG | *6,100* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenz(a,h)anthracene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenzofuran | UG/KG | *290,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Diethylphthalate | UG/KG | *49,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dimethylphthalate | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-butylphthalate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-octylphthalate | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluoranthene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluorene | UG/KG | *2,600,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobenzene | UG/KG | *300* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachloroethane | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Isophorone | UG/KG | *510,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrobenzene | UG/KG | *20,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodimethylamine | UG/KG | *9.5* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pentachlorophenol | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenanthrene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenol | UG/KG | *37,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pyrene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | North Garrison | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | North Garrison AST | North Garrison AST | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Pistol Range | Pistol Range | Pistol Range | Pistol Range |
| | | **FIELD SAMPLE ID:** | NG1003 | NG1005 | NG3005 | NG3011 | NG3018 | NG3026 | NG3040 | NG3055 | NG4004 | NG4009 | NG4015 | NG4028 |
| | | **LOCATION ID:** | A-NG-AST-2 | A-NG-AST-3 | H-NG-RR-5 | H-NG-RR-11 | H-NG-RR-18 | H-NG-RR-26 | H-NG-RR-40 | H-NG-RR-55 | H-NG-PR-4 | H-NG-PR-4 | H-NG-PR-4 | H-NG-PR-4 |
| | | **LABORATORY SAMPLE ID:** | 159344-003 | 159344-004 | 159363-018 | 159363-019 | 159363-020 | 159363-021 | 159363-022 | 159363-023 | 159363-026 | 159363-027 | 159363-028 | 159363-029 |
| | | **SAMPLE PURPOSE:** | N | N | SS | SS | SS | SS | SS | SS | SS | SS | SS | SS |
| **Analysis** | **Units** | ***Comparison Value (1)*** | | | | | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **TPH (SW8015)** | | | | | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* (3) | 2400 | 0.96 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* (3) | 2700 | 2.4 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Gasoline C7-C12 | MG/KG | *100 to 400* (3) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Metals (SW6010/7471)** | | | | | | | | | | | | | | |
| Antimony | MG/KG | *31* | -- | -- | 2.9 UJ | 3.3 UJ | 3.2 U | 3.1 U | 3.2 U | 2.8 U | 3.3 UJ | 3.2 UJ | 3.1 UJ | 3.3 UJ |
| Arsenic | MG/KG | *2.7* | -- | -- | 2.9 | 2.8 | 2.2 | 3.8 | 3 | 5.5 | 0.33 | 0.5 | 3.1 | 20 |
| Barium | MG/KG | *5,400* | -- | -- | 130 | 180 | 180 | 240 | 370 | 340 | 60 | 110 | 160 | 490 |
| Beryllium | MG/KG | *150* | -- | -- | 0.35 | 0.35 | 0.37 | 0.41 | 0.46 | 0.56 | 0.31 | 0.38 | 0.4 | 0.57 |
| Cadmium | MG/KG | *9* (2) | -- | -- | 1.2 | 1.2 | 1.4 | 1.3 | 1.7 | 1.6 | 2.6 | 2.3 | 2.4 | 3.3 |
| Chromium | MG/KG | *210* | -- | -- | 73 J | 98 J | 32 J | 27 J | 46 J | 30 J | 110 J | 110 J | 110 J | 88 J |
| Cobalt | MG/KG | *4,700* | -- | -- | 13 | 12 | 14 | 7.7 | 13 | 12 | 34 | 31 | 31 | 31 |
| Copper | MG/KG | *2,900* | -- | -- | 12 | 27 | 21 | 14 | 31 | 15 | 67 | 48 | 61 | 130 |
| Lead | MG/KG | *400* | -- | -- | 20 J | 110 J | 13 J | 17 J | 43 J | 18 J | 28 J | 2.9 J | 11 J | 15 J |
| Mercury | MG/KG | *23* | -- | -- | 0.11 | 0.86 | 0.32 | 0.06 | 0.17 | 0.06 | 0.056 | 0.033 U | 0.078 | 0.18 |
| *Molybdenum* | MG/KG | *390* | -- | -- | 0.95 U | 1.1 U | 1.1 U | 0.5 J | 1.1 U | 0.63 J | 1.1 U | 0.86 U | 1 U | 0.69 J |
| Nickel | MG/KG | *150* (2) | -- | -- | 130 | 200 | 39 | 36 | 50 | 46 | 49 | 45 | 52 | 83 |
| Selenium | MG/KG | *390* | -- | -- | 0.94 | 0.58 U | 1.3 | 1 U | 1.6 | 1.4 | 1.3 | 1.0 U | 1.3 | 2.1 |
| Silver | MG/KG | *390* | -- | -- | 0.24 U | 0.28 U | 0.27 U | 0.26 U | 0.26 U | 0.23 U | 0.13 J | 0.094 J | 0.15 J | 0.34 |
| Thallium | MG/KG | *5.2* | -- | -- | 0.31 | 0.28 U | 1.2 | 0.58 | 1.7 | 0.9 | 1.1 | 2.3 | 2.3 | 2.9 |
| Vanadium | MG/KG | *550* | -- | -- | 36 | 30 | 48 | 32 | 50 | 33 | 110 | 100 | 110 | 140 |
| Zinc | MG/KG | *23,000* | -- | -- | 40 U | 53 U | 60 | 60 | 68 | 120 | 82 | 53 U | 70 | 140 |
| **Pesticides (SW8081A)** | | | | | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDE | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDT | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aldrin | UG/KG | *29* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-BHC | UG/KG | *90* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-Chlordane | UG/KG | *1,600* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| beta-BHC | UG/KG | *320* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| delta-BHC | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| *Dieldrin* | UG/KG | *30* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan I | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan II | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan sulfate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin | UG/KG | *18,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin aldehyde | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-BHC | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-Chlordane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor | UG/KG | *110* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide A | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide B | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methoxychlor | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toxaphene | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | | | North Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | North Garrison AST | North Garrison AST | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Pistol Range | Pistol Range | Pistol Range | Pistol Range |
| | | **FIELD SAMPLE ID:** | NG1003 | NG1005 | NG3005 | NG3011 | NG3018 | NG3026 | NG3040 | NG3055 | NG4004 | NG4009 | NG4015 | NG4028 |
| | | **LOCATION ID:** | A-NG-AST-2 | A-NG-AST-3 | H-NG-RR-5 | H-NG-RR-11 | H-NG-RR-18 | H-NG-RR-26 | H-NG-RR-40 | H-NG-RR-55 | H-NG-PR-4 | H-NG-PR-4 | H-NG-PR-4 | H-NG-PR-4 |
| | | **LABORATORY SAMPLE ID:** | 159344-003 | 159344-004 | 159363-018 | 159363-019 | 159363-020 | 159363-021 | 159363-022 | 159363-023 | 159363-026 | 159363-027 | 159363-028 | 159363-029 |
| | | **SAMPLE PURPOSE:** | N | N | SS | SS | SS | SS | SS | SS | SS | SS | SS | SS |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1221 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1232 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1242 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1248 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1254 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1260 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **VOCs (SW8260B)** | | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,2-Trichloroethane | UG/KG | *840* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloroethene | UG/KG | *54* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloropropene | UG/KG | *NE* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dibromoethane | UG/KG | *52,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichloroethane | UG/KG | *350* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichloropropane | UG/KG | *350* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichloropropane | UG/KG | *700* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,2-Dichloropropane | UG/KG | *NE* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Butanone | UG/KG | *7,300,000* | 11 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorotoluene | UG/KG | *160,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Hexanone | UG/KG | *NE* | 11 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chlorotoluene | UG/KG | *NE* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | 11 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acetone | UG/KG | *3,400* | 21 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzene | UG/KG | *650* | 0.6 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromobenzene | UG/KG | *28,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromochloromethane | UG/KG | *NE* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromodichloromethane | UG/KG | *1,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromoform | UG/KG | *62,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromomethane | UG/KG | *62,000* | 11 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbon Disulfide | UG/KG | *360,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbon Tetrachloride | UG/KG | *240* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chlorobenzene | UG/KG | *150,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloroethane | UG/KG | *3,000* | 11 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloroform | UG/KG | *240* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloromethane | UG/KG | *1,200* | 11 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | North Garrison | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | North Garrison AST | North Garrison AST | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Pistol Range | Pistol Range | Pistol Range | Pistol Range |
| | | **FIELD SAMPLE ID:** | NG1003 | NG1005 | NG3005 | NG3011 | NG3018 | NG3026 | NG3040 | NG3055 | NG4004 | NG4009 | NG4015 | NG4028 |
| | | **LOCATION ID:** | A-NG-AST-2 | A-NG-AST-3 | H-NG-RR-5 | H-NG-RR-11 | H-NG-RR-18 | H-NG-RR-26 | H-NG-RR-40 | H-NG-RR-55 | H-NG-PR-4 | H-NG-PR-4 | H-NG-PR-4 | H-NG-PR-4 |
| | | **LABORATORY SAMPLE ID:** | 159344-003 | 159344-004 | 159363-018 | 159363-019 | 159363-020 | 159363-021 | 159363-022 | 159363-023 | 159363-026 | 159363-027 | 159363-028 | 159363-029 |
| | | **SAMPLE PURPOSE:** | N | N | SS | SS | SS | SS | SS | SS | SS | SS | SS | SS |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibromochloromethane | UG/KG | *1,100* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibromomethane | UG/KG | *67,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Ethylbenzene | UG/KG | *230,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Freon 113 | UG/KG | *5,600,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Freon 12 | UG/KG | *94,000* | 11 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Isopropylbenzene | UG/KG | *160,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| m,p-Xylenes | UG/KG | *210,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methylene Chloride | UG/KG | *8,900* | 21 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| MTBE | UG/KG | *17,000* (2) | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| n-Butylbenzene | UG/KG | *140,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| o-Xylene | UG/KG | *210,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| para-Isopropyl Toluene | UG/KG | *NE* | 2.8 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Propylbenzene | UG/KG | *NE* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| sec-Butylbenzene | UG/KG | *110,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Styrene | UG/KG | *1,700,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| tert-Butylbenzene | UG/KG | *130,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Tetrachloroethene | UG/KG | *5,700* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toluene | UG/KG | *520,000* | 0.4 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| trans-1,3-Dichloropropene | UG/KG | *700* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Trichloroethene | UG/KG | *2,800* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Trichlorofluoromethane | UG/KG | *390,000* | 5.3 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Vinyl Acetate | UG/KG | *430,000* | 53 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Vinyl Chloride | UG/KG | *150* | 11 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dichlorophenol | UG/KG | *180,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrophenol | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorophenol | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylnaphthalene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylphenol | UG/KG | *3,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitroaniline | UG/KG | *3,500* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitrophenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3,3'-Dichlorobenzidine | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3-Nitroaniline | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | | North Garrison | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | | North Garrison AST | North Garrison AST | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Rifle Range | Pistol Range | Pistol Range | Pistol Range | Pistol Range |
| | | **FIELD SAMPLE ID:** | | NG1003 | NG1005 | NG3005 | NG3011 | NG3018 | NG3026 | NG3040 | NG3055 | NG4004 | NG4009 | NG4015 | NG4028 |
| | | **LOCATION ID:** | | A-NG-AST-2 | A-NG-AST-3 | H-NG-RR-5 | H-NG-RR-11 | H-NG-RR-18 | H-NG-RR-26 | H-NG-RR-40 | H-NG-RR-55 | H-NG-PR-4 | H-NG-PR-4 | H-NG-PR-4 | H-NG-PR-4 |
| | | **LABORATORY SAMPLE ID:** | | 159344-003 | 159344-004 | 159363-018 | 159363-019 | 159363-020 | 159363-021 | 159363-022 | 159363-023 | 159363-026 | 159363-027 | 159363-028 | 159363-029 |
| | | **SAMPLE PURPOSE:** | | N | N | SS | SS | SS | SS | SS | SS | SS | SS | SS | SS |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloroaniline | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Methylphenol | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitroaniline | UG/KG | *310,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitrophenol | UG/KG | *490,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthene | UG/KG | *3,700,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthylene | UG/KG | *3,700,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Anthracene | UG/KG | *22,000,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Azobenzene | UG/KG | *4,400* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)anthracene | UG/KG | *620* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)pyrene | UG/KG | *62* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(b)fluoranthene | UG/KG | *620* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(g,h,i)perylene | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(k)fluoranthene | UG/KG | *610* | (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzoic acid | UG/KG | *100,000,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzyl alcohol | UG/KG | *18,000,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethyl)ether | UG/KG | *210* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Butylbenzylphthalate | UG/KG | *12,000,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chrysene | UG/KG | *6,100* | (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenz(a,h)anthracene | UG/KG | *62* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenzofuran | UG/KG | *290,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Diethylphthalate | UG/KG | *49,000,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dimethylphthalate | UG/KG | *100,000,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-butylphthalate | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-octylphthalate | UG/KG | *1,200,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluoranthene | UG/KG | *2,300,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluorene | UG/KG | *2,600,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobenzene | UG/KG | *300* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachloroethane | UG/KG | *35,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Isophorone | UG/KG | *510,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrobenzene | UG/KG | *20,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodimethylamine | UG/KG | *9.5* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pentachlorophenol | UG/KG | *3,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenanthrene | UG/KG | *NE* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenol | UG/KG | *37,000,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pyrene | UG/KG | *2,300,000* | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison - Motor Pool | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Vehicle Lift Rack | Vehicle Lift Rack | Vehicle Lift Rack | Vehicle Lift Rack | Oil Change Rack |
| | | **FIELD SAMPLE ID:** | MP1002 | MP1003 | MP1004 | MP1005 | MP1006 | MP1007 | MP1059 | MP1066 | MP1067 | MP1069 | MP1052 |
| | | **LOCATION ID:** | B-MP-DSA-1 | B-MP-DSA-1 | B-MP-DSA-2 | B-MP-DSA-2 | B-MP-DSA-3 | B-MP-DSA-3 | B-MP-VLR-4 | B-MP-VLR-1 | B-MP-VLR-2 | B-MP-VLR-4 | B-MP-OCR-1 |
| | | **LABORATORY SAMPLE ID:** | 159330-002 | 159330-003 | 159330-004 | 159330-005 | 159330-006 | 159330-007 | 159344-010 | 159309-003 | 159309-002 | 159344-011 | 159304-001 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | FD-MP1069 | N | N | N | N |
| **Analysis** | **Units** | **Comparison Value (1)** | | | | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **TPH (SW8015)** | | | | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* (3) | -- | -- | -- | -- | -- | -- | -- | 20 | 4.8 | 8 | 6.1 |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* (3) | -- | -- | -- | -- | -- | -- | -- | 150 | 19 | 12 | 86 |
| Gasoline C7-C12 | MG/KG | *100 to 400* (3) | -- | -- | -- | -- | -- | -- | -- | 0.018 U | 0.028 U | 0.16 U | 0.18 U |
| **Metals (SW6010/7471)** | | | | | | | | | | | | | |
| Antimony | MG/KG | *31* | 3.1 U | 1.4 UJ | 2 UJ | 1.9 UJ | 1.8 UJ | 3 U | -- | 3 U | 3.1 U | 1.9 UJ | 3.1 UJ |
| Arsenic | MG/KG | *2.7* | 3.3 U | 3.8 U | 4.8 | 3.4 U | 3.3 U | 3.2 U | -- | 4 | 3.1 | 4.3 U | 4.2 |
| Barium | MG/KG | *5,400* | 140 | 160 | 220 | 85 | 160 | 100 | -- | 130 | 88 | 120 | 130 |
| Beryllium | MG/KG | *150* | 0.66 | 0.76 | 0.67 | 0.68 | 0.68 | 0.65 | -- | 0.6 | 0.57 | 0.61 | 0.68 |
| Cadmium | MG/KG | *9* (2) | 1.1 | 1.1 | 1.5 | 1.1 | 1.1 | 1 | -- | 1.1 | 0.82 | 1.2 | 1.1 |
| Chromium | MG/KG | *210* | 30 | 32 | 59 | 36 | 30 | 28 | -- | 31 | 24 | 28 | 30 |
| Cobalt | MG/KG | *4,700* | 11 | 10 | 15 | 11 | 11 | 13 | -- | 10 | 8.3 | 9.5 | 12 |
| Copper | MG/KG | *2,900* | 14 | 15 | 22 | 15 | 18 | 14 | -- | 15 | 12 | 15 | 17 |
| Lead | MG/KG | *400* | 12 | 19 | 1500 | 44 | 20 | 13 | -- | 32 | 6.8 | 8.4 U | 240 |
| Mercury | MG/KG | *23* | 0.15 | 0.12 U | 0.12 U | 0.11 U | 0.1 U | 0.11 U | -- | 0.14 | 0.056 | 0.12 U | 0.15 |
| Molybdenum | MG/KG | *390* | 1 U | 1 U | 0.95 U | 0.99 U | 1 U | 1 U | -- | 0.99 U | 1 U | 0.95 U | 1.0 U |
| Nickel | MG/KG | *150* (2) | 42 | 47 | 110 | 66 | 49 | 44 | -- | 46 | 38 | 42 | 45 |
| Selenium | MG/KG | *390* | 0.4 | 0.26 U | 0.41 | 0.31 | 0.33 | 0.25 U | -- | 0.47 | 0.21 J | 0.39 | 0.65 |
| Silver | MG/KG | *390* | 0.26 U | 0.26 U | 0.24 U | 0.25 U | 0.25 U | 0.25 U | -- | 0.25 U | 0.26 U | 0.24 U | 0.26 U |
| Thallium | MG/KG | *5.2* | 0.56 U | 0.51 | 0.86 U | 0.72 U | 0.48 U | 0.79 U | -- | 0.87 U | 0.3 U | 0.55 U | 1.1 U |
| Vanadium | MG/KG | *550* | 37 | 39 | 39 | 35 | 36 | 34 | -- | 33 | 30 | 36 | 38 |
| Zinc | MG/KG | *23,000* | 37 | 46 | 180 | 48 | 43 | 37 | -- | 57 | 36 | 42 | 52 |
| **Pesticides (SW8081A)** | | | | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDE | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDT | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aldrin | UG/KG | *29* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-BHC | UG/KG | *90* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-Chlordane | UG/KG | *1,600* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| beta-BHC | UG/KG | *320* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| delta-BHC | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dieldrin | UG/KG | *30* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan I | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan II | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan sulfate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin | UG/KG | *18,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin aldehyde | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-BHC | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-Chlordane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor | UG/KG | *110* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide A | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide B | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methoxychlor | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toxaphene | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison - Motor Pool | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Vehicle Lift Rack | Vehicle Lift Rack | Vehicle Lift Rack | Vehicle Lift Rack | Oil Change Rack |
| | | FIELD SAMPLE ID: | MP1002 | MP1003 | MP1004 | MP1005 | MP1006 | MP1007 | MP1059 | MP1066 | MP1067 | MP1069 | MP1052 |
| | | LOCATION ID: | B-MP-DSA-1 | B-MP-DSA-1 | B-MP-DSA-2 | B-MP-DSA-2 | B-MP-DSA-3 | B-MP-DSA-3 | B-MP-VLR-4 | B-MP-VLR-1 | B-MP-VLR-2 | B-MP-VLR-4 | B-MP-OCR-1 |
| | | LABORATORY SAMPLE ID: | 159330-002 | 159330-003 | 159330-004 | 159330-005 | 159330-006 | 159330-007 | 159344-010 | 159309-003 | 159309-002 | 159344-011 | 159304-001 |
| | | SAMPLE PURPOSE: | N | N | N | N | N | N | FD-MP1069 | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | 13 U | 13 U | 13 U | 13 U | 13 U | 13 U | -- | -- | -- | 13 U | -- |
| Aroclor-1221 | UG/KG | *220* | 25 U | 25 U | 25 U | 25 U | 25 U | 25 U | -- | -- | -- | 26 U | -- |
| Aroclor-1232 | UG/KG | *220* | 13 U | 13 U | 13 U | 13 U | 13 U | 13 U | -- | -- | -- | 13 U | -- |
| Aroclor-1242 | UG/KG | *220* | 13 U | 13 U | 13 U | 13 U | 13 U | 13 U | -- | -- | -- | 13 U | -- |
| Aroclor-1248 | UG/KG | *220* | 13 U | 13 U | 13 U | 13 U | 13 U | 13 U | -- | -- | -- | 13 U | -- |
| Aroclor-1254 | UG/KG | *220* | 13 U | 13 U | 13 U | 13 U | 13 U | 13 U | -- | -- | -- | 13 U | -- |
| Aroclor-1260 | UG/KG | *220* | 13 U | 13 U | 13 U | 27 U | 13 U | 13 U | -- | -- | -- | 13 U | -- |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,1,2-Trichloroethane | UG/KG | *840* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,1-Dichloroethene | UG/KG | *54* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,1-Dichloropropene | UG/KG | *NE* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,2-Dibromoethane | UG/KG | *52,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,2-Dichloroethane | UG/KG | *350* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,2-Dichloropropane | UG/KG | *350* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,3-Dichloropropane | UG/KG | *700* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 2,2-Dichloropropane | UG/KG | *NE* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 2-Butanone | UG/KG | *7,300,000* | 9.9 U | 8.4 U | 8.2 U | 8.6 U | 8.7 U | 9 U | 9.3 U | 8.8 U | 9.9 U | 8.9 U | 10 U |
| 2-Chlorotoluene | UG/KG | *160,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 2-Hexanone | UG/KG | *NE* | 9.9 U | 8.4 U | 8.2 U | 8.6 U | 8.7 U | 9 U | 9.3 U | 8.8 U | 9.9 U | 8.9 U | 10 U |
| 4-Chlorotoluene | UG/KG | *NE* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | 9.9 U | 8.4 U | 8.2 U | 8.6 U | 8.7 U | 9 U | 9.3 U | 8.8 U | 9.9 U | 8.9 U | 10 U |
| Acetone | UG/KG | *3,400* | 20 U | 17 U | 16 U | 17 U | 17 U | 18 U | 19 U | 18 U | 20 U | 18 U | 20 U |
| Benzene | UG/KG | *650* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Bromobenzene | UG/KG | *28,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Bromochloromethane | UG/KG | *NE* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Bromodichloromethane | UG/KG | *1,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Bromoform | UG/KG | *62,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Bromomethane | UG/KG | *62,000* | 9.9 U | 8.4 U | 8.2 U | 8.6 U | 8.7 U | 9 U | 9.3 U | 8.8 U | 9.9 U | 8.9 U | 10 U |
| Carbon Disulfide | UG/KG | *360,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Carbon Tetrachloride | UG/KG | *240* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Chlorobenzene | UG/KG | *150,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Chloroethane | UG/KG | *3,000* | 9.9 U | 8.4 U | 8.2 U | 8.6 U | 8.7 U | 9 U | 9.3 U | 8.8 U | 9.9 U | 8.9 U | 10 U |
| Chloroform | UG/KG | *240* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Chloromethane | UG/KG | *1,200* | 9.9 U | 8.4 U | 8.2 U | 8.6 U | 8.7 U | 9 U | 9.3 U | 8.8 U | 9.9 U | 8.9 U | 10 U |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |

APPENDIX B
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison - Motor Pool | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Vehicle Lift Rack | Vehicle Lift Rack | Vehicle Lift Rack | Vehicle Lift Rack | Oil Change Rack |
| | | **FIELD SAMPLE ID:** | MP1002 | MP1003 | MP1004 | MP1005 | MP1006 | MP1007 | MP1059 | MP1066 | MP1067 | MP1069 | MP1052 |
| | | **LOCATION ID:** | B-MP-DSA-1 | B-MP-DSA-1 | B-MP-DSA-2 | B-MP-DSA-2 | B-MP-DSA-3 | B-MP-DSA-3 | B-MP-VLR-4 | B-MP-VLR-1 | B-MP-VLR-2 | B-MP-VLR-4 | B-MP-OCR-1 |
| | | **LABORATORY SAMPLE ID:** | 159330-002 | 159330-003 | 159330-004 | 159330-005 | 159330-006 | 159330-007 | 159344-010 | 159309-003 | 159309-002 | 159344-011 | 159304-001 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | FD-MP1069 | N | N | N | N |
| **Analysis** | **Units** | ***Comparison*** | | | | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Dibromochloromethane | UG/KG | *1,100* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Dibromomethane | UG/KG | *67,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Ethylbenzene | UG/KG | *230,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Freon 113 | UG/KG | *5,600,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Freon 12 | UG/KG | *94,000* | 9.9 U | 8.4 U | 8.2 U | 8.6 U | 8.7 U | 9 U | 9.3 U | 8.8 U | 9.9 U | 8.9 U | 10 U |
| Hexachlorobutadiene | UG/KG | *6,200* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Isopropylbenzene | UG/KG | *160,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| m,p-Xylenes | UG/KG | *210,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Methylene Chloride | UG/KG | *8,900* | 20 U | 17 U | 16 U | 17 U | 17 U | 18 U | 19 U | 18 U | 20 U | 18 U | 20 U |
| MTBE | UG/KG | *17,000* (2) | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Naphthalene | UG/KG | *56,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| n-Butylbenzene | UG/KG | *140,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| o-Xylene | UG/KG | *210,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| para-Isopropyl Toluene | UG/KG | *NE* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Propylbenzene | UG/KG | *NE* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| sec-Butylbenzene | UG/KG | *110,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Styrene | UG/KG | *1,700,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| tert-Butylbenzene | UG/KG | *130,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Tetrachloroethene | UG/KG | *5,700* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Toluene | UG/KG | *520,000* | 1.4 J | 4.2 U | 0.44 J | 2 J | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| trans-1,3-Dichloropropene | UG/KG | *700* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Trichloroethene | UG/KG | *2,800* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Trichlorofluoromethane | UG/KG | *390,000* | 5 U | 4.2 U | 4.1 U | 4.3 U | 4.4 U | 4.5 U | 4.6 U | 4.4 U | 4.9 U | 4.5 U | 5 U |
| Vinyl Acetate | UG/KG | *430,000* | 50 U | 42 U | 41 U | 43 U | 44 U | 45 U | 46 U | 44 U | 49 U | 45 U | 50 U |
| Vinyl Chloride | UG/KG | *150* | 9.9 U | 8.4 U | 8.2 U | 8.6 U | 8.7 U | 9 U | 9.3 U | 8.8 U | 9.9 U | 8.9 U | 10 U |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 2,4-Dichlorophenol | UG/KG | *180,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 2,4-Dinitrophenol | UG/KG | *120,000* | 1700 U | 1800 U | 1800 U | 1700 U | 1800 U | 1700 U | -- | -- | -- | 1800 U | -- |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 2-Chlorophenol | UG/KG | *63,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 2-Methylnaphthalene | UG/KG | *NE* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 26 J | -- |
| 2-Methylphenol | UG/KG | *3,100,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 2-Nitroaniline | UG/KG | *3,500* | 690 U | 710 U | 700 U | 700 U | 700 U | 690 U | -- | -- | -- | 700 U | -- |
| 2-Nitrophenol | UG/KG | *NE* | 690 U | 710 U | 700 U | 700 U | 700 U | 690 U | -- | -- | -- | 700 U | -- |
| 3,3'-Dichlorobenzidine | UG/KG | *1,100* | 690 U | 710 U | 700 U | 700 U | 700 U | 690 U | -- | -- | -- | 700 U | -- |
| 3-Nitroaniline | UG/KG | *120,000* | 690 U | 710 U | 700 U | 700 U | 700 U | 690 U | -- | -- | -- | 700 U | -- |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | 1700 U | 1800 U | 1800 U | 1700 U | 1800 U | 1700 U | -- | -- | -- | 1800 U | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison - Motor Pool | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Drum Storage Area | Vehicle Lift Rack | Vehicle Lift Rack | Vehicle Lift Rack | Vehicle Lift Rack | Oil Change Rack |
| | | **FIELD SAMPLE ID:** | MP1002 | MP1003 | MP1004 | MP1005 | MP1006 | MP1007 | MP1059 | MP1066 | MP1067 | MP1069 | MP1052 |
| | | **LOCATION ID:** | B-MP-DSA-1 | B-MP-DSA-1 | B-MP-DSA-2 | B-MP-DSA-2 | B-MP-DSA-3 | B-MP-DSA-3 | B-MP-VLR-4 | B-MP-VLR-1 | B-MP-VLR-2 | B-MP-VLR-4 | B-MP-OCR-1 |
| | | **LABORATORY SAMPLE ID:** | 159330-002 | 159330-003 | 159330-004 | 159330-005 | 159330-006 | 159330-007 | 159344-010 | 159309-003 | 159309-002 | 159344-011 | 159304-001 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | FD-MP1069 | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 4-Chloroaniline | UG/KG | *NE* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 4-Methylphenol | UG/KG | *NE* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| 4-Nitroaniline | UG/KG | *310,000* | 690 U | 710 U | 700 U | 700 U | 700 U | 690 U | -- | -- | -- | 700 U | -- |
| 4-Nitrophenol | UG/KG | *490,000* | 690 U | 710 U | 700 U | 700 U | *700 U* | 690 U | -- | -- | -- | 700 U | -- |
| Acenaphthene | UG/KG | *3,700,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Acenaphthylene | UG/KG | *3,700,000* | 350 U | 350 U | 350 U | 350 U | 43 J | 350 U | -- | -- | -- | 350 U | -- |
| Anthracene | UG/KG | *22,000,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Azobenzene | UG/KG | *4,400* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Benzo(a)anthracene | UG/KG | *620* | 350 U | 350 U | 350 U | 350 U | 60 J | 350 U | -- | -- | -- | 350 U | -- |
| Benzo(a)pyrene | UG/KG | *62* | 350 U | 350 U | 350 U | 350 U | 59 J | 42 J | -- | -- | -- | 16 J | -- |
| Benzo(b)fluoranthene | UG/KG | *620* | 350 U | 350 U | 350 U | 350 U | 49 J | 50 J | -- | -- | -- | 350 U | -- |
| Benzo(g,h,i)perylene | UG/KG | *NE* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Benzoic acid | UG/KG | *100,000,000* | 1700 U | 1800 U | 1800 U | *1700 U* | 1800 U | 1700 U | -- | -- | -- | 1800 U | -- |
| Benzyl alcohol | UG/KG | *18,000,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| bis(2-Chloroethyl)ether | UG/KG | *210* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Butylbenzylphthalate | UG/KG | *12,000,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Chrysene | UG/KG | *6,100* (2) | 350 U | 350 U | 350 U | 350 U | 57 J | 41 J | -- | -- | -- | 350 U | -- |
| Dibenz(a,h)anthracene | UG/KG | *62* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Dibenzofuran | UG/KG | *290,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Diethylphthalate | UG/KG | *49,000,000* | 350 U | 350 U | 350 U | *350 U* | *350 U* | 350 U | -- | -- | -- | 350 U | -- |
| Dimethylphthalate | UG/KG | *100,000,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Di-n-butylphthalate | UG/KG | *NE* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Di-n-octylphthalate | UG/KG | *1,200,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Fluoranthene | UG/KG | *2,300,000* | 350 U | 350 U | 350 U | 350 U | 65 J | 350 U | -- | -- | -- | 350 U | -- |
| Fluorene | UG/KG | *2,600,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Hexachlorobenzene | UG/KG | *300* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | 1700 U | 1800 U | 1800 U | 1700 U | 1800 U | 1700 U | -- | -- | -- | 1800 U | -- |
| Hexachloroethane | UG/KG | *35,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Isophorone | UG/KG | *510,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Naphthalene | UG/KG | *56,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Nitrobenzene | UG/KG | *20,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| N-Nitrosodimethylamine | UG/KG | *9.5* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Pentachlorophenol | UG/KG | *3,000* | 690 U | 710 U | 700 U | 700 U | 700 U | 690 U | -- | -- | -- | 700 U | -- |
| Phenanthrene | UG/KG | *NE* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 33 J | -- |
| Phenol | UG/KG | *37,000,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 350 U | -- |
| Pyrene | UG/KG | *2,300,000* | 350 U | 350 U | 350 U | 350 U | 350 U | 350 U | -- | -- | -- | 33 J | -- |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | East Garrison - Motor Pool | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Oil Change Rack | Oil Change Rack | Oil Change Rack | Oil Change Rack | Oil Change Rack | Incinerator | Incinerator | Wash Rack | Wash Rack | Deer Pen Tank |
| | | **FIELD SAMPLE ID:** | MP1054 | MP1055 | MP1056 | MP1057 | MP1058 | INCNE-3 | INCNW-6 | MP1071 | MP1072 | MP2001 |
| | | **LOCATION ID:** | B-MP-OCR-2 | B-MP-OCR-2 | B-MP-OCR-3 | B-MP-OCR-3 | B-MP-OCR-3 | INCNE-3 | INCNW-6 | B-MP-WR-1 | B-MP-WR-2 | B-MP-DPT-1 |
| | | **LABORATORY SAMPLE ID:** | 159267-005 | 159267-006 | 159304-002 | 159309-001 | 159304-005 | 159363-024 | 159363-025 | 159304-003 | 159309-004 | 159340-003 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | *FD-MP1056* | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison Value (1)** | | | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **TPH (SW8015)** | | | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* (3) | 12 | 15 | 1.4 | 4.8 | -- | -- | -- | 2.1 | 20 | 5 |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* (3) | 30 | 66 | 5.2 U | 8.9 | -- | -- | -- | 5.8 | 56 | 7.7 |
| Gasoline C7-C12 | MG/KG | *100 to 400* (3) | 0.49 U | 0.24 U | 0.19 U | 0.18 U | 0.2 U | -- | -- | 0.18 U | 0.18 U | -- |
| **Metals (SW6010/7471)** | | | | | | | | | | | | |
| Antimony | MG/KG | *31* | 6.2 U | 3 U | 3.6 UJ | 3.1 U | -- | 30 U | 2.2 UJ | 3.0 UJ | 3.2 UJ | -- |
| Arsenic | MG/KG | *2.7* | 6.5 | 3 | 3.1 | 4 | -- | 28 | 4.9 | 4.4 | 4.3 | -- |
| Barium | MG/KG | *5,400* | 230 | 84 | 62 | 76 | -- | 370 | 120 | 140 | 120 | -- |
| Beryllium | MG/KG | *150* | 1.4 | 0.54 | 0.54 | 0.53 | -- | 1.3 J | 0.44 | 0.69 | 0.52 | -- |
| Cadmium | MG/KG | *9* (2) | 2.2 | 0.91 | 1.4 | 0.94 | -- | 26 | 2.4 | 1.3 | 1.4 | -- |
| Chromium | MG/KG | *210* | 59 | 34 | 110 | 26 | -- | 59 J | 52 J | 36 | 46 | -- |
| Cobalt | MG/KG | *4,700* | 24 | 9.7 | 16 | 9.3 | -- | 18 | 12 | 12 | 17 | -- |
| Copper | MG/KG | *2,900* | 29 | 14 | 77 | 18 | -- | 520 | 60 | 25 | 25 | -- |
| Lead | MG/KG | *400* | 35 | 15 | 760 | 6 | -- | 3100 J | 330 J | 140 | 24 | -- |
| Mercury | MG/KG | *23* | 0.25 | 0.063 U | 0.058 | 0.12 | -- | 0.47 | 0.2 | 0.099 | 0.12 | -- |
| Molybdenum | MG/KG | *390* | 2.1 U | 1 U | 0.92 U | 1 U | -- | 4.1 | 0.53 J | 1 U | 1.1 U | -- |
| Nickel | MG/KG | *150* (2) | 100 | 55 | 210 | 43 | -- | 200 | 86 | 57 | 70 | -- |
| Selenium | MG/KG | *390* | 1.1 | 0.25 U | 0.39 | 0.46 | -- | 5 U | 0.59 U | 0.46 | 1.1 | -- |
| Silver | MG/KG | *390* | 0.52 U | 0.25 U | 0.23 U | 0.26 U | -- | 0.37 | 0.18 U | 0.25 U | 0.27 U | -- |
| Thallium | MG/KG | *5.2* | 1.8 | 0.54 | 0.37 U | 0.75 U | -- | 5 U | 0.55 | 0.86 U | 1.2 U | -- |
| Vanadium | MG/KG | *550* | 70 | 29 | 41 | 30 | -- | 27 | 35 | 41 | 36 | -- |
| Zinc | MG/KG | *23,000* | 87 | 43 | 98 | 37 | -- | 12000 | 580 | 65 | 61 | -- |
| **Pesticides (SW8081A)** | | | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDE | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDT | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aldrin | UG/KG | *29* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-BHC | UG/KG | *90* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-Chlordane | UG/KG | *1,600* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| beta-BHC | UG/KG | *320* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| delta-BHC | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dieldrin | UG/KG | *30* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan I | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan II | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan sulfate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin | UG/KG | *18,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin aldehyde | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-BHC | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-Chlordane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor | UG/KG | *110* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide A | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide B | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methoxychlor | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toxaphene | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison - Motor Pool | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Oil Change Rack | Oil Change Rack | Oil Change Rack | Oil Change Rack | Oil Change Rack | Incinerator | Incinerator | Wash Rack | Wash Rack | Deer Pen Tank |
| | | FIELD SAMPLE ID: | MP1054 | MP1055 | MP1056 | MP1057 | MP1058 | INCNE-3 | INCNW-6 | MP1071 | MP1072 | MP2001 |
| | | LOCATION ID: | B-MP-OCR-2 | B-MP-OCR-2 | B-MP-OCR-3 | B-MP-OCR-3 | B-MP-OCR-3 | INCNE-3 | INCNW-6 | B-MP-WR-1 | B-MP-WR-2 | B-MP-DPT-1 |
| | | LABORATORY SAMPLE ID: | 159267-005 | 159267-006 | 159304-002 | 159309-001 | 159304-005 | 159363-024 | 159363-025 | 159304-003 | 159309-004 | 159340-003 |
| | | SAMPLE PURPOSE: | N | N | N | N | FD-MP1056 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | 26 U | -- | 12 U | -- | -- | -- | -- | 13 U | -- | -- |
| Aroclor-1221 | UG/KG | *220* | 52 U | -- | 25 U | -- | -- | -- | -- | 25 U | -- | -- |
| Aroclor-1232 | UG/KG | *220* | 26 U | -- | 12 U | -- | -- | -- | -- | 13 U | -- | -- |
| Aroclor-1242 | UG/KG | *220* | 26 U | -- | 12 U | -- | -- | -- | -- | 13 U | -- | -- |
| Aroclor-1248 | UG/KG | *220* | 26 U | -- | 12 U | -- | -- | -- | -- | 13 U | -- | -- |
| Aroclor-1254 | UG/KG | *220* | 26 U | -- | 12 U | -- | -- | -- | -- | 13 U | -- | -- |
| Aroclor-1260 | UG/KG | *220* | 26 U | -- | 12 U | -- | -- | -- | -- | 13 U | -- | -- |
| **VOCs (SW8260B)** | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,1,2-Trichloroethane | UG/KG | *840* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,1-Dichloroethene | UG/KG | *54* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,1-Dichloropropene | UG/KG | *NE* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,2-Dibromoethane | UG/KG | *52,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,2-Dichloroethane | UG/KG | *350* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,2-Dichloropropane | UG/KG | *350* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,3-Dichloropropane | UG/KG | *700* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 2,2-Dichloropropane | UG/KG | *NE* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 2-Butanone | UG/KG | *7,300,000* | 21 U | 8.9 U | 9.3 U | 8.5 U | 8.8 U | -- | -- | 9.3 U | 8.8 U | 14 U |
| 2-Chlorotoluene | UG/KG | *160,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 2-Hexanone | UG/KG | *NE* | 21 U | 8.9 U | 9.3 U | 8.5 U | 8.8 U | -- | -- | 9.3 U | 8.8 U | 14 U |
| 4-Chlorotoluene | UG/KG | *NE* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | 21 U | 8.9 U | 9.3 U | 8.5 U | 8.8 U | -- | -- | 9.3 U | 8.8 U | 14 U |
| Acetone | UG/KG | *3,400* | 43 U | 18 U | 19 U | 17 U | 18 U | -- | -- | 19 U | 18 U | 27 U |
| Benzene | UG/KG | *650* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Bromobenzene | UG/KG | *28,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Bromochloromethane | UG/KG | *NE* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Bromodichloromethane | UG/KG | *1,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Bromoform | UG/KG | *62,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Bromomethane | UG/KG | *62,000* | 21 U | 8.9 U | 9.3 U | 8.5 U | 8.8 U | -- | -- | 9.3 U | 8.8 U | 14 U |
| Carbon Disulfide | UG/KG | *360,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Carbon Tetrachloride | UG/KG | *240* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Chlorobenzene | UG/KG | *150,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Chloroethane | UG/KG | *3,000* | 21 U | 8.9 U | 9.3 U | 8.5 U | 8.8 U | -- | -- | 9.3 U | 8.8 U | 14 U |
| Chloroform | UG/KG | *240* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Chloromethane | UG/KG | *1,200* | 21 U | 8.9 U | 9.3 U | 8.5 U | 8.8 U | -- | -- | 9.3 U | 8.8 U | 14 U |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison - Motor Pool | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Oil Change Rack | Oil Change Rack | Oil Change Rack | Oil Change Rack | Oil Change Rack | Incinerator | Incinerator | Wash Rack | Wash Rack | Deer Pen Tank |
| | | FIELD SAMPLE ID: | MP1054 | MP1055 | MP1056 | MP1057 | MP1058 | INCNE-3 | INCNW-6 | MP1071 | MP1072 | MP2001 |
| | | LOCATION ID: | B-MP-OCR-2 | B-MP-OCR-2 | B-MP-OCR-3 | B-MP-OCR-3 | B-MP-OCR-3 | INCNE-3 | INCNW-6 | B-MP-WR-1 | B-MP-WR-2 | B-MP-DPT-1 |
| | | LABORATORY SAMPLE ID: | 159267-005 | 159267-006 | 159304-002 | 159309-001 | 159304-005 | 159363-024 | 159363-025 | 159304-003 | 159309-004 | 159340-003 |
| | | SAMPLE PURPOSE: | N | N | N | N | FD-MP1056 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Dibromochloromethane | UG/KG | *1,100* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Dibromomethane | UG/KG | *67,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Ethylbenzene | UG/KG | *230,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Freon 113 | UG/KG | *5,600,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Freon 12 | UG/KG | *94,000* | 21 U | 8.9 U | 9.3 U | 8.5 U | 8.8 U | -- | -- | 9.3 U | 8.8 U | 14 U |
| Hexachlorobutadiene | UG/KG | *6,200* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Isopropylbenzene | UG/KG | *160,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| m,p-Xylenes | UG/KG | *210,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Methylene Chloride | UG/KG | *8,900* | 43 U | 18 U | 19 U | 17 U | 18 U | -- | -- | 19 U | 18 U | 27 U |
| MTBE | UG/KG | *17,000* (2) | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Naphthalene | UG/KG | *56,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| n-Butylbenzene | UG/KG | *140,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| o-Xylene | UG/KG | *210,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| para-Isopropyl Toluene | UG/KG | *NE* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Propylbenzene | UG/KG | *NE* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| sec-Butylbenzene | UG/KG | *110,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Styrene | UG/KG | *1,700,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| tert-Butylbenzene | UG/KG | *130,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Tetrachloroethene | UG/KG | *5,700* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Toluene | UG/KG | *520,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| trans-1,3-Dichloropropene | UG/KG | *700* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Trichloroethene | UG/KG | *2,800* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Trichlorofluoromethane | UG/KG | *390,000* | 11 U | 4.5 U | 4.7 U | 4.3 U | 4.4 U | -- | -- | 4.7 U | 4.4 U | 6.8 U |
| Vinyl Acetate | UG/KG | *430,000* | 110 U | 45 U | 47 U | 43 U | 44 U | -- | -- | 47 U | 44 U | 68 U |
| Vinyl Chloride | UG/KG | *150* | 21 U | 8.9 U | 9.3 U | 8.5 U | 8.8 U | -- | -- | 9.3 U | 8.8 U | 14 U |
| **SVOCs (SW8270C)** | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2,4-Dichlorophenol | UG/KG | *180,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2,4-Dinitrophenol | UG/KG | *120,000* | 3600 U | -- | -- | -- | -- | -- | -- | 1800 U | -- | -- |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2-Chlorophenol | UG/KG | *63,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2-Methylnaphthalene | UG/KG | *NE* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2-Methylphenol | UG/KG | *3,100,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 2-Nitroaniline | UG/KG | *3,500* | 1400 U | -- | -- | -- | -- | -- | -- | 720 U | -- | -- |
| 2-Nitrophenol | UG/KG | *NE* | 1400 U | -- | -- | -- | -- | -- | -- | 720 U | -- | -- |
| 3,3'-Dichlorobenzidine | UG/KG | *1,100* | 1400 U | -- | -- | -- | -- | -- | -- | 720 U | -- | -- |
| 3-Nitroaniline | UG/KG | *120,000* | 1400 U | -- | -- | -- | -- | -- | -- | 720 U | -- | -- |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | 3600 U | -- | -- | -- | -- | -- | -- | 1800 U | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison - Motor Pool | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Oil Change Rack | Oil Change Rack | Oil Change Rack | Oil Change Rack | Oil Change Rack | Incinerator | Incinerator | Wash Rack | Wash Rack | Deer Pen Tank |
| | | **FIELD SAMPLE ID:** | MP1054 | MP1055 | MP1056 | MP1057 | MP1058 | INCNE-3 | INCNW-6 | MP1071 | MP1072 | MP2001 |
| | | **LOCATION ID:** | B-MP-OCR-2 | B-MP-OCR-2 | B-MP-OCR-3 | B-MP-OCR-3 | B-MP-OCR-3 | INCNE-3 | INCNW-6 | B-MP-WR-1 | B-MP-WR-2 | B-MP-DPT-1 |
| | | **LABORATORY SAMPLE ID:** | 159267-005 | 159267-006 | 159304-002 | 159309-001 | 159304-005 | 159363-024 | 159363-025 | 159304-003 | 159309-004 | 159340-003 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | FD-MP1056 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 4-Chloroaniline | UG/KG | *NE* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 4-Methylphenol | UG/KG | *NE* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| 4-Nitroaniline | UG/KG | *310,000* | 1400 U | -- | -- | -- | -- | -- | -- | 720 U | -- | -- |
| 4-Nitrophenol | UG/KG | *490,000* | 1400 U | -- | -- | -- | -- | -- | -- | 720 U | -- | -- |
| Acenaphthene | UG/KG | *3,700,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Acenaphthylene | UG/KG | *3,700,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Anthracene | UG/KG | *22,000,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Azobenzene | UG/KG | *4,400* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Benzo(a)anthracene | UG/KG | *620* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Benzo(a)pyrene | UG/KG | *62* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Benzo(b)fluoranthene | UG/KG | *620* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Benzo(g,h,i)perylene | UG/KG | *NE* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Benzoic acid | UG/KG | *100,000,000* | 3600 U | -- | -- | -- | -- | -- | -- | 1800 U | -- | -- |
| Benzyl alcohol | UG/KG | *18,000,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| bis(2-Chloroethyl)ether | UG/KG | *210* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Butylbenzylphthalate | UG/KG | *12,000,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Chrysene | UG/KG | *6,100* (2) | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Dibenz(a,h)anthracene | UG/KG | *62* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Dibenzofuran | UG/KG | *290,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Diethylphthalate | UG/KG | *49,000,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Dimethylphthalate | UG/KG | *100,000,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Di-n-butylphthalate | UG/KG | *NE* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Di-n-octylphthalate | UG/KG | *1,200,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Fluoranthene | UG/KG | *2,300,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Fluorene | UG/KG | *2,600,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Hexachlorobenzene | UG/KG | *300* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | 3600 U | -- | -- | -- | -- | -- | -- | 1800 U | -- | -- |
| Hexachloroethane | UG/KG | *35,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Isophorone | UG/KG | *510,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Naphthalene | UG/KG | *56,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Nitrobenzene | UG/KG | *20,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| N-Nitrosodimethylamine | UG/KG | *9.5* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Pentachlorophenol | UG/KG | *3,000* | 1400 U | -- | -- | -- | -- | -- | -- | 720 U | -- | -- |
| Phenanthrene | UG/KG | *NE* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Phenol | UG/KG | *37,000,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |
| Pyrene | UG/KG | *2,300,000* | 720 U | -- | -- | -- | -- | -- | -- | 360 U | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Power Plant AST | Power Plant AST | Power Plant AST | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Photoshop | Former Photoshop | Former Photoshop |
| | | **FIELD SAMPLE ID:** | EG1001 | EG1003 | EG1006W | EG1010 | EG1011 | EG1012 | EG1013 | EG1014 | EG1015 | EG1016 | EG1028 |
| | | **LOCATION ID:** | B-EG-AST-1 | B-EG-AST-2 | B-EG-AST-2 | H-EG-FBS-S | H-EG-FBS-E | H-EG-FBS-N | H-EG-FBS-W | H-EG-FBS-W | H-EG-FPS-1 | H-EG-FPS-2 | H-EG-FPS-2 |
| | | **LABORATORY SAMPLE ID:** | 159329-001 | 159329-002 | 159329-005 | 159363-006 | 159363-007 | 159363-008 | 159363-009 | 159363-010 | 159363-012 | 159363-013 | 159363-014 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | N | FD-EG1013 | N | N | FD-EG1016 |
| **Analysis** | **Units** | **Comparison Value (1)** | | | | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **TPH (SW8015)** | | | | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* (3) | 3.8 | 1.3 | 4.5 | -- | -- | -- | -- | -- | -- | -- | -- |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* (3) | 7.9 | 19 | 6 U | -- | -- | -- | -- | -- | -- | -- | -- |
| Gasoline C7-C12 | MG/KG | *100 to 400* (3) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Metals (SW6010/7471)** | | | | | | | | | | | | | |
| Antimony | MG/KG | *31* | -- | -- | -- | 3.2 UJ | 3.2 | 3.6 UJ | 2.9 U | 2.9 UJ | 3.1 U | 3.1 UJ | 2.8 UJ |
| Arsenic | MG/KG | *2.7* | -- | -- | -- | 3.9 | 3.2 UJ | 2 | 1.5 J | 2.2 J | 3.4 | 3.8 | 2.9 |
| Barium | MG/KG | *5,400* | -- | -- | -- | 220 | 91 | 120 | 100 J | 210 J | 110 | 140 | 130 |
| Beryllium | MG/KG | *150* | -- | -- | -- | 0.29 | 0.3 | 0.23 | 0.14 | 0.18 | 0.35 | 0.41 | 0.37 |
| Cadmium | MG/KG | *9* (2) | -- | -- | -- | 1.9 | 1.6 | 1.6 | 1.1 | 1.3 | 1.2 | 1.7 | 1.4 |
| Chromium | MG/KG | *210* | -- | -- | -- | 300 J | 190 J | 310 J | 150 J | 190 J | 43 J | 79 J | 62 J |
| Cobalt | MG/KG | *4,700* | -- | -- | -- | 34 | 22 | 28 | 14 | 17 | 11 | 16 | 13 |
| Copper | MG/KG | *2,900* | -- | -- | -- | 34 | 27 | 64 | 36 | 36 | 17 | 25 | 18 |
| Lead | MG/KG | *400* | -- | -- | -- | 940 J | 180 J | 500 | 720 J | 640 J | 39 J | 40 J | 31 J |
| Mercury | MG/KG | *23* | -- | -- | -- | 0.28 | 0.2 | 0.17 | 0.14 | 0.099 | 0.097 | 0.12 | 0.13 |
| Molybdenum | MG/KG | *390* | -- | -- | -- | 0.91 J | 0.41 J | 0.68 J | 0.47 J | 0.75 J | 1 U | 0.43 J | 0.94 U |
| Nickel | MG/KG | *150* (2) | -- | -- | -- | 710 | 370 | 650 | 320 | 390 | 58 | 120 | 89 |
| Selenium | MG/KG | *390* | -- | -- | -- | 2.5 | 1.2 | 1.2 | 0.69 UJ | 1.1 J | 1.1 | 1.4 | 1 |
| Silver | MG/KG | *390* | -- | -- | -- | 0.25 U | 0.24 U | 0.088 J | 0.24 U | 0.24 U | 0.26 U | 0.26 U | 0.23 U |
| Thallium | MG/KG | *5.2* | -- | -- | -- | 0.63 | 0.85 | 0.36 | 0.36 | 0.24 U | 0.9 | 0.84 | 0.7 |
| Vanadium | MG/KG | *550* | -- | -- | -- | 120 | 42 | 81 | 42 | 55 | 37 | 42 | 35 |
| Zinc | MG/KG | *23,000* | -- | -- | -- | 300 | 150 | 270 | 190 | 260 | 70 | 76 | 65 |
| **Pesticides (SW8081A)** | | | | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDE | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDT | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aldrin | UG/KG | *29* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-BHC | UG/KG | *90* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-Chlordane | UG/KG | *1,600* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| beta-BHC | UG/KG | *320* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| delta-BHC | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dieldrin | UG/KG | *30* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan I | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan II | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan sulfate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin | UG/KG | *18,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin aldehyde | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-BHC | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-Chlordane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor | UG/KG | *110* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide A | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide B | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methoxychlor | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toxaphene | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Power Plant AST | Power Plant AST | Power Plant AST | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Photoshop | Former Photoshop | Former Photoshop |
| | | **FIELD SAMPLE ID:** | EG1001 | EG1003 | EG1006W | EG1010 | EG1011 | EG1012 | EG1013 | EG1014 | EG1015 | EG1016 | EG1028 |
| | | **LOCATION ID:** | B-EG-AST-1 | B-EG-AST-2 | B-EG-AST-2 | H-EG-FBS-S | H-EG-FBS-E | H-EG-FBS-N | H-EG-FBS-W | H-EG-FBS-W | H-EG-FPS-1 | H-EG-FPS-2 | H-EG-FPS-2 |
| | | **LABORATORY SAMPLE ID:** | 159329-001 | 159329-002 | 159329-005 | 159363-006 | 159363-007 | 159363-008 | 159363-009 | 159363-010 | 159363-012 | 159363-013 | 159363-014 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | N | FD-EG1013 | N | N | FD-EG1016 |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1221 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1232 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1242 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1248 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1254 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1260 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,2-Trichloroethane | UG/KG | *840* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloroethene | UG/KG | *54* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloropropene | UG/KG | *NE* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dibromoethane | UG/KG | *52,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichloroethane | UG/KG | *350* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichloropropane | UG/KG | *350* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichloropropane | UG/KG | *700* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,2-Dichloropropane | UG/KG | *NE* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Butanone | UG/KG | *7,300,000* | 9.2 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorotoluene | UG/KG | *160,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Hexanone | UG/KG | *NE* | 9.2 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chlorotoluene | UG/KG | *NE* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | 9.2 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acetone | UG/KG | *3,400* | 18 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzene | UG/KG | *650* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromobenzene | UG/KG | *28,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromochloromethane | UG/KG | *NE* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromodichloromethane | UG/KG | *1,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromoform | UG/KG | *62,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromomethane | UG/KG | *62,000* | 9.2 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbon Disulfide | UG/KG | *360,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbon Tetrachloride | UG/KG | *240* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chlorobenzene | UG/KG | *150,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloroethane | UG/KG | *3,000* | 9.2 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloroform | UG/KG | *240* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloromethane | UG/KG | *1,200* | 9.2 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Power Plant AST | Power Plant AST | Power Plant AST | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Photoshop | Former Photoshop | Former Photoshop |
| | | FIELD SAMPLE ID: | EG1001 | EG1003 | EG1006W | EG1010 | EG1011 | EG1012 | EG1013 | EG1014 | EG1015 | EG1016 | EG1028 |
| | | LOCATION ID: | B-EG-AST-1 | B-EG-AST-2 | B-EG-AST-2 | H-EG-FBS-S | H-EG-FBS-E | H-EG-FBS-N | H-EG-FBS-W | H-EG-FBS-W | H-EG-FPS-1 | H-EG-FPS-2 | H-EG-FPS-2 |
| | | LABORATORY SAMPLE ID: | 159329-001 | 159329-002 | 159329-005 | 159363-006 | 159363-007 | 159363-008 | 159363-009 | 159363-010 | 159363-012 | 159363-013 | 159363-014 |
| | | SAMPLE PURPOSE: | N | N | N | N | N | N | N | FD-EG1013 | N | N | FD-EG1016 |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibromochloromethane | UG/KG | *1,100* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibromomethane | UG/KG | *67,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Ethylbenzene | UG/KG | *230,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Freon 113 | UG/KG | *5,600,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Freon 12 | UG/KG | *94,000* | 9.2 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Isopropylbenzene | UG/KG | *160,000* | 2.3 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| m,p-Xylenes | UG/KG | *210,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methylene Chloride | UG/KG | *8,900* | 18 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| MTBE | UG/KG | *17,000* (2) | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| n-Butylbenzene | UG/KG | *140,000* | 6.2 | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| o-Xylene | UG/KG | *210,000* | 3 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| para-Isopropyl Toluene | UG/KG | *NE* | 2.8 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Propylbenzene | UG/KG | *NE* | 1.6 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| sec-Butylbenzene | UG/KG | *110,000* | 2.4 J | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Styrene | UG/KG | *1,700,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| tert-Butylbenzene | UG/KG | *130,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Tetrachloroethene | UG/KG | *5,700* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toluene | UG/KG | *520,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| trans-1,3-Dichloropropene | UG/KG | *700* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Trichloroethene | UG/KG | *2,800* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Trichlorofluoromethane | UG/KG | *390,000* | 4.6 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Vinyl Acetate | UG/KG | *430,000* | 46 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Vinyl Chloride | UG/KG | *150* | 9.2 U | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 2,4-Dichlorophenol | UG/KG | *180,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 2,4-Dinitrophenol | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | 1700 U | 8600 U | 8700 U |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 2-Chlorophenol | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 2-Methylnaphthalene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | 41 J | 1700 U | 1700 U |
| 2-Methylphenol | UG/KG | *3,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 2-Nitroaniline | UG/KG | *3,500* | -- | -- | -- | -- | -- | -- | -- | -- | 700 U | 3400 U | 3500 U |
| 2-Nitrophenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | 700 U | 3400 U | 3500 U |
| 3,3'-Dichlorobenzidine | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | -- | 700 U | 3400 U | 3500 U |
| 3-Nitroaniline | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | 700 U | 3400 U | 3500 U |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | 1700 U | 8600 U | 8700 U |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Power Plant AST | Power Plant AST | Power Plant AST | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Boiler Stack | Former Photoshop | Former Photoshop | Former Photoshop |
| | | **FIELD SAMPLE ID:** | EG1001 | EG1003 | EG1006W | EG1010 | EG1011 | EG1012 | EG1013 | EG1014 | EG1015 | EG1016 | EG1028 |
| | | **LOCATION ID:** | B-EG-AST-1 | B-EG-AST-2 | B-EG-AST-2 | H-EG-FBS-S | H-EG-FBS-E | H-EG-FBS-N | H-EG-FBS-W | H-EG-FBS-W | H-EG-FPS-1 | H-EG-FPS-2 | H-EG-FPS-2 |
| | | **LABORATORY SAMPLE ID:** | 159329-001 | 159329-002 | 159329-005 | 159363-006 | 159363-007 | 159363-008 | 159363-009 | 159363-010 | 159363-012 | 159363-013 | 159363-014 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | N | FD-EG1013 | N | N | FD-EG1016 |
| **Analysis** | **Units** | ***Comparison*** | | | | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 4-Chloroaniline | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| 4-Methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | 50 J | 1700 U | 1700 U |
| 4-Nitroaniline | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | 700 U | 3400 U | 3500 U |
| 4-Nitrophenol | UG/KG | *490,000* | -- | -- | -- | -- | -- | -- | -- | -- | 700 U | 3400 U | 3500 U |
| Acenaphthene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Acenaphthylene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Anthracene | UG/KG | *22,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Azobenzene | UG/KG | *4,400* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Benzo(a)anthracene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Benzo(a)pyrene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Benzo(b)fluoranthene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Benzo(g,h,i)perylene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | -- | -- | -- | -- | -- | -- | -- | -- | 16 J | 1700 U | 1700 U |
| Benzoic acid | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | 1700 U | 8600 U | 8700 U |
| Benzyl alcohol | UG/KG | *18,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| bis(2-Chloroethyl)ether | UG/KG | *210* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Butylbenzylphthalate | UG/KG | *12,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Chrysene | UG/KG | *6,100* (2) | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Dibenz(a,h)anthracene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Dibenzofuran | UG/KG | *290,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Diethylphthalate | UG/KG | *49,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Dimethylphthalate | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Di-n-butylphthalate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Di-n-octylphthalate | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Fluoranthene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Fluorene | UG/KG | *2,600,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Hexachlorobenzene | UG/KG | *300* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | -- | -- | -- | -- | -- | -- | -- | -- | 1700 U | 8600 U | 8700 U |
| Hexachloroethane | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Isophorone | UG/KG | *510,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | -- | -- | -- | 41 J | 1700 U | 1700 U |
| Nitrobenzene | UG/KG | *20,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| N-Nitrosodimethylamine | UG/KG | *9.5* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Pentachlorophenol | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | -- | 700 U | 3400 U | 3500 U |
| Phenanthrene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Phenol | UG/KG | *37,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |
| Pyrene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | 350 U | 1700 U | 1700 U |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Former Transformer Pad | Former Transformer Pad | Former Transformer Pad | Former Transformer Pad | Electrical Eq_ Storage (Oil Can #1) | Electrical Eq_ Storage (Oil Can #2) | Electrical Eq_ Storage (Oil Circiut Breaker) | Electrical Eq_ Storage (Hopper) | Electrical Eq_ Storage (Transformer #1 Gym) |
| | | FIELD SAMPLE ID: | FTP1001NE | FTP1002NW | FTP1003SE | FTP1004SW | MP1008 | MP1009 | MP1010 | MP1011 | MP1012 |
| | | LOCATION ID: | FTP1001NE | FTP1002NW | FTP1003SE | FTP1004SW | P-MP-EES-1 | P-MP-EES-2 | P-MP-EES-3 | P-MP-EES-4 | P-MP-EES-5 |
| | | LABORATORY SAMPLE ID: | 159344-006 | 159344-007 | 159344-008 | 159344-009 | 159362-001 | 159362-002 | 159362-003 | 159362-004 | 159362-005 |
| | | SAMPLE PURPOSE: | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison Value (1)** | | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **TPH (SW8015)** | | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* (3) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* (3) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Gasoline C7-C12 | MG/KG | *100 to 400* (3) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Metals (SW6010/7471)** | | | | | | | | | | | |
| Antimony | MG/KG | *31* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Arsenic | MG/KG | *2.7* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Barium | MG/KG | *5,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Beryllium | MG/KG | *150* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium | MG/KG | *9* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chromium | MG/KG | *210* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cobalt | MG/KG | *4,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper | MG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Lead | MG/KG | *400* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Mercury | MG/KG | *23* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Molybdenum | MG/KG | *390* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nickel | MG/KG | *150* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Selenium | MG/KG | *390* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Silver | MG/KG | *390* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Thallium | MG/KG | *5.2* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Vanadium | MG/KG | *550* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Zinc | MG/KG | *23,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Pesticides (SW8081A)** | | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDE | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDT | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aldrin | UG/KG | *29* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-BHC | UG/KG | *90* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-Chlordane | UG/KG | *1,600* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| beta-BHC | UG/KG | *320* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| delta-BHC | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dieldrin | UG/KG | *30* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan I | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan II | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan sulfate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin | UG/KG | *18,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin aldehyde | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-BHC | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-Chlordane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor | UG/KG | *110* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide A | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide B | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methoxychlor | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toxaphene | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Former Transformer Pad | Former Transformer Pad | Former Transformer Pad | Former Transformer Pad | Electrical Eq_ Storage (Oil Can #1) | Electrical Eq_ Storage (Oil Can #2) | Electrical Eq_ Storage (Oil Circiut Breaker) | Electrical Eq_ Storage (Hopper) | Electrical Eq_ Storage (Transformer #1 Gym) |
| | | FIELD SAMPLE ID: | FTP1001NE | FTP1002NW | FTP1003SE | FTP1004SW | MP1008 | MP1009 | MP1010 | MP1011 | MP1012 |
| | | LOCATION ID: | FTP1001NE | FTP1002NW | FTP1003SE | FTP1004SW | P-MP-EES-1 | P-MP-EES-2 | P-MP-EES-3 | P-MP-EES-4 | P-MP-EES-5 |
| | | LABORATORY SAMPLE ID: | 159344-006 | 159344-007 | 159344-008 | 159344-009 | 159362-001 | 159362-002 | 159362-003 | 159362-004 | 159362-005 |
| | | SAMPLE PURPOSE: | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | 13 U | 13 U | 13 U | 13 U | 28000 U | 28000 U | 2700 U | 560 U | 550 U |
| Aroclor-1221 | UG/KG | *220* | 25 U | 26 U | 25 U | 26 U | 52000 U | 52000 U | 4900 U | 1000 U | 1000 U |
| Aroclor-1232 | UG/KG | *220* | 13 U | 13 U | 13 U | 13 U | 26000 U | 26000 U | 2500 U | 510 U | 500 U |
| Aroclor-1242 | UG/KG | *220* | 13 U | 13 U | 13 U | 13 U | 26000 U | 26000 U | 2500 U | 510 U | 500 U |
| Aroclor-1248 | UG/KG | *220* | 13 U | 13 U | 13 U | 13 U | 26000 U | 26000 U | 2500 U | 510 U | 500 U |
| Aroclor-1254 | UG/KG | *220* | 13 U | 13 U | 13 U | 13 U | 26000 U | 26000 U | 2500 U | 510 U | 500 U |
| Aroclor-1260 | UG/KG | *220* | 13 U | 13 U | 13 U | 20 U | 26000 U | 26000 U | 2500 U | 510 U | 500 U |
| **VOCs (SW8260B)** | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,2-Trichloroethane | UG/KG | *840* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloroethene | UG/KG | *54* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloropropene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dibromoethane | UG/KG | *52,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichloroethane | UG/KG | *350* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichloropropane | UG/KG | *350* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichloropropane | UG/KG | *700* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,2-Dichloropropane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Butanone | UG/KG | *7,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorotoluene | UG/KG | *160,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Hexanone | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chlorotoluene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acetone | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzene | UG/KG | *650* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromobenzene | UG/KG | *28,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromochloromethane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromodichloromethane | UG/KG | *1,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromoform | UG/KG | *62,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromomethane | UG/KG | *62,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbon Disulfide | UG/KG | *360,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbon Tetrachloride | UG/KG | *240* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chlorobenzene | UG/KG | *150,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloroethane | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloroform | UG/KG | *240* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloromethane | UG/KG | *1,200* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Former Transformer Pad | Former Transformer Pad | Former Transformer Pad | Former Transformer Pad | Electrical Eq_ Storage (Oil Can #1) | Electrical Eq_ Storage (Oil Can #2) | Electrical Eq_ Storage (Oil Circiut Breaker) | Electrical Eq_ Storage (Hopper) | Electrical Eq_ Storage (Transformer #1 Gym) |
| | | FIELD SAMPLE ID: | FTP1001NE | FTP1002NW | FTP1003SE | FTP1004SW | MP1008 | MP1009 | MP1010 | MP1011 | MP1012 |
| | | LOCATION ID: | FTP1001NE | FTP1002NW | FTP1003SE | FTP1004SW | P-MP-EES-1 | P-MP-EES-2 | P-MP-EES-3 | P-MP-EES-4 | P-MP-EES-5 |
| | | LABORATORY SAMPLE ID: | 159344-006 | 159344-007 | 159344-008 | 159344-009 | 159362-001 | 159362-002 | 159362-003 | 159362-004 | 159362-005 |
| | | SAMPLE PURPOSE: | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibromochloromethane | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibromomethane | UG/KG | *67,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Ethylbenzene | UG/KG | *230,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Freon 113 | UG/KG | *5,600,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Freon 12 | UG/KG | *94,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Isopropylbenzene | UG/KG | *160,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| m,p-Xylenes | UG/KG | *210,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methylene Chloride | UG/KG | *8,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| MTBE | UG/KG | *17,000* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| n-Butylbenzene | UG/KG | *140,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| o-Xylene | UG/KG | *210,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| para-Isopropyl Toluene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Propylbenzene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| sec-Butylbenzene | UG/KG | *110,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Styrene | UG/KG | *1,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| tert-Butylbenzene | UG/KG | *130,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Tetrachloroethene | UG/KG | *5,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toluene | UG/KG | *520,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| trans-1,3-Dichloropropene | UG/KG | *700* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Trichloroethene | UG/KG | *2,800* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Trichlorofluoromethane | UG/KG | *390,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Vinyl Acetate | UG/KG | *430,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Vinyl Chloride | UG/KG | *150* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **SVOCs (SW8270C)** | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dichlorophenol | UG/KG | *180,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrophenol | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorophenol | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylnaphthalene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylphenol | UG/KG | *3,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitroaniline | UG/KG | *3,500* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitrophenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3,3'-Dichlorobenzidine | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3-Nitroaniline | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Former Transformer Pad | Former Transformer Pad | Former Transformer Pad | Former Transformer Pad | Electrical Eq_ Storage (Oil Can #1) | Electrical Eq_ Storage (Oil Can #2) | Electrical Eq_ Storage (Oil Circiut Breaker) | Electrical Eq_ Storage (Hopper) | Electrical Eq_ Storage (Transformer #1 Gym) |
| | | FIELD SAMPLE ID: | FTP1001NE | FTP1002NW | FTP1003SE | FTP1004SW | MP1008 | MP1009 | MP1010 | MP1011 | MP1012 |
| | | LOCATION ID: | FTP1001NE | FTP1002NW | FTP1003SE | FTP1004SW | P-MP-EES-1 | P-MP-EES-2 | P-MP-EES-3 | P-MP-EES-4 | P-MP-EES-5 |
| | | LABORATORY SAMPLE ID: | 159344-006 | 159344-007 | 159344-008 | 159344-009 | 159362-001 | 159362-002 | 159362-003 | 159362-004 | 159362-005 |
| | | SAMPLE PURPOSE: | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloroaniline | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitroaniline | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitrophenol | UG/KG | *490,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthylene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Anthracene | UG/KG | *22,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Azobenzene | UG/KG | *4,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)anthracene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)pyrene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(b)fluoranthene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(g,h,i)perylene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzoic acid | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzyl alcohol | UG/KG | *18,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethyl)ether | UG/KG | *210* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Butylbenzylphthalate | UG/KG | *12,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chrysene | UG/KG | *6,100* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenz(a,h)anthracene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenzofuran | UG/KG | *290,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Diethylphthalate | UG/KG | *49,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dimethylphthalate | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-butylphthalate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-octylphthalate | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluoranthene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluorene | UG/KG | *2,600,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobenzene | UG/KG | *300* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachloroethane | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Isophorone | UG/KG | *510,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrobenzene | UG/KG | *20,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodimethylamine | UG/KG | *9.5* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pentachlorophenol | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenanthrene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenol | UG/KG | *37,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pyrene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | Ayala Cove | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **SITE NAME:** | | | Electrical Eq_ Storage (Transfomer #2 Gym) | Electrical Substation | Electrical Substation | Electrical Substation | Electrical Substation | Visitor Center | Visitor Center | Visitor Center | Visitor Center | Visitor Center | Visitor Center |
| **FIELD SAMPLE ID:** | | | MP1013 | EG1006 | EG1007 | EG1008 | EG1009 | AC1025 | AC1026 | AC1030 | AC1031 | AC1032 | AC1033 |
| **LOCATION ID:** | | | P-MP-EES-6 | H-EG-ES-1 | H-EG-ES-2 | H-EG-ES-3 | H-EG-ES-4 | B-AC-VC10-2 | B-AC-VC10-1 | B-AC-VC80-1 | B-AC-VC80-1 | B-AC-VC80-2 | B-AC-VC80-3 |
| **LABORATORY SAMPLE ID:** | | | 159362-006 | 159361-001 | 159361-002 | 159361-003 | 159361-004 | 159341-005 | 159404-001 | 159404-005 | 159404-006 | 159404-007 | 159404-008 |
| **SAMPLE PURPOSE:** | | | N | N | N | N | N | N | N | N | FD-AC1030 | N | N |
| **Analysis** | **Units** | **Comparison Value (1)** | | | | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **TPH (SW8015)** | | | | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* (3) | -- | -- | -- | -- | -- | 1.1 U | 1.2 U | 1.2 U | 1.2 U | 1.1 U | 1.1 U |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* (3) | -- | -- | -- | -- | -- | 5.6 U | 5.9 U | 5.8 U | 6 U | 5.7 U | 5.6 U |
| Gasoline C7-C12 | MG/KG | *100 to 400* (3) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Metals (SW6010/7471)** | | | | | | | | | | | | | |
| Antimony | MG/KG | *31* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Arsenic | MG/KG | *2.7* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Barium | MG/KG | *5,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Beryllium | MG/KG | *150* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cadmium | MG/KG | *9* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chromium | MG/KG | *210* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Cobalt | MG/KG | *4,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Copper | MG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Lead | MG/KG | *400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Mercury | MG/KG | *23* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Molybdenum | MG/KG | *390* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nickel | MG/KG | *150* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Selenium | MG/KG | *390* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Silver | MG/KG | *390* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Thallium | MG/KG | *5.2* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Vanadium | MG/KG | *550* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Zinc | MG/KG | *23,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| **Pesticides (SW8081A)** | | | | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDE | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDT | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Aldrin | UG/KG | *29* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-BHC | UG/KG | *90* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-Chlordane | UG/KG | *1,600* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| beta-BHC | UG/KG | *320* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| delta-BHC | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dieldrin | UG/KG | *30* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan I | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan II | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan sulfate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin | UG/KG | *18,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin aldehyde | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-BHC | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-Chlordane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor | UG/KG | *110* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide A | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide B | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Methoxychlor | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Toxaphene | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | Ayala Cove | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Electrical Eq_ Storage (Transfomer #2 Gym) | Electrical Substation | Electrical Substation | Electrical Substation | Electrical Substation | Visitor Center | Visitor Center | Visitor Center | Visitor Center | Visitor Center | Visitor Center |
| | | **FIELD SAMPLE ID:** | MP1013 | EG1006 | EG1007 | EG1008 | EG1009 | AC1025 | AC1026 | AC1030 | AC1031 | AC1032 | AC1033 |
| | | **LOCATION ID:** | P-MP-EES-6 | H-EG-ES-1 | H-EG-ES-2 | H-EG-ES-3 | H-EG-ES-4 | B-AC-VC10-2 | B-AC-VC10-1 | B-AC-VC80-1 | B-AC-VC80-1 | B-AC-VC80-2 | B-AC-VC80-3 |
| | | **LABORATORY SAMPLE ID:** | 159362-006 | 159361-001 | 159361-002 | 159361-003 | 159361-004 | 159341-005 | 159404-001 | 159404-005 | 159404-006 | 159404-007 | 159404-008 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | N | N | FD-AC1030 | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | 14000 U | 130000 U | 65000 U | 13000 U | 64000 U | -- | -- | -- | -- | -- | -- |
| Aroclor-1221 | UG/KG | *220* | 26000 U | 270000 U | 130000 U | 26000 U | 130000 U | -- | -- | -- | -- | -- | -- |
| Aroclor-1232 | UG/KG | *220* | 13000 U | 130000 U | 65000 U | 13000 U | 64000 U | -- | -- | -- | -- | -- | -- |
| Aroclor-1242 | UG/KG | *220* | 13000 U | 130000 U | 65000 U | 13000 U | 64000 U | -- | -- | -- | -- | -- | -- |
| Aroclor-1248 | UG/KG | *220* | 13000 U | 130000 U | 65000 U | 13000 U | 64000 U | -- | -- | -- | -- | -- | -- |
| Aroclor-1254 | UG/KG | *220* | 13000 U | 130000 U | 65000 U | 13000 U | 64000 U | -- | -- | -- | -- | -- | -- |
| Aroclor-1260 | UG/KG | *220* | 560000 | 2400000 | 1900000 | 340000 | 1100000 | -- | -- | -- | -- | -- | -- |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,1,2-Trichloroethane | UG/KG | *840* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,1-Dichloroethene | UG/KG | *54* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,1-Dichloropropene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,2-Dibromoethane | UG/KG | *52,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,2-Dichloroethane | UG/KG | *350* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,2-Dichloropropane | UG/KG | *350* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,3-Dichloropropane | UG/KG | *700* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 2,2-Dichloropropane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 2-Butanone | UG/KG | *7,300,000* | -- | -- | -- | -- | -- | -- | -- | 10 U | 11 U | -- | -- |
| 2-Chlorotoluene | UG/KG | *160,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 2-Hexanone | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 10 U | 11 U | -- | -- |
| 4-Chlorotoluene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 10 U | 11 U | -- | -- |
| Acetone | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | 21 U | 21 U | -- | -- |
| Benzene | UG/KG | *650* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Bromobenzene | UG/KG | *28,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Bromochloromethane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Bromodichloromethane | UG/KG | *1,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Bromoform | UG/KG | *62,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Bromomethane | UG/KG | *62,000* | -- | -- | -- | -- | -- | -- | -- | 10 U | 11 U | -- | -- |
| Carbon Disulfide | UG/KG | *360,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Carbon Tetrachloride | UG/KG | *240* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Chlorobenzene | UG/KG | *150,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Chloroethane | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | 10 U | 11 U | -- | -- |
| Chloroform | UG/KG | *240* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Chloromethane | UG/KG | *1,200* | -- | -- | -- | -- | -- | -- | -- | 10 U | 11 U | -- | -- |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | Ayala Cove | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Electrical Eq_ Storage (Transfomer #2 Gym) | Electrical Substation | Electrical Substation | Electrical Substation | Electrical Substation | Visitor Center | Visitor Center | Visitor Center | Visitor Center | Visitor Center | Visitor Center |
| | | **FIELD SAMPLE ID:** | MP1013 | EG1006 | EG1007 | EG1008 | EG1009 | AC1025 | AC1026 | AC1030 | AC1031 | AC1032 | AC1033 |
| | | **LOCATION ID:** | P-MP-EES-6 | H-EG-ES-1 | H-EG-ES-2 | H-EG-ES-3 | H-EG-ES-4 | B-AC-VC10-2 | B-AC-VC10-1 | B-AC-VC80-1 | B-AC-VC80-1 | B-AC-VC80-2 | B-AC-VC80-3 |
| | | **LABORATORY SAMPLE ID:** | 159362-006 | 159361-001 | 159361-002 | 159361-003 | 159361-004 | 159341-005 | 159404-001 | 159404-005 | 159404-006 | 159404-007 | 159404-008 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | N | N | FD-AC1030 | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Dibromochloromethane | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Dibromomethane | UG/KG | *67,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Ethylbenzene | UG/KG | *230,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Freon 113 | UG/KG | *5,600,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Freon 12 | UG/KG | *94,000* | -- | -- | -- | -- | -- | -- | -- | 10 U | 11 U | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Isopropylbenzene | UG/KG | *160,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| m,p-Xylenes | UG/KG | *210,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Methylene Chloride | UG/KG | *8,900* | -- | -- | -- | -- | -- | -- | -- | 21 U | 21 U | -- | -- |
| MTBE | UG/KG | *17,000* (2) | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| n-Butylbenzene | UG/KG | *140,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| o-Xylene | UG/KG | *210,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| para-Isopropyl Toluene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Propylbenzene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| sec-Butylbenzene | UG/KG | *110,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Styrene | UG/KG | *1,700,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| tert-Butylbenzene | UG/KG | *130,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Tetrachloroethene | UG/KG | *5,700* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Toluene | UG/KG | *520,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| trans-1,3-Dichloropropene | UG/KG | *700* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Trichloroethene | UG/KG | *2,800* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Trichlorofluoromethane | UG/KG | *390,000* | -- | -- | -- | -- | -- | -- | -- | 5.2 U | 5.3 U | -- | -- |
| Vinyl Acetate | UG/KG | *430,000* | -- | -- | -- | -- | -- | -- | -- | 52 U | 53 U | -- | -- |
| Vinyl Chloride | UG/KG | *150* | -- | -- | -- | -- | -- | -- | -- | 10 U | 11 U | -- | -- |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dichlorophenol | UG/KG | *180,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrophenol | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorophenol | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylnaphthalene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylphenol | UG/KG | *3,100,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitroaniline | UG/KG | *3,500* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitrophenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3,3'-Dichlorobenzidine | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 3-Nitroaniline | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | East Garrison | | | | | Ayala Cove | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Electrical Eq_ Storage (Transfomer #2 Gym) | Electrical Substation | Electrical Substation | Electrical Substation | Electrical Substation | Visitor Center | Visitor Center | Visitor Center | Visitor Center | Visitor Center | Visitor Center |
| | | **FIELD SAMPLE ID:** | MP1013 | EG1006 | EG1007 | EG1008 | EG1009 | AC1025 | AC1026 | AC1030 | AC1031 | AC1032 | AC1033 |
| | | **LOCATION ID:** | P-MP-EES-6 | H-EG-ES-1 | H-EG-ES-2 | H-EG-ES-3 | H-EG-ES-4 | B-AC-VC10-2 | B-AC-VC10-1 | B-AC-VC80-1 | B-AC-VC80-1 | B-AC-VC80-2 | B-AC-VC80-3 |
| | | **LABORATORY SAMPLE ID:** | 159362-006 | 159361-001 | 159361-002 | 159361-003 | 159361-004 | 159341-005 | 159404-001 | 159404-005 | 159404-006 | 159404-007 | 159404-008 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | N | N | FD-AC1030 | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloroaniline | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitroaniline | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitrophenol | UG/KG | *490,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthylene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Anthracene | UG/KG | *22,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Azobenzene | UG/KG | *4,400* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)anthracene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)pyrene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(b)fluoranthene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(g,h,i)perylene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzoic acid | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzyl alcohol | UG/KG | *18,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethyl)ether | UG/KG | *210* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Butylbenzylphthalate | UG/KG | *12,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Chrysene | UG/KG | *6,100* (2) | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenz(a,h)anthracene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenzofuran | UG/KG | *290,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Diethylphthalate | UG/KG | *49,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Dimethylphthalate | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-butylphthalate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-octylphthalate | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluoranthene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluorene | UG/KG | *2,600,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobenzene | UG/KG | *300* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachloroethane | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Isophorone | UG/KG | *510,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrobenzene | UG/KG | *20,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodimethylamine | UG/KG | *9.5* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pentachlorophenol | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenanthrene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenol | UG/KG | *37,000,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |
| Pyrene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | Ayala Cove | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Building 332 UST | Building 332 UST | Building 332 UST | Boat Ramp AST | Boat Ramp AST | Boat Ramp AST | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site |
| | | FIELD SAMPLE ID: | B-332#1@15' | B-332#1@15' | B-332#2@15' | AC1001 | AC1001D | AC1003 | AC1003 | AC1008 | AC1009 | AC1009 | AC1010 |
| | | LOCATION ID: | B-332#1@15' | B-332#1@15' | B-332#2@15' | B-AC-BRAST-1 | B-AC-BRAST-1 | B-AC-BRAST-2 | B-AC-BRAST-2 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 |
| | | LABORATORY SAMPLE ID: | 159234-002 | 159234-003 | 159234-001 | 159341-001 | 159341-004 | 159340-004 | 159341-002 | 159313-009 | 159313-008 | 159313-011 | 159313-007 |
| | | SAMPLE PURPOSE: | N | N | N | N | N | N | N | N | N | N | N |
| **Analysis** | ***Units*** | ***Comparison Value (1)*** | | | | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | -- | -- | -- | -- | -- | -- | -- | 1.1 U | 1.2 U | -- | 1.2 U |
| **TPH (SW8015)** | | | | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* (3) | 1.2 U | -- | 1.1 U | 1.1 U | 2.7 | -- | -- | 29 | 19 | -- | 32 |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* (3) | 5.8 U | -- | 5.6 U | 5.5 U | 5.6 U | -- | -- | 140 | 35 | -- | 46 |
| Gasoline C7-C12 | MG/KG | *100 to 400* (3) | -- | -- | -- | -- | -- | -- | -- | 0.3 U | 0.26 U | 0.22 U | 0.22 U |
| **Metals (SW6010/7471)** | | | | | | | | | | | | | |
| Antimony | MG/KG | *31* | -- | -- | -- | -- | -- | -- | -- | 3.3 UJ | 2.7 UJ | -- | 3.0 UJ |
| Arsenic | MG/KG | *2.7* | -- | -- | -- | -- | -- | -- | -- | 5.1 | 7.3 | -- | 9.6 |
| Barium | MG/KG | *5,400* | -- | -- | -- | -- | -- | -- | -- | 540 | 160 | -- | 150 |
| Beryllium | MG/KG | *150* | -- | -- | -- | -- | -- | -- | -- | 0.5 | 0.28 | -- | 0.36 |
| Cadmium | MG/KG | *9* (2) | -- | -- | -- | -- | -- | -- | -- | 1.5 | 1.6 | -- | 1.9 |
| Chromium | MG/KG | *210* | -- | -- | -- | -- | -- | -- | -- | 24 | 33 | -- | 37 |
| Cobalt | MG/KG | *4,700* | -- | -- | -- | -- | -- | -- | -- | 9.6 | 12 | -- | 16 |
| Copper | MG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | 28 | 22 | -- | 23 |
| Lead | MG/KG | *400* | -- | -- | -- | -- | -- | -- | -- | 460 | 58 | -- | 42 |
| Mercury | MG/KG | *23* | -- | -- | -- | -- | -- | -- | -- | 0.38 | 0.17 | -- | 0.24 |
| Molybdenum | MG/KG | *390* | -- | -- | -- | -- | -- | -- | -- | 1.1 U | 0.90 U | -- | 1.1 U |
| Nickel | MG/KG | *150* (2) | -- | -- | -- | -- | -- | -- | -- | 53 | 59 | -- | 64 |
| Selenium | MG/KG | *390* | -- | -- | -- | -- | -- | -- | -- | 0.28 U | 0.74 | -- | 0.6 |
| Silver | MG/KG | *390* | -- | -- | -- | -- | -- | -- | -- | 0.28 U | 0.22 U | -- | 0.25 U |
| Thallium | MG/KG | *5.2* | -- | -- | -- | -- | -- | -- | -- | 0.73 U | 0.7 U | -- | 0.82 U |
| Vanadium | MG/KG | *550* | -- | -- | -- | -- | -- | -- | -- | 36 | 27 | -- | 32 |
| Zinc | MG/KG | *23,000* | -- | -- | -- | -- | -- | -- | -- | 270 | 90 | -- | 80 |
| **Pesticides (SW8081A)** | | | | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | -- | -- | -- | -- | -- | -- | -- | 38 U | 39 U | -- | 40 U |
| 4,4'-DDE | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | 6.9 J | 39 U | -- | 40 U |
| 4,4'-DDT | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | 38 U | 39 U | -- | 40 U |
| Aldrin | UG/KG | *29* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| alpha-BHC | UG/KG | *90* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| alpha-Chlordane | UG/KG | *1,600* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| beta-BHC | UG/KG | *320* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| delta-BHC | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| Dieldrin | UG/KG | *30* | -- | -- | -- | -- | -- | -- | -- | 38 U | 39 U | -- | 40 U |
| Endosulfan I | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| Endosulfan II | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | 38 U | 39 U | -- | 40 U |
| Endosulfan sulfate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 38 U | 39 U | -- | 40 U |
| Endrin | UG/KG | *18,000* | -- | -- | -- | -- | -- | -- | -- | 38 U | 39 U | -- | 40 U |
| Endrin aldehyde | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 38 U | 39 U | -- | 40 U |
| gamma-BHC | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| gamma-Chlordane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| Heptachlor | UG/KG | *110* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| Heptachlor epoxide A | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| Heptachlor epoxide B | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | 19 U | 20 U | -- | 21 U |
| Methoxychlor | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | 190 U | 200 U | -- | 210 U |
| Toxaphene | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | 680 U | 710 U | -- | 730 U |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | Ayala Cove | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Building 332 UST | Building 332 UST | Building 332 UST | Boat Ramp AST | Boat Ramp AST | Boat Ramp AST | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site |
| | | **FIELD SAMPLE ID:** | B-332#1@15' | B-332#1@15' | B-332#2@15' | AC1001 | AC1001D | AC1003 | AC1003 | AC1008 | AC1009 | AC1009 | AC1010 |
| | | **LOCATION ID:** | B-332#1@15' | B-332#1@15' | B-332#2@15' | B-AC-BRAST-1 | B-AC-BRAST-1 | B-AC-BRAST-2 | B-AC-BRAST-2 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 |
| | | **LABORATORY SAMPLE ID:** | 159234-002 | 159234-003 | 159234-001 | 159341-001 | 159341-004 | 159340-004 | 159341-002 | 159313-009 | 159313-008 | 159313-011 | 159313-007 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | -- | -- | -- | -- | -- | -- | -- | 14 U | 14 U | -- | 15 U |
| Aroclor-1221 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | 27 U | 28 U | -- | 29 U |
| Aroclor-1232 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | 14 U | 14 U | -- | 15 U |
| Aroclor-1242 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | 14 U | 14 U | -- | 15 U |
| Aroclor-1248 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | 14 U | 14 U | -- | 15 U |
| Aroclor-1254 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | 14 U | 14 U | -- | 15 U |
| Aroclor-1260 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | 14 U | 14 U | -- | 15 U |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,1,2-Trichloroethane | UG/KG | *840* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,1-Dichloroethene | UG/KG | *54* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,1-Dichloropropene | UG/KG | *NE* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,2-Dibromoethane | UG/KG | *52,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,2-Dichloroethane | UG/KG | *350* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,2-Dichloropropane | UG/KG | *350* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,3-Dichloropropane | UG/KG | *700* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 2,2-Dichloropropane | UG/KG | *NE* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 2-Butanone | UG/KG | *7,300,000* | -- | 8.9 U | -- | -- | -- | 7.7 U | 16 U | 27 U | 9.9 U | -- | 10 U |
| 2-Chlorotoluene | UG/KG | *160,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 2-Hexanone | UG/KG | *NE* | -- | 8.9 U | -- | -- | -- | 7.7 U | 16 U | 27 U | 9.9 U | -- | 10 U |
| 4-Chlorotoluene | UG/KG | *NE* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | -- | 8.9 U | -- | -- | -- | 7.7 U | 16 U | 27 U | 9.9 U | -- | 10 U |
| Acetone | UG/KG | *3,400* | -- | 18 U | -- | -- | -- | 15 U | 31 U | 54 U | 20 U | -- | 21 U |
| Benzene | UG/KG | *650* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Bromobenzene | UG/KG | *28,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Bromochloromethane | UG/KG | *NE* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Bromodichloromethane | UG/KG | *1,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Bromoform | UG/KG | *62,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Bromomethane | UG/KG | *62,000* | -- | 8.9 U | -- | -- | -- | 7.7 U | 16 U | 27 U | 9.9 U | -- | 10 U |
| Carbon Disulfide | UG/KG | *360,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Carbon Tetrachloride | UG/KG | *240* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Chlorobenzene | UG/KG | *150,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Chloroethane | UG/KG | *3,000* | -- | 8.9 U | -- | -- | -- | 7.7 U | 16 U | 27 U | 9.9 U | -- | 10 U |
| Chloroform | UG/KG | *240* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Chloromethane | UG/KG | *1,200* | -- | 8.9 U | -- | -- | -- | 7.7 U | 16 U | 27 U | 9.9 U | -- | 10 U |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | Ayala Cove | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Building 332 UST | Building 332 UST | Building 332 UST | Boat Ramp AST | Boat Ramp AST | Boat Ramp AST | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site |
| | | FIELD SAMPLE ID: | B-332#1@15' | B-332#1@15' | B-332#2@15' | AC1001 | AC1001D | AC1003 | AC1003 | AC1008 | AC1009 | AC1009 | AC1010 |
| | | LOCATION ID: | B-332#1@15' | B-332#1@15' | B-332#2@15' | B-AC-BRAST-1 | B-AC-BRAST-1 | B-AC-BRAST-2 | B-AC-BRAST-2 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 |
| | | LABORATORY SAMPLE ID: | 159234-002 | 159234-003 | 159234-001 | 159341-001 | 159341-004 | 159340-004 | 159341-002 | 159313-009 | 159313-008 | 159313-011 | 159313-007 |
| | | SAMPLE PURPOSE: | N | N | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Dibromochloromethane | UG/KG | *1,100* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Dibromomethane | UG/KG | *67,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Ethylbenzene | UG/KG | *230,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Freon 113 | UG/KG | *5,600,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Freon 12 | UG/KG | *94,000* | -- | 8.9 U | -- | -- | -- | 7.7 U | 16 U | 27 U | 9.9 U | -- | 10 U |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Isopropylbenzene | UG/KG | *160,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| m,p-Xylenes | UG/KG | *210,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Methylene Chloride | UG/KG | *8,900* | -- | 18 U | -- | -- | -- | 15 U | 31 U | 54 U | 20 U | -- | 21 U |
| MTBE | UG/KG | *17,000* (2) | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Naphthalene | UG/KG | *56,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| n-Butylbenzene | UG/KG | *140,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| o-Xylene | UG/KG | *210,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| para-Isopropyl Toluene | UG/KG | *NE* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Propylbenzene | UG/KG | *NE* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| sec-Butylbenzene | UG/KG | *110,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Styrene | UG/KG | *1,700,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| tert-Butylbenzene | UG/KG | *130,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Tetrachloroethene | UG/KG | *5,700* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Toluene | UG/KG | *520,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| trans-1,3-Dichloropropene | UG/KG | *700* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Trichloroethene | UG/KG | *2,800* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Trichlorofluoromethane | UG/KG | *390,000* | -- | 4.5 U | -- | -- | -- | 3.8 U | 7.8 U | 14 U | 5 U | -- | 5.2 U |
| Vinyl Acetate | UG/KG | *430,000* | -- | 45 U | -- | -- | -- | 38 U | 78 U | 140 U | 50 U | -- | 52 U |
| Vinyl Chloride | UG/KG | *150* | -- | 8.9 U | -- | -- | -- | 7.7 U | 16 U | 27 U | 9.9 U | -- | 10 U |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 2,4-Dichlorophenol | UG/KG | *180,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 2,4-Dinitrophenol | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | 1900 U | 2000 U | -- | 2000 U |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 2-Chlorophenol | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 2-Methylnaphthalene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 27 J | 17 J | -- | 110 J |
| 2-Methylphenol | UG/KG | *3,100,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 2-Nitroaniline | UG/KG | *3,500* | -- | -- | -- | -- | -- | -- | -- | 760 U | 790 U | -- | 800 U |
| 2-Nitrophenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 760 U | 790 U | -- | 800 U |
| 3,3'-Dichlorobenzidine | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | 760 U | 790 U | -- | 800 U |
| 3-Nitroaniline | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | 760 U | 790 U | -- | 800 U |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 1900 U | 2000 U | -- | 2000 U |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | | | | Ayala Cove | | | |
| | | **SITE NAME:** | Building 332 UST | Building 332 UST | Building 332 UST | Boat Ramp AST | Boat Ramp AST | Boat Ramp AST | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site |
| | | **FIELD SAMPLE ID:** | B-332#1@15' | B-332#1@15' | B-332#2@15' | AC1001 | AC1001D | AC1003 | AC1003 | AC1008 | AC1009 | AC1009 | AC1010 |
| | | **LOCATION ID:** | B-332#1@15' | B-332#1@15' | B-332#2@15' | B-AC-BRAST-1 | B-AC-BRAST-1 | B-AC-BRAST-2 | B-AC-BRAST-2 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 | T-AC-BR-1 |
| | | **LABORATORY SAMPLE ID:** | 159234-002 | 159234-003 | 159234-001 | 159341-001 | 159341-004 | 159340-004 | 159341-002 | 159313-009 | 159313-008 | 159313-011 | 159313-007 |
| | | **SAMPLE PURPOSE:** | N | N | N | N | N | N | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 380 *U* | 400 U | -- | 400 U |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 4-Chloroaniline | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 4-Methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| 4-Nitroaniline | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | 760 *U* | 790 U | -- | 800 U |
| 4-Nitrophenol | UG/KG | *490,000* | -- | -- | -- | -- | -- | -- | -- | 760 U | 790 U | -- | 800 U |
| Acenaphthene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Acenaphthylene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Anthracene | UG/KG | *22,000,000* | -- | -- | -- | -- | -- | -- | -- | 23 J | 32 J | -- | 400 U |
| Azobenzene | UG/KG | *4,400* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Benzo(a)anthracene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | 54 J | 65 J | -- | 41 J |
| Benzo(a)pyrene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | 82 J | 74 J | -- | 48 J |
| Benzo(b)fluoranthene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | 170 J | 47 J | -- | 66 J |
| Benzo(g,h,i)perylene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 70 J | 67 J | -- | 68 J |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | -- | -- | -- | -- | -- | -- | -- | 78 J | 61 J | -- | 21 J |
| Benzoic acid | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | 1900 U | 2000 U | -- | 2000 U |
| Benzyl alcohol | UG/KG | *18,000,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| bis(2-Chloroethyl)ether | UG/KG | *210* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Butylbenzylphthalate | UG/KG | *12,000,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Chrysene | UG/KG | *6,100* (2) | -- | -- | -- | -- | -- | -- | -- | 120 J | 83 J | -- | 75 J |
| Dibenz(a,h)anthracene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | 380 U | 29 J | -- | 400 U |
| Dibenzofuran | UG/KG | *290,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Diethylphthalate | UG/KG | *49,000,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Dimethylphthalate | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Di-n-butylphthalate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Di-n-octylphthalate | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Fluoranthene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | 120 J | 130 J | -- | 56 J |
| Fluorene | UG/KG | *2,600,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 25 J |
| Hexachlorobenzene | UG/KG | *300* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | -- | -- | -- | -- | -- | -- | -- | 1900 U | 2000 U | -- | 2000 U |
| Hexachloroethane | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | 70 J | 55 J | -- | 52 J |
| Isophorone | UG/KG | *510,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 45 J |
| Nitrobenzene | UG/KG | *20,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 *U* |
| N-Nitrosodimethylamine | UG/KG | *9.5* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 *U* | -- | 400 U |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Pentachlorophenol | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | 760 U | 790 U | -- | 800 U |
| Phenanthrene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | 65 J | 100 J | -- | 150 J |
| Phenol | UG/KG | *37,000,000* | -- | -- | -- | -- | -- | -- | -- | 380 U | 400 U | -- | 400 U |
| Pyrene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | 120 J | 160 *J* | -- | *88 J* |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | Ayala Cove | | | | | | West Garrison | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Former Disinfection Bldg | Former Disinfection Bldg | Former Disinfection Bldg | West Garrison Dump Site | West Garrison Dump Site | West Garrison Dump Site | Paint Shop | Paint Shop |
| | | FIELD SAMPLE ID: | AC1011 | AC1012 | AC1013 | AC1015 | AC1016 | AC1017 | WG1004 | WG1005 | WG1006 | WG1016 | WG1017 |
| | | LOCATION ID: | T-AC-BR-2 | T-AC-BR-2 | T-AC-BR-2 | B-AC-FDB-1 | B-AC-FDB-2 | B-AC-FDB-2 | T-WG-DS-5 | T-WG-DS-5 | T-WG-DS-5 | H-WG-PS-W | H-WG-PS-N |
| | | LABORATORY SAMPLE ID: | 159313-006 | 159313-005 | 159313-003 | 159341-003 | 159340-002 | 159340-001 | 159265-001 | 159265-002 | 159265-003 | 159363-001 | 159363-002 |
| | | SAMPLE PURPOSE: | N | N | FD-AC1012 | N | N | FD-AC1016 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison Value (1)** | | | | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | 1.2 U | 1.3 U | 1.1 U | 1.1 U | -- | -- | 1.2 U | 1.2 U | 1.2 U | -- | -- |
| **TPH (SW8015)** | | | | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* (3) | 3800 | 2700 | 2700 | -- | -- | -- | 1.2 U | 1.2 U | 1.2 U | -- | -- |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* (3) | 93 | 81 | 76 | -- | -- | -- | 5.8 U | 5.9 U | 6.1 U | -- | -- |
| Gasoline C7-C12 | MG/KG | *100 to 400* (3) | 97 | 24 | 94 | -- | -- | -- | 0.3 U | 0.4 U | 0.54 U | -- | -- |
| **Metals (SW6010/7471)** | | | | | | | | | | | | | |
| Antimony | MG/KG | *31* | 4 UJ | 3.2 UJ | 3.2 UJ | -- | -- | -- | 3.4 U | 3.3 U | 3.5 U | 3.1 UJ | 3.0 UJ |
| Arsenic | MG/KG | *2.7* | 6 | 6.2 | 7.6 | -- | -- | -- | 2.3 | 2.4 | 2.4 | 2.1 | 1.3 |
| Barium | MG/KG | *5,400* | 220 | 93 | 130 | -- | -- | -- | 130 | 110 | 120 | 77 | 100 |
| Beryllium | MG/KG | *150* | 0.57 | 0.48 | 0.36 | -- | -- | -- | 0.46 | 0.41 | 0.44 | 0.2 | 0.22 |
| Cadmium | MG/KG | *9* (2) | 2.3 | 2 | 1.9 | -- | -- | -- | 1.5 | 1.5 | 1.4 | 1.6 | 1.3 |
| Chromium | MG/KG | *210* | 180 | 73 | 51 | -- | -- | -- | 120 | 190 | 94 | 200 J | 89 J |
| Cobalt | MG/KG | *4,700* | 23 | 18 | 15 | -- | -- | -- | 19 | 28 | 12 | 27 | 21 |
| Copper | MG/KG | *2,900* | 24 | 19 | 19 | -- | -- | -- | 23 | 25 | 20 | 19 | 19 |
| Lead | MG/KG | *400* | 7.3 | 24 | 18 | -- | -- | -- | 5.1 | 7.8 | 3.8 | 110 J | 46 J |
| Mercury | MG/KG | *23* | 0.18 | 0.15 | 0.11 | -- | -- | -- | 0.058 U | 0.038 U | 0.064 | 0.28 | 0.1 |
| Molybdenum | MG/KG | *390* | 1.0 U | 1.1 U | 1.4 U | -- | -- | -- | 1.1 U | 1.1 U | 1.2 U | 0.88 U | 1 U |
| Nickel | MG/KG | *150* (2) | 270 | 110 | 100 | -- | -- | -- | *160* | *260* | *120* | *380* | *180* |
| Selenium | MG/KG | *390* | 0.45 | 0.81 | 0.88 | -- | -- | -- | 0.36 | 0.73 | 0.27 J | 1.1 | 1.1 |
| Silver | MG/KG | *390* | 0.25 U | 0.27 U | 0.26 U | -- | -- | -- | 0.28 U | 0.27 U | 0.29 U | 0.22 U | 0.25 U |
| Thallium | MG/KG | *5.2* | 0.25 U | 1.1 U | 1.1 U | -- | -- | -- | 1 | 1.4 | 0.63 | 0.93 | 0.72 |
| Vanadium | MG/KG | *550* | 48 | 39 | 27 | -- | -- | -- | 45 | 50 | 44 | 42 | 40 |
| Zinc | MG/KG | *23,000* | 57 | 67 | 59 | -- | -- | -- | 43 | 45 | 48 | 66 | 56 |
| **Pesticides (SW8081A)** | | | | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | 3.8 U | 42 U | -- | 3.8 U | 3.6 U | 3.6 U | -- | -- | -- | -- | -- |
| 4,4'-DDE | UG/KG | *1,700* | 3.8 U | 42 U | -- | 3.8 U | 3.6 U | 3.6 U | -- | -- | -- | -- | -- |
| 4,4'-DDT | UG/KG | *1,700* | 3.8 U | 42 U | -- | 3.8 U | 3.6 U | 3.6 U | -- | -- | -- | -- | -- |
| Aldrin | UG/KG | *29* | 2 U | 21 U | -- | 2 U | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| alpha-BHC | UG/KG | *90* | 1.5 J | 21 U | -- | 2 U | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| alpha-Chlordane | UG/KG | *1,600* | 2 U | 21 U | -- | 1.6 J | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| beta-BHC | UG/KG | *320* | 3.8 J | 21 U | -- | 2 U | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| delta-BHC | UG/KG | *NE* | 0.85 J | 21 U | -- | 2 U | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| Dieldrin | UG/KG | *30* | 3.8 U | 42 U | -- | 0.99 J | 3.6 U | 3.6 U | -- | -- | -- | -- | -- |
| Endosulfan I | UG/KG | *370,000* | 2 U | 21 U | -- | 2 U | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| Endosulfan II | UG/KG | *370,000* | 3.8 U | 42 U | -- | 3.8 U | 3.6 U | 3.6 U | -- | -- | -- | -- | -- |
| Endosulfan sulfate | UG/KG | *NE* | 3.8 U | 42 U | -- | 3.8 U | 3.6 U | 3.6 U | -- | -- | -- | -- | -- |
| Endrin | UG/KG | *18,000* | 3.8 U | 42 U | -- | 3.8 U | 3.6 U | 3.6 U | -- | -- | -- | -- | -- |
| Endrin aldehyde | UG/KG | *NE* | 3.8 U | 42 U | -- | 3.8 U | 3.6 U | 3.6 U | -- | -- | -- | -- | -- |
| gamma-BHC | UG/KG | *440* | 2 U | 21 U | -- | 2 U | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| gamma-Chlordane | UG/KG | *NE* | 2 U | 21 U | -- | 2.1 | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| Heptachlor | UG/KG | *110* | 1.5 J | 21 U | -- | 2 U | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| Heptachlor epoxide A | UG/KG | *53* | 2 U | 21 U | -- | 2 U | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| Heptachlor epoxide B | UG/KG | *53* | 2 U | 21 U | -- | 2 U | 1.8 U | 1.9 U | -- | -- | -- | -- | -- |
| Methoxychlor | UG/KG | *310,000* | 20 U | 210 U | -- | 20 U | 18 U | 19 U | -- | -- | -- | -- | -- |
| Toxaphene | UG/KG | *440* | 70 U | 760 U | -- | 70 U | 65 U | 65 U | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | Ayala Cove | | | | | | West Garrison | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Former Disinfection Bldg | Former Disinfection Bldg | Former Disinfection Bldg | West Garrison Dump Site | West Garrison Dump Site | West Garrison Dump Site | Paint Shop | Paint Shop |
| | | FIELD SAMPLE ID: | AC1011 | AC1012 | AC1013 | AC1015 | AC1016 | AC1017 | WG1004 | WG1005 | WG1006 | WG1016 | WG1017 |
| | | LOCATION ID: | T-AC-BR-2 | T-AC-BR-2 | T-AC-BR-2 | B-AC-FDB-1 | B-AC-FDB-2 | B-AC-FDB-2 | T-WG-DS-5 | T-WG-DS-5 | T-WG-DS-5 | H-WG-PS-W | H-WG-PS-N |
| | | LABORATORY SAMPLE ID: | 159313-006 | 159313-005 | 159313-003 | 159341-003 | 159340-002 | 159340-001 | 159265-001 | 159265-002 | 159265-003 | 159363-001 | 159363-002 |
| | | SAMPLE PURPOSE: | N | N | FD-AC1012 | N | N | FD-AC1016 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | 14 U | 15 U | 13 U | -- | 13 U | 13 U | 14 U | 14 U | 15 U | -- | -- |
| Aroclor-1221 | UG/KG | *220* | 28 U | 30 U | 27 U | -- | 27 U | 26 U | 28 U | 28 U | 29 U | -- | -- |
| Aroclor-1232 | UG/KG | *220* | 14 U | 15 U | 13 U | -- | 13 U | 13 U | 14 U | 14 U | 15 U | -- | -- |
| Aroclor-1242 | UG/KG | *220* | 14 U | 15 U | 13 U | -- | 13 U | 13 U | 14 U | 14 U | 15 U | -- | -- |
| Aroclor-1248 | UG/KG | *220* | 14 U | 15 U | 13 U | -- | 13 U | 13 U | 14 U | 14 U | 15 U | -- | -- |
| Aroclor-1254 | UG/KG | *220* | 14 U | 15 U | 13 U | -- | 13 U | 13 U | 14 U | 14 U | 15 U | -- | -- |
| Aroclor-1260 | UG/KG | *220* | 14 U | 15 U | 13 U | -- | 13 U | 13 U | 14 U | 14 U | 15 U | -- | -- |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,1,2-Trichloroethane | UG/KG | *840* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,1-Dichloroethene | UG/KG | *54* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,1-Dichloropropene | UG/KG | *NE* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,2-Dibromoethane | UG/KG | *52,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,2-Dichloroethane | UG/KG | *350* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,2-Dichloropropane | UG/KG | *350* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,3-Dichloropropane | UG/KG | *700* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 2,2-Dichloropropane | UG/KG | *NE* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 2-Butanone | UG/KG | *7,300,000* | 9.2 U | 10 U | 2.3 J | -- | -- | -- | 20 U | 25 U | 13 U | -- | -- |
| 2-Chlorotoluene | UG/KG | *160,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 2-Hexanone | UG/KG | *NE* | 9.2 U | 10 U | 10 U | -- | -- | -- | 20 U | 25 U | 13 U | -- | -- |
| 4-Chlorotoluene | UG/KG | *NE* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | 9.2 U | 10 U | 10 U | -- | -- | -- | 20 U | 25 U | 13 U | -- | -- |
| Acetone | UG/KG | *3,400* | 18 U | 21 U | 20 U | -- | -- | -- | 41 U | 51 U | 26 U | -- | -- |
| Benzene | UG/KG | *650* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Bromobenzene | UG/KG | *28,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Bromochloromethane | UG/KG | *NE* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Bromodichloromethane | UG/KG | *1,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Bromoform | UG/KG | *62,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Bromomethane | UG/KG | *62,000* | 9.2 U | 10 U | 10 U | -- | -- | -- | 20 U | 25 U | 13 U | -- | -- |
| Carbon Disulfide | UG/KG | *360,000* | 4.6 U | 5.2 U | 0.61 J | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Carbon Tetrachloride | UG/KG | *240* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Chlorobenzene | UG/KG | *150,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Chloroethane | UG/KG | *3,000* | 9.2 U | 10 U | 10 U | -- | -- | -- | 20 U | 25 U | 13 U | -- | -- |
| Chloroform | UG/KG | *240* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Chloromethane | UG/KG | *1,200* | 9.2 U | 10 U | 10 U | -- | -- | -- | 20 U | 25 U | 13 U | -- | -- |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | Ayala Cove | | | | | | West Garrison | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | SITE NAME: | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Former Disinfection Bldg | Former Disinfection Bldg | Former Disinfection Bldg | West Garrison Dump Site | West Garrison Dump Site | West Garrison Dump Site | Paint Shop | Paint Shop |
| | | FIELD SAMPLE ID: | AC1011 | AC1012 | AC1013 | AC1015 | AC1016 | AC1017 | WG1004 | WG1005 | WG1006 | WG1016 | WG1017 |
| | | LOCATION ID: | T-AC-BR-2 | T-AC-BR-2 | T-AC-BR-2 | B-AC-FDB-1 | B-AC-FDB-2 | B-AC-FDB-2 | T-WG-DS-5 | T-WG-DS-5 | T-WG-DS-5 | H-WG-PS-W | H-WG-PS-N |
| | | LABORATORY SAMPLE ID: | 159313-006 | 159313-005 | 159313-003 | 159341-003 | 159340-002 | 159340-001 | 159265-001 | 159265-002 | 159265-003 | 159363-001 | 159363-002 |
| | | SAMPLE PURPOSE: | N | N | FD-AC1012 | N | N | FD-AC1016 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| *Dibromochloromethane* | UG/KG | *1,100* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Dibromomethane | UG/KG | *67,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Ethylbenzene | UG/KG | *230,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Freon 113 | UG/KG | *5,600,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Freon 12 | UG/KG | *94,000* | 9.2 U | 10 U | 10 U | -- | -- | -- | 20 U | 25 U | 13 U | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Isopropylbenzene | UG/KG | *160,000* | 4.6 U | 5.2 U | 2.4 J | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| m,p-Xylenes | UG/KG | *210,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Methylene Chloride | UG/KG | *8,900* | 18 U | 21 U | 20 U | -- | -- | -- | 41 U | 51 U | 26 U | -- | -- |
| MTBE | UG/KG | *17,000* (2) | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Naphthalene | UG/KG | *56,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| *n-Butylbenzene* | UG/KG | *140,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| o-Xylene | UG/KG | *210,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| para-Isopropyl Toluene | UG/KG | *NE* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Propylbenzene | UG/KG | *NE* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| sec-Butylbenzene | UG/KG | *110,000* | 2.1 J | 1.3 J | 34 | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Styrene | UG/KG | *1,700,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| tert-Butylbenzene | UG/KG | *130,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Tetrachloroethene | UG/KG | *5,700* | 4.6 U | 5.2 J | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Toluene | UG/KG | *520,000* | 4.6 U | 0.75 | 5.1 U | -- | -- | -- | 10 U | 13 U | 5.2 J | -- | -- |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| trans-1,3-Dichloropropene | UG/KG | *700* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| *Trichloroethene* | UG/KG | *2,800* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Trichlorofluoromethane | UG/KG | *390,000* | 4.6 U | 5.2 U | 5.1 U | -- | -- | -- | 10 U | 13 U | 6.4 U | -- | -- |
| Vinyl Acetate | UG/KG | *430,000* | 46 U | 52 U | 51 U | -- | -- | -- | 100 U | 130 U | 64 U | -- | -- |
| Vinyl Chloride | UG/KG | *150* | 9.2 U | 10 U | 10 U | -- | -- | -- | 20 U | 25 U | 13 U | -- | -- |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2,4-Dichlorophenol | UG/KG | *180,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2,4-Dinitrophenol | UG/KG | *120,000* | 20000 U | 11000 U | 1800 U | -- | -- | -- | 2000 U | 2000 U | 2000 U | -- | -- |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2-Chlorophenol | UG/KG | *63,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2-Methylnaphthalene | UG/KG | *NE* | 360 J | 2100 U | 94 J | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2-Methylphenol | UG/KG | *3,100,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 2-Nitroaniline | UG/KG | *3,500* | 8000 U | 4300 U | 740 U | -- | -- | -- | 790 U | 780 U | 810 U | -- | -- |
| 2-Nitrophenol | UG/KG | *NE* | 8000 U | 4300 U | 740 U | -- | -- | -- | 790 U | 780 U | 810 U | -- | -- |
| *3,3'-Dichlorobenzidine* | UG/KG | *1,100* | 8000 U | 4300 U | 740 U | -- | -- | -- | 790 U | 780 U | 810 U | -- | -- |
| 3-Nitroaniline | UG/KG | *120,000* | 8000 U | 4300 U | 740 U | -- | -- | -- | 790 U | 780 U | 810 U | -- | -- |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | 20000 U | 11000 U | 1800 U | -- | -- | -- | 2000 U | 2000 U | 2000 U | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | Ayala Cove | | | | | | West Garrison | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Ayala Cove Boat Ramp Dump Site | Former Disinfection Bldg | Former Disinfection Bldg | Former Disinfection Bldg | West Garrison Dump Site | West Garrison Dump Site | West Garrison Dump Site | Paint Shop | Paint Shop |
| | | **FIELD SAMPLE ID:** | AC1011 | AC1012 | AC1013 | AC1015 | AC1016 | AC1017 | WG1004 | WG1005 | WG1006 | WG1016 | WG1017 |
| | | **LOCATION ID:** | T-AC-BR-2 | T-AC-BR-2 | T-AC-BR-2 | B-AC-FDB-1 | B-AC-FDB-2 | B-AC-FDB-2 | T-WG-DS-5 | T-WG-DS-5 | T-WG-DS-5 | H-WG-PS-W | H-WG-PS-N |
| | | **LABORATORY SAMPLE ID:** | 159313-006 | 159313-005 | 159313-003 | 159341-003 | 159340-002 | 159340-001 | 159265-001 | 159265-002 | 159265-003 | 159363-001 | 159363-002 |
| | | **SAMPLE PURPOSE:** | N | N | FD-AC1012 | N | N | FD-AC1016 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 4-Chloroaniline | UG/KG | *NE* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 4-Methylphenol | UG/KG | *NE* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| 4-Nitroaniline | UG/KG | *310,000* | 8000 U | 4300 U | 740 U | -- | -- | -- | 790 U | 780 U | 810 U | -- | -- |
| 4-Nitrophenol | UG/KG | *490,000* | 8000 U | 4300 U | 740 U | -- | -- | -- | 790 U | 780 U | 810 U | -- | -- |
| Acenaphthene | UG/KG | *3,700,000* | 360 J | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Acenaphthylene | UG/KG | *3,700,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Anthracene | UG/KG | *22,000,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Azobenzene | UG/KG | *4,400* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Benzo(a)anthracene | UG/KG | *620* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Benzo(a)pyrene | UG/KG | *62* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Benzo(b)fluoranthene | UG/KG | *620* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Benzo(g,h,i)perylene | UG/KG | *NE* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Benzoic acid | UG/KG | *100,000,000* | 20000 U | 11000 U | 1800 U | -- | -- | -- | 2000 U | 2000 U | 2000 U | -- | -- |
| Benzyl alcohol | UG/KG | *18,000,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| bis(2-Chloroethyl)ether | UG/KG | *210* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Butylbenzylphthalate | UG/KG | *12,000,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Chrysene | UG/KG | *6,100* (2) | 4000 U | 2100 U | 27 J | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Dibenz(a,h)anthracene | UG/KG | *62* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Dibenzofuran | UG/KG | *290,000* | 350 J | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Diethylphthalate | UG/KG | *49,000,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Dimethylphthalate | UG/KG | *100,000,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Di-n-butylphthalate | UG/KG | *NE* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Di-n-octylphthalate | UG/KG | *1,200,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Fluoranthene | UG/KG | *2,300,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Fluorene | UG/KG | *2,600,000* | 1900 J | 2100 U | 180 J | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Hexachlorobenzene | UG/KG | *300* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | 20000 U | 11000 U | 1800 U | -- | -- | -- | 2000 U | 2000 U | 2000 U | -- | -- |
| Hexachloroethane | UG/KG | *35,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Isophorone | UG/KG | *510,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Naphthalene | UG/KG | *56,000* | 4000 U | 2100 U | 62 J | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Nitrobenzene | UG/KG | *20,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| N-Nitrosodimethylamine | UG/KG | *9.5* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Pentachlorophenol | UG/KG | *3,000* | 8000 U | 4300 U | 740 U | -- | -- | -- | 790 U | 780 U | 810 U | -- | -- |
| Phenanthrene | UG/KG | *NE* | 3800 J | 220 J | 320 J | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Phenol | UG/KG | *37,000,000* | 4000 U | 2100 U | 370 U | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |
| Pyrene | UG/KG | *2,300,000* | 4000 U | 140 J | 69 J | -- | -- | -- | 390 U | 390 U | 400 U | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | West Garrison | | | Ambient Metals | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **SITE NAME:** | | Paint Shop | Paint Shop | Paint Shop | E_Garrison Perimeter Rd | E_Garrison Perimeter Rd | E_Garrison Perimeter Rd | Perimeter Road Ambient Metals | Perimeter Road Ambient Metals |
| | **FIELD SAMPLE ID:** | | WG1018 | WG1019 | WG1020 | EG1022 | EG1023 | EG1024 | WG1001 | WG1002 |
| | **LOCATION ID:** | | H-WG-PS-E | H-WH-PS-S | H-WG-PS-N | H-EGPR-1 | H-EGPR-1 | H-EGPR-1 | H-WG-PR-1 | H-WG-PR-2 |
| | **LABORATORY SAMPLE ID:** | | 159363-003 | 159363-004 | 159363-005 | 159363-030 | 159363-031 | 159363-015 | 159363-016 | 159363-017 |
| | **SAMPLE PURPOSE:** | | N | N | FD-WG1017 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison Value (1)** | | | | | | | | |
| **Wet Chemistry** | | | | | | | | | | |
| Cyanide (E335.2) | MG/KG | *11* | -- | -- | -- | -- | -- | -- | -- | -- |
| **TPH (SW8015)** | | | | | | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | *100 to 500* (3) | -- | -- | -- | -- | -- | -- | -- | -- |
| Motor Oil C24-C36(SGCU) | MG/KG | *500 to 1000* (3) | -- | -- | -- | -- | -- | -- | -- | -- |
| Gasoline C7-C12 | MG/KG | *100 to 400* (3) | -- | -- | -- | -- | -- | -- | -- | -- |
| **Metals (SW6010/7471)** | | | | | | | | | | |
| Antimony | MG/KG | *31* | 2.9 UJ | 3.5 UJ | 3.0 UJ | 3.0 UJ | 3.3 UJ | 3.9 UJ | 3 UJ | 3.7 UJ |
| Arsenic | MG/KG | *2.7* | 2.2 | 1.7 | 1.7 | 1.6 | 1.7 | 1.3 | 3.7 | 4.4 |
| Barium | MG/KG | *5,400* | 120 | 150 | 130 | 110 | 96 | 120 | 120 | 130 |
| Beryllium | MG/KG | *150* | 0.26 | 0.2 J | 0.31 J | 0.37 | 0.38 | 0.36 | 0.31 | 0.35 |
| Cadmium | MG/KG | *9* (2) | 1.7 | 2 | 1.9 | 2.1 | 1.9 | 2.1 | 2.2 | 2.4 |
| Chromium | MG/KG | *210* | 120 J | 110 J | 100 J | 60 J | 100 J | 45 J | 110 J | 120 J |
| Cobalt | MG/KG | *4,700* | 23 | 23 | 24 | 25 | 25 | 26 | 28 | 30 |
| Copper | MG/KG | *2,900* | 32 | 29 | 25 | 26 | 22 | 25 | 39 | *44* |
| Lead | MG/KG | *400* | 97 | 1900 J | 70 J | 18 J | 24 J | 19 J | 40 J | 42 J |
| Mercury | MG/KG | *23* | 0.17 | 0.2 J | 0.099 J | 0.07 | 0.091 | 0.072 | 0.19 | 0.19 |
| Molybdenum | MG/KG | *390* | 0.97 U | 1 U | 1 U | 0.36 J | 0.39 J | 0.74 J | 0.86 U | 1 U |
| Nickel | MG/KG | *150* (2) | 220 | 190 | 190 | 97 | 180 | 73 | 170 | 180 |
| Selenium | MG/KG | *390* | 1.3 | 1.4 | 1.3 | 0.97 U | 1.3 | 1.5 | 1.7 | 1.7 |
| Silver | MG/KG | *390* | 0.24 U | 0.13 J | 0.25 U | 0.17 J | 0.25 U | 0.15 J | 0.075 J | 0.16 J |
| Thallium | MG/KG | *5.2* | 0.98 | 0.85 J | 0.57 J | 2.1 | 2.3 | 2.4 | 1.9 | 1.4 |
| Vanadium | MG/KG | *550* | 48 | 53 | 61 | 87 | 81 | 87 | 70 | 78 |
| Zinc | MG/KG | *23,000* | 99 | 280 J | 76 J | 67 | 63 | 70 | 77 | 81 |
| **Pesticides (SW8081A)** | | | | | | | | | | |
| 4,4'-DDD | UG/KG | *2,400* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDE | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,4'-DDT | UG/KG | *1,700* | -- | -- | -- | -- | -- | -- | -- | -- |
| Aldrin | UG/KG | *29* | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-BHC | UG/KG | *90* | -- | -- | -- | -- | -- | -- | -- | -- |
| alpha-Chlordane | UG/KG | *1,600* | -- | -- | -- | -- | -- | -- | -- | -- |
| beta-BHC | UG/KG | *320* | -- | -- | -- | -- | -- | -- | -- | -- |
| delta-BHC | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| Dieldrin | UG/KG | *30* | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan I | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan II | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Endosulfan sulfate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin | UG/KG | *18,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Endrin aldehyde | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-BHC | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- |
| gamma-Chlordane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor | UG/KG | *110* | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide A | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- |
| Heptachlor epoxide B | UG/KG | *53* | -- | -- | -- | -- | -- | -- | -- | -- |
| Methoxychlor | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Toxaphene | UG/KG | *440* | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**
SUMMARY OF CHEMICAL RESULTS FOR SOIL
*Fort McDowell Site Investigation*

| | | | West Garrison | | | Ambient Metals | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | **SITE NAME:** | | Paint Shop | Paint Shop | Paint Shop | E_Garrison Perimeter Rd | E_Garrison Perimeter Rd | E_Garrison Perimeter Rd | Perimeter Road Ambient Metals | Perimeter Road Ambient Metals |
| | **FIELD SAMPLE ID:** | | WG1018 | WG1019 | WG1020 | EG1022 | EG1023 | EG1024 | WG1001 | WG1002 |
| | **LOCATION ID:** | | H-WG-PS-E | H-WH-PS-S | H-WG-PS-N | H-EGPR-1 | H-EGPR-1 | H-EGPR-1 | H-WG-PR-1 | H-WG-PR-2 |
| | **LABORATORY SAMPLE ID:** | | 159363-003 | 159363-004 | 159363-005 | 159363-030 | 159363-031 | 159363-015 | 159363-016 | 159363-017 |
| | **SAMPLE PURPOSE:** | | N | N | FD-WG1017 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | |
| **PCBs (SW8082)** | | | | | | | | | | |
| Aroclor-1016 | UG/KG | *3,900* | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1221 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1232 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1242 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1248 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1254 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- |
| Aroclor-1260 | UG/KG | *220* | -- | -- | -- | -- | -- | -- | -- | -- |
| **VOCs (SW8260B)** | | | | | | | | | | |
| 1,1,1,2-Tetrachloroethane | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,1-Trichloroethane | UG/KG | *630,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,2,2-Tetrachloroethane | UG/KG | *380* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1,2-Trichloroethane | UG/KG | *840* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloroethane | UG/KG | *3,300* (2) | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloroethene | UG/KG | *54* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,1-Dichloropropene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3-Trichlorobenzene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,3-Trichloropropane | UG/KG | *1.4* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2,4-Trimethylbenzene | UG/KG | *52,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dibromo-3-Chloropropane | UG/KG | *52,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dibromoethane | UG/KG | *52,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichloroethane | UG/KG | *350* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichloropropane | UG/KG | *350* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3,5-Trimethylbenzene | UG/KG | *21,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichloropropane | UG/KG | *700* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,2-Dichloropropane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Butanone | UG/KG | *7,300,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorotoluene | UG/KG | *160,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Hexanone | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chlorotoluene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Methyl-2-Pentanone | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| Acetone | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzene | UG/KG | *650* | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromobenzene | UG/KG | *28,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromochloromethane | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromodichloromethane | UG/KG | *1,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromoform | UG/KG | *62,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Bromomethane | UG/KG | *62,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbon Disulfide | UG/KG | *360,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Carbon Tetrachloride | UG/KG | *240* | -- | -- | -- | -- | -- | -- | -- | -- |
| Chlorobenzene | UG/KG | *150,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloroethane | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloroform | UG/KG | *240* | -- | -- | -- | -- | -- | -- | -- | -- |
| Chloromethane | UG/KG | *1,200* | -- | -- | -- | -- | -- | -- | -- | -- |
| cis-1,2-Dichloroethene | UG/KG | *43,000* | -- | -- | -- | -- | -- | -- | -- | -- |

**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | West Garrison | | | Ambient Metals | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Paint Shop | Paint Shop | Paint Shop | E_Garrison Perimeter Rd | E_Garrison Perimeter Rd | E_Garrison Perimeter Rd | Perimeter Road Ambient Metals | Perimeter Road Ambient Metals |
| | | **FIELD SAMPLE ID:** | WG1018 | WG1019 | WG1020 | EG1022 | EG1023 | EG1024 | WG1001 | WG1002 |
| | | **LOCATION ID:** | H-WG-PS-E | H-WH-PS-S | H-WG-PS-N | H-EGPR-1 | H-EGPR-1 | H-EGPR-1 | H-WG-PR-1 | H-WG-PR-2 |
| | | **LABORATORY SAMPLE ID:** | 159363-003 | 159363-004 | 159363-005 | 159363-030 | 159363-031 | 159363-015 | 159363-016 | 159363-017 |
| | | **SAMPLE PURPOSE:** | N | N | FD-WG1017 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | |
| **VOCs (SW8260B)** | | | | | | | | | | |
| cis-1,3-Dichloropropene | UG/KG | *700* | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibromochloromethane | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibromomethane | UG/KG | *67,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Ethylbenzene | UG/KG | *230,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Freon 113 | UG/KG | *5,600,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Freon 12 | UG/KG | *94,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | -- | -- | -- |
| Isopropylbenzene | UG/KG | *160,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| m,p-Xylenes | UG/KG | *210,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Methylene Chloride | UG/KG | *8,900* | -- | -- | -- | -- | -- | -- | -- | -- |
| MTBE | UG/KG | *17,000* (2) | -- | -- | -- | -- | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| n-Butylbenzene | UG/KG | *140,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| o-Xylene | UG/KG | *210,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| para-Isopropyl Toluene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| Propylbenzene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| sec-Butylbenzene | UG/KG | *110,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Styrene | UG/KG | *1,700,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| tert-Butylbenzene | UG/KG | *130,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Tetrachloroethene | UG/KG | *5,700* | -- | -- | -- | -- | -- | -- | -- | -- |
| Toluene | UG/KG | *520,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| trans-1,2-Dichloroethene | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| trans-1,3-Dichloropropene | UG/KG | *700* | -- | -- | -- | -- | -- | -- | -- | -- |
| Trichloroethene | UG/KG | *2,800* | -- | -- | -- | -- | -- | -- | -- | -- |
| Trichlorofluoromethane | UG/KG | *390,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Vinyl Acetate | UG/KG | *430,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Vinyl Chloride | UG/KG | *150* | -- | -- | -- | -- | -- | -- | -- | -- |
| **SVOCs (SW8270C)** | | | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/KG | *650,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,2-Dichlorobenzene | UG/KG | *370,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,3-Dichlorobenzene | UG/KG | *13,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 1,4-Dichlorobenzene | UG/KG | *3,400* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,5-Trichlorophenol | UG/KG | *6,100,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4,6-Trichlorophenol | UG/KG | *44,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dichlorophenol | UG/KG | *180,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dimethylphenol | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrophenol | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,4-Dinitrotoluene | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2,6-Dinitrotoluene | UG/KG | *61,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chloronaphthalene | UG/KG | *3,900,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Chlorophenol | UG/KG | *63,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylnaphthalene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Methylphenol | UG/KG | *3,100,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitroaniline | UG/KG | *3,500* | -- | -- | -- | -- | -- | -- | -- | -- |
| 2-Nitrophenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 3,3'-Dichlorobenzidine | UG/KG | *1,100* | -- | -- | -- | -- | -- | -- | -- | -- |
| 3-Nitroaniline | UG/KG | *120,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4,6-Dinitro-2-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |

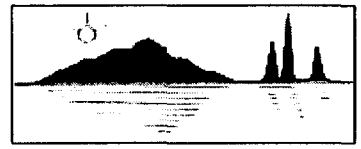
**APPENDIX B**

SUMMARY OF CHEMICAL RESULTS FOR SOIL

*Fort McDowell Site Investigation*

| | | | | West Garrison | | | Ambient Metals | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | **SITE NAME:** | Paint Shop | Paint Shop | Paint Shop | E_Garrison Perimeter Rd | E_Garrison Perimeter Rd | E_Garrison Perimeter Rd | Perimeter Road Ambient Metals | Perimeter Road Ambient Metals |
| | | **FIELD SAMPLE ID:** | WG1018 | WG1019 | WG1020 | EG1022 | EG1023 | EG1024 | WG1001 | WG1002 |
| | | **LOCATION ID:** | H-WG-PS-E | H-WH-PS-S | H-WG-PS-N | H-EGPR-1 | H-EGPR-1 | H-EGPR-1 | H-WG-PR-1 | H-WG-PR-2 |
| | | **LABORATORY SAMPLE ID:** | 159363-003 | 159363-004 | 159363-005 | 159363-030 | 159363-031 | 159363-015 | 159363-016 | 159363-017 |
| | | **SAMPLE PURPOSE:** | N | N | FD-WG1017 | N | N | N | N | N |
| **Analysis** | **Units** | **Comparison** | | | | | | | | |
| **SVOCs (SW8270C)** | | | | | | | | | | |
| 4-Bromophenyl-phenylether | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloro-3-methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chloroaniline | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Chlorophenyl-phenylether | UG/KG | *240,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Methylphenol | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitroaniline | UG/KG | *310,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| 4-Nitrophenol | UG/KG | *490,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Acenaphthylene | UG/KG | *3,700,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Anthracene | UG/KG | *22,000,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Azobenzene | UG/KG | *4,400* | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)anthracene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(a)pyrene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(b)fluoranthene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(g,h,i)perylene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzo(k)fluoranthene | UG/KG | *610* (2) | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzoic acid | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Benzyl alcohol | UG/KG | *18,000,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethoxy)methane | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroethyl)ether | UG/KG | *210* | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Chloroisopropyl) ether | UG/KG | *2,900* | -- | -- | -- | -- | -- | -- | -- | -- |
| bis(2-Ethylhexyl)phthalate | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Butylbenzylphthalate | UG/KG | *12,000,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Chrysene | UG/KG | *6,100* (2) | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenz(a,h)anthracene | UG/KG | *62* | -- | -- | -- | -- | -- | -- | -- | -- |
| Dibenzofuran | UG/KG | *290,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Diethylphthalate | UG/KG | *49,000,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Dimethylphthalate | UG/KG | *100,000,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-butylphthalate | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| Di-n-octylphthalate | UG/KG | *1,200,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluoranthene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Fluorene | UG/KG | *2,600,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobenzene | UG/KG | *300* | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorobutadiene | UG/KG | *6,200* | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachlorocyclopentadiene | UG/KG | *420,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Hexachloroethane | UG/KG | *35,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Indeno(1,2,3-cd)pyrene | UG/KG | *620* | -- | -- | -- | -- | -- | -- | -- | -- |
| Isophorone | UG/KG | *510,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Naphthalene | UG/KG | *56,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Nitrobenzene | UG/KG | *20,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodimethylamine | UG/KG | *9.5* | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitroso-di-n-propylamine | UG/KG | *69* | -- | -- | -- | -- | -- | -- | -- | -- |
| N-Nitrosodiphenylamine | UG/KG | *99,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Pentachlorophenol | UG/KG | *3,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenanthrene | UG/KG | *NE* | -- | -- | -- | -- | -- | -- | -- | -- |
| Phenol | UG/KG | *37,000,000* | -- | -- | -- | -- | -- | -- | -- | -- |
| Pyrene | UG/KG | *2,300,000* | -- | -- | -- | -- | -- | -- | -- | -- |

**Transwest Geochem, Inc.**
**Field Analytical Results**

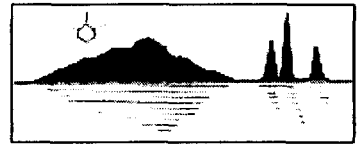


**Client :** TN& Associates, Inc.
**Project #:** Ft. McDowell SI/2001070
**Project Date(s):** 6/18-21/2002

**TGI ID No.: 0206176**

| TGI ID/ SAMPLE NUMBER | CLIENT ID | Units | Date Analyzed | Total Metals by EDXRF As | Ba | Cd | Cr | Pb | Hg | Se | Ag | Cu | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0206176 -26 | NG3026 | mg/kg | 06/18/02 | <15 | 530 | <15 | 150 | 21 | <15 | <15 | <15 | <15 | 100 |
| 0206176 -27 | NG3027 | mg/kg | 06/18/02 | <15 | 450 | <15 | 120 | 42 | <15 | <15 | <15 | 23 | 100 |
| 0206176 -28 | NG3028 | mg/kg | 06/18/02 | <15 | 290 | <15 | 120 | 26 | <15 | <15 | <15 | 19 | 82 |
| 0206176 -29 | NG3029 | mg/kg | 06/18/02 | <15 | 490 | <15 | 130 | 23 | <15 | <15 | <15 | 15 | 78 |
| 0206176 -30 | NG3030 | mg/kg | 06/18/02 | <15 | 660 | <15 | 150 | 26 | <15 | <15 | <15 | 20 | 86 |
| 0206176 -31 | NG3031 | mg/kg | 06/18/02 | <15 | 500 | <15 | 130 | 36 | <15 | <15 | <15 | <15 | 69 |
| 0206176 -32 | NG3032 | mg/kg | 06/18/02 | <15 | 400 | <15 | 220 | 120 | <15 | <15 | <15 | 27 | 59 |
| 0206176 -33 | NG3033 | mg/kg | 06/18/02 | <15 | 460 | <15 | 170 | 66 | <15 | <15 | <15 | <15 | 75 |
| 0206176 -34 | NG3034 | mg/kg | 06/18/02 | <15 | 470 | <15 | 130 | 110 | <15 | <15 | <15 | 22 | 94 |
| 0206176 -35 | NG3035 | mg/kg | 06/18/02 | <18 | 520 | <15 | 110 | 180 | <15 | <15 | <15 | 22 | 91 |
| 0206176 -36 | NG3036 | mg/kg | 06/18/02 | <22 | 380 | <15 | 140 | 220 | <15 | <15 | <15 | 51 | 110 |
| 0206176 -37 | NG3037 | mg/kg | 06/18/02 | <18 | 500 | <15 | 140 | 180 | <15 | <15 | <15 | 41 | 100 |
| 0206176 -38 | NG3038 | mg/kg | 06/18/02 | <38 | 410 | <15 | 140 | 380 | <15 | <15 | <15 | 69 | 100 |
| 0206176 -39 | NG3039 | mg/kg | 06/18/02 | <15 | 710 | <15 | 180 | 83 | <15 | <15 | <15 | 35 | 120 |
| 0206176 -40 | NG3040 | mg/kg | 06/18/02 | <15 | 740 | <15 | 170 | 55 | <15 | <15 | <15 | 36 | 110 |
| 0206176 -41 | NG3041 | mg/kg | 06/19/02 | <15 | 310 | <15 | 140 | 23 | <15 | <15 | <15 | 52 | 110 |
| 0206176 -42 | NG3042 | mg/kg | 06/19/02 | <15 | 290 | <15 | 100 | 41 | <15 | <15 | <15 | 48 | 110 |
| 0206176 -43 | NG3043 | mg/kg | 06/19/02 | <15 | 610 | <15 | 120 | 44 | <15 | <15 | <15 | 50 | 120 |
| 0206176 -44 | NG3044 | mg/kg | 06/19/02 | <15 | 370 | <15 | 130 | 24 | <15 | <15 | <15 | 71 | 100 |
| 0206176 -45 | NG3045 | mg/kg | 06/19/02 | <15 | 450 | <15 | 150 | 27 | <15 | <15 | <15 | 70 | 110 |
| 0206176 -46 | NG3046 | mg/kg | 06/19/02 | <15 | 210 | <15 | 200 | 73 | <15 | <15 | <15 | 90 | 96 |
| 0206176 -47 | NG3047 | mg/kg | 06/19/02 | <15 | 29 | <15 | 200 | 21 | <15 | <15 | <15 | 81 | 110 |
| 0206176 -48 | NG4001 | mg/kg | 06/19/02 | <15 | 370 | <15 | 260 | 19 | <15 | <15 | <15 | 79 | 100 |
| 0206176 -49 | NG4002 | mg/kg | 06/19/02 | <15 | 250 | <15 | 270 | 17 | <15 | <15 | <15 | 100 | 94 |
| 0206176 -50 | NG4003 | mg/kg | 06/19/02 | <15 | 140 | <15 | 190 | 32 | <15 | <15 | <15 | 94 | 120 |

## Transwest Geochem, Inc.
## Field Analytical Results



Client : TN& Associates, Inc.
Project #: Ft. McDowell SI/2001070
Project Date(s): 6/18-21/2002

TGI ID No.: 0206176

| TGI ID/ SAMPLE NUMBER | CLIENT ID | Total Metals by EDXRF | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Units | Date Analyzed | As | Ba | Cd | Cr | Pb | Hg | Se | Ag | Cu | Zn |
| 0206176 -51 | NG4004 | mg/kg | 06/19/02 | <15 | 120 | <15 | 250 | 44 | <15 | <15 | <15 | 92 | 150 |
| 0206176 -52 | NG4005 | mg/kg | 06/19/02 | <15 | 180 | <15 | 260 | 25 | <15 | <15 | <15 | 100 | 120 |
| 0206176 -53 | NG4006 | mg/kg | 06/19/02 | <15 | 93 | <15 | 280 | 26 | <15 | <15 | <15 | 110 | 110 |
| 0206176 -54 | NG4007 | mg/kg | 06/19/02 | <15 | 360 | <15 | 260 | <15 | <15 | <15 | <15 | 65 | 82 |
| 0206176 -55 | NG4008 | mg/kg | 06/19/02 | <15 | 260 | <15 | 230 | <15 | <15 | <15 | <15 | 73 | 100 |
| 0206176 -56 | NG4009 | mg/kg | 06/19/02 | <15 | 400 | <15 | 260 | <15 | <15 | <15 | <15 | 86 | 110 |
| 0206176 -57 | NG4010 | mg/kg | 06/19/02 | <15 | 400 | <15 | 250 | <15 | <15 | <15 | <15 | 91 | 100 |
| 0206176 -58 | NG4011 | mg/kg | 06/19/02 | <15 | 210 | <15 | 290 | <15 | <15 | <15 | <15 | 80 | 110 |
| 0206176 -59 | NG4012 | mg/kg | 06/19/02 | <15 | 350 | <15 | 330 | <15 | <15 | <15 | <15 | 100 | 100 |
| 0206176 -60 | NG4013 | mg/kg | 06/19/02 | <15 | 160 | <15 | 320 | <15 | <15 | <15 | <15 | 93 | 97 |
| 0206176 -61 | NG4014 | mg/kg | 06/19/02 | <15 | 250 | <15 | 220 | 33 | <15 | <15 | <15 | 100 | 120 |
| 0206176 -62 | NG4015 | mg/kg | 06/19/02 | <15 | 370 | <15 | 270 | 27 | <15 | <15 | <15 | 78 | 120 |
| 0206176 -63 | NG4016 | mg/kg | 06/19/02 | <15 | 370 | <15 | 260 | <15 | <15 | <15 | <15 | 83 | 95 |
| 0206176 -64 | NG4017 | mg/kg | 06/19/02 | <19 | 240 | <15 | 290 | 190 | <15 | <15 | <15 | 79 | 140 |
| 0206176 -65 | NG4018 | mg/kg | 06/19/02 | <15 | 310 | <15 | 280 | <15 | <15 | <15 | <15 | 77 | 100 |
| 0206176 -66 | NG4019 | mg/kg | 06/19/02 | <15 | 190 | <15 | 250 | 28 | <15 | <15 | <15 | 86 | 110 |
| 0206176 -67 | NG4020 | mg/kg | 06/19/02 | <15 | 150 | <15 | 250 | <15 | <15 N1 | <15 | <15 | 93 | 110 |
| 0206176 -68 | NG4021 | mg/kg | 06/19/02 | <15 | 230 | <15 | 280 | 29 | <15 | <15 | <15 | 100 | 130 |
| 0206176 -69 | NG4022 | mg/kg | 06/19/02 | <15 | 240 | <15 | 250 | 21 | <15 | <15 | <15 | 78 | 100 |
| 0206176 -70 | NG4023 | mg/kg | 06/19/02 | <15 | 310 | <15 | 300 | 20 | <15 | <15 | <15 | 70 | 99 |
| 0206176 -71 | NG4024 | mg/kg | 06/19/02 | <15 | 250 | <15 | 240 | <15 | <15 | <15 | <15 | 81 | 110 |
| 0206176 -72 | NG4025 | mg/kg | 06/19/02 | <15 | 260 | <15 | 210 | <15 | <15 | <15 | <15 | 93 | 97 |
| 0206176 -73 | NG4026 | mg/kg | 06/19/02 | <15 | 260 | <15 | 270 | 18 | <15 | <15 | <15 | 79 | 98 |
| 0206176 -74 | NG3048 | mg/kg | 06/20/02 | <15 | 530 | <15 | 150 | 47 | <15 | <15 | <15 | 26 | 160 |
| 0206176 -75 | NG3049 | mg/kg | 06/25/02 | <15 | 760 | <15 | 130 | 29 | <15 | <15 | <15 | 23 | 110 |

## Transwest Geochem, Inc.
## Field Analytical Results

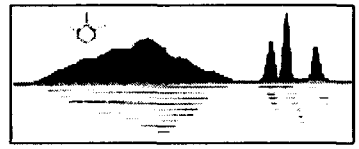


Client : TN& Associates, Inc.
Project #: Ft. McDowell SI/2001070
Project Date(s): 6/18-21/2002

TGI ID No.: 0206176

| TGI ID/ SAMPLE NUMBER | CLIENT ID | Units | Date Analyzed | Total Metals by EDXRF As | Ba | Cd | Cr | Pb | Hg | Se | Ag | Cu | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0206176 -76 | NG3050 | mg/kg | 06/25/02 | <15 | 580 | <15 | 140 | 30 | <15 | <15 | <15 | 18 | 83 |
| 0206176 -77 | NG3051 | mg/kg | 06/25/02 | <19 | 700 | <15 | 96 | 190 | <15 | <15 | <15 | 30 | 110 |
| 0206176 -78 | NG3052 | mg/kg | 06/25/02 | <15 | 660 | <15 | 97 | 36 | <15 | <15 | <15 | 23 | 69 |
| 0206176 -79 | NG3053 | mg/kg | 06/25/02 | <15 | 690 | <15 | 160 | 50 | <15 | <15 | <15 | 30 | 95 |
| 0206176 -80 | NG3054 | mg/kg | 06/25/02 | <15 | 740 | <15 | 160 | 33 | <15 | <15 | <15 | 28 | 86 |
| 0206176 -81 | NG3055 | mg/kg | 06/25/02 | <15 | 760 | <15 | 120 | 30 | <15 | <15 | <15 | 31 | 82 |
| 0206176 -82 | NG3056 | mg/kg | 06/25/02 | <15 | 730 | <15 | 130 | 34 | <15 | <15 | <15 | 15 | 80 |
| 0206176 -83 | NG30560 | mg/kg | 06/25/02 | <15 | 730 | <15 | 130 | 50 | <15 | <15 | <15 | 20 | 85 |
| 0206176 -84 | NG3057 | mg/kg | 06/25/02 | <15 | 640 | <15 | 99 | 26 | <15 | <15 | <15 | 19 | 70 |
| 0206176 -85 | NG3058 | mg/kg | 06/25/02 | <15 | 680 | <15 | 100 | 80 | <15 | <15 | <15 | 28 | 97 |
| 0206176 -86 | NG3059 | mg/kg | 06/25/02 | <15 | 760 | <15 | 140 | 40 | <15 | <15 | <15 | 32 | 100 |
| 0206176 -87 | NG3060 | mg/kg | 06/25/02 | <15 | 530 | <15 | 96 | 41 | <15 | <15 | <15 | 18 | 68 |
| 0206176 -88 | NG3061 | mg/kg | 06/25/02 | <34 | 620 | <15 | 110 | 340 | <15 | <15 | <15 | 43 | 68 |
| 0206176 -89 | NG3062 | mg/kg | 06/25/02 | <15 | 750 | <15 | 140 | 100 | <15 | <15 | <15 | 44 | 99 |
| 0206176 -90 | NG3063 | mg/kg | 06/25/02 | <15 | 780 | <15 | 100 | 120 | <15 | <15 | <15 | 44 | 110 |
| 0206176 -91 | NG30630 | mg/kg | 06/25/02 | <15 | 760 | <15 | 140 | 100 | <15 | <15 | <15 | 41 | 110 |
| 0206176 -92 | NG3080 | mg/kg | 06/25/02 | <15 | 630 | <15 | 110 | 22 | <15 | <15 | <15 | 28 | 94 |
| 0206176 -93 | NG3081 | mg/kg | 06/25/02 | <15 | 700 | <15 | 160 | 36 | <15 | <15 | <15 | 23 | 66 |
| 0206176 -94 | NG3082 | mg/kg | 06/25/02 | <22 | 570 | <15 | 170 | 220 | <15 | <15 | <15 | 65 | 96 |
| 0206176 -95 | NG3083 | mg/kg | 06/26/02 | <15 | 790 | <15 | 130 | 36 | <15 | <15 | <15 | 32 | 85 |
| 0206176 -96 | NG3084 | mg/kg | 06/26/02 | <15 | 850 | <15 | 92 | 56 | <15 | <15 | <15 | 16 | 84 |
| 0206176 -97 | NG3085 | mg/kg | 06/26/02 | <15 | 750 | <15 | 130 | 120 | <15 | <15 | <15 | 41 | 100 |
| 0206176 -98 | NG3086 | mg/kg | 06/26/02 | <21 | 590 | <15 | 120 | 210 | <15 | <15 | <15 | 51 | 100 |
| 0206176 -99 | NG3087 | mg/kg | 06/26/02 | <15 | 720 | <15 | 180 | 68 | <15 | <15 | <15 | 46 | 120 |
| 0206176 -100 | INCNW-1 | mg/kg | 06/26/02 | <85 | 780 | <15 | 200 | 850 | <15 | <15 | <15 | 88 | 1100 |

**Transwest Geochem, Inc.**
**Field Analytical Results**

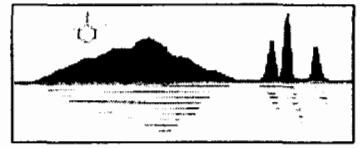


**Client :** TN& Associates, Inc.
**Project #:** Ft. McDowell SI/2001070
**Project Date(s):** 6/18-21/2002

**TGI ID No.: 0206176**

| TGI ID/ SAMPLE NUMBER | CLIENT ID | Total Metals by EDXRF | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Units | Date Analyzed | As | Ba | Cd | Cr | Pb | Hg | Se | Ag | Cu | Zn |
| 0206176 -101 | INCNW-2 | mg/kg | 06/26/02 | <120 | 850 | <15 | 180 | 1200 | <15 | <15 | <15 | 150 | 1500 |
| 0206176 -102 | INCNE-1 | mg/kg | 06/26/02 | <620 | 1100 | 24 | 150 | 6200 | <15 | <15 | <15 | 980 | 23000 |
| 0206176 -103 | INCNE-2 | mg/kg | 06/26/02 | <33 | 710 | <15 | 220 | 330 | <15 | <15 | <15 | 69 | 840 |
| 0206176 -104 | INCNE-3 | mg/kg | 06/26/02 | <560 | 1000 | 16 | 140 | 5600 | <15 | <15 | <15 | 760 | 23000 |
| 0206176 -105 | INCSE-1 | mg/kg | 06/20/02 | <15 | 640 | <15 | 82 | 140 | <15 | <15 | <15 | 68 | 250 |
| 0206176 -106 | INCSE-2 | mg/kg | 06/20/02 | <48 | 73 | <15 | 26 | 480 | <15 | <15 | <15 | 16000 | 6800 |
| 0206176 -107 | INCSE-3 | mg/kg | 06/20/02 | <27 | 440 | <15 | 230 | 270 | <15 | <15 | <15 | 65 | 620 |
| 0206176 -108 | INCSE-4 | mg/kg | 06/20/02 | <15 | 870 | <15 | 160 | 110 | <15 | <15 | <15 | 51 | 230 |
| 0206176 -109 | NG4027 | mg/kg | 06/21/02 | 37 | NR | NR | 230 | 20 | <15 | <15 | NR | 170 | 210 |
| 0206176 -110 | NG4028 | mg/kg | 06/21/02 | 38 | NR | NR | 220 | 24 | <15 | <15 | NR | 210 | 240 |
| 0206176 -111 | NG4029 | mg/kg | 06/21/02 | <15 | NR | NR | 340 | <15 | <15 | <15 | NR | 95 | 110 |
| 0206176 -112 | NG4030 | mg/kg | 06/21/02 | <15 | NR | NR | 250 | 44 | <15 | <15 | NR | 120 | 140 |
| 0206176 -113 | NG4031 | mg/kg | 06/21/02 | <15 | NR | NR | 270 | <15 | <15 | <15 | NR | 94 | 110 |
| 0206176 -114 | NG4032 | mg/kg | 06/21/02 | <15 | NR | NR | 280 | 35 | <15 | <15 | NR | 100 | 100 |
| 0206176 -115 | NG4033 | mg/kg | 06/21/02 | <15 | NR | NR | 340 | <15 | <15 | <15 | NR | 98 | 97 |
| 0206176 -116 | NG4034 | mg/kg | 06/21/02 | <15 | NR | NR | 300 | 22 | <15 | <15 | NR | 89 | 90 |
| 0206176 -117 | NG4035 | mg/kg | 06/21/02 | <15 | NR | NR | 250 | 34 | <15 | <15 | NR | 74 | 97 |
| 0206176 -118 | NG4036 | mg/kg | 06/21/02 | <15 | NR | NR | 300 | 15 | <15 | <15 | NR | 90 | 100 |
| 0206176 -119 | NG4037 | mg/kg | 06/21/02 | <15 | NR | NR | 300 | 22 | <15 | <15 | NR | 90 | 99 |
| 0206176 -120 | NG4038 | mg/kg | 06/21/02 | <15 | NR | NR | 300 | <15 | <15 | <15 | NR | 74 | 98 |
| 0206176 -121 | NG4039 | mg/kg | 06/21/02 | <15 | NR | NR | 230 | 20 | <15 | <15 | NR | 89 | 120 |
| 0206176 -122 | INCNW-3 | mg/kg | 06/21/02 | <29 | NR | NR | 240 | 290 | <15 | <15 | NR | 48 | 280 |
| 0206176 -123 | INCNW-4 | mg/kg | 06/21/02 | <71 | NR | NR | 240 | 710 | <15 | <15 | NR | 88 | 720 |
| 0206176 -124 | INCNW-5 | mg/kg | 06/21/02 | <60 | NR | NR | 230 | 600 | <15 | <15 | NR | 110 | 790 |
| 0206176 -125 | INCNW-6 | mg/kg | 06/21/02 | <44 | NR | NR | 230 | 440 | <15 | <15 | NR | 68 | 650 |

**Transwest Geochem, Inc.**
**Field Analytical Results**



**Client :** TN& Associates, Inc.
**Project #:** Ft. McDowell SI/2001070
**Project Date(s):** 6/18-21/2002

**TGI ID No.: 0206176**

| TGI ID/ SAMPLE NUMBER | CLIENT ID | Units | Date Analyzed | Total Metals by EDXRF As | Ba | Cd | Cr | Pb | Hg | Se | Ag | Cu | Zn |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0206176 -126 | INCNE-4 | mg/kg | 06/21/02 | <37 | NR | NR | 230 | 370 | <15 | <15 | NR | 33 | 400 |
| 0206176 -127 | INCNE-5 | mg/kg | 06/21/02 | <15 | NR | NR | 24 | 29 | <15 | <15 | NR | <15 | 32 |
| 0206176 -128 | INCSE-5 | mg/kg | 06/21/02 | <22 | NR | NR | 290 | 220 | <15 | <15 | NR | 41 | 370 |
| 0206176 -129 | WG1001 | mg/kg | 06/21/02 | <15 | NR | NR | 340 | 77 | <15 | <15 | NR | 80 | 130 |
| 0206176 -130 | WG1002 | mg/kg | 06/21/02 | <15 | NR | NR | 370 | 77 | <15 | <15 | NR | 90 | 140 |
| 0206176 -131 | EG1022 | mg/kg | 06/21/02 | <15 | NR | NR | 240 | 43 | <15 | <15 | NR | 47 | 120 |
| 0206176 -132 | EG1023 | mg/kg | 06/21/02 | <15 | NR | NR | 310 | 44 | <15 | <15 | NR | 40 | 110 |
| 0206176 -133 | EG1024 | mg/kg | 06/21/02 | <15 | NR | NR | 180 | 49 | <15 | <15 | NR | 36 | 140 |

*Notes:*

*For Lead values >150 mg/kg, arsenic reporting limit will be raised to 10% of the total lead value due to spectral interferences between the elements.*

*N1* *Result for Mercury is estimated due to excessive drying of sample.*

*NR* *These compounds are not reported due to equipment problem.*

# APPENDIX C

# UST DETAIL TABLE

# Appendix C
# UST Details
# Fort McDowell/Angel Island

| Location | UST Status | Size | Previous Sample Results | Condition | Volume of Soil Removed | Soil Staining/ Free Product |
|---|---|---|---|---|---|---|
| **North Garrison** | | | | | | |
| Barracks Building 241 | Former UST location (removed Fall 2000) | 500-gallon heating oil | TPH-diesel<br>- 150-3,600 mg/kg (bottom samples)<br>- 4,400 mg/kg (excavated soil stockpile) | Poor condition, several holes noted | 15 cubic yards | Approx. 3 inches of free product and water, soil staining |
| Barracks Building 242 | Former UST Location (removed Fall 2000) | 300-gallon heating oil | TPH-diesel<br>- 5,300-7,700 mg/kg (bottom samples)<br>- 6,300 mg/kg (excavated soil stockpile) | Very poor condition, several holes note | 15 cubic yards | Approx. 4 inches of free product and water, soil staining |
| East of the water tank | Former UST Location (removed Fall 2000) | 500-gallon heating oil | TPH-diesel<br>- 150-11,000 mg/kg (bottom samples)<br>- 87 mg/kg (excavated soil stockpile) | Poor condition, several holes noted | 15 cubic yards | Soil staining |
| Building 205 | Former UST Location (removed Fall 2000) | 500-gallon heating oil | TPH-diesel<br>- 150 to 380 mg/kg (bottom samples)<br>- 260 to 18,000 mg/kg (excavated soil stockpile) | Fair condition, moderate to heavy rust | 15 cubic yards | Soil staining |

Source: Report of Underground Storage Tank Closure, DGS (Ref. 12)

# Appendix C
# UST Details
# Fort McDowell/Angel Island

| Location | UST Status | Size | Previous Sample Results | Condition | Volume of Soil Removed | Soil Staining/ Free Product |
|---|---|---|---|---|---|---|
| **North Garrison, Continued** | | | | | | |
| Park Maintenance Warehouse, Building 228 | Former UST Location (removed Fall 2000) | 2,000-gallon unleaded gasoline | Benzene – ND (<5)<br>Toluene – ND (<5)<br>Ethylbenzene – ND (<5)<br>m, p-Xylene – ND (<5)<br>o-Xylene – ND (<5)<br>1,2-Dibromomethane – ND (<5)<br>TPH- gasoline – ND | New condition, recent use by Park Service | Unknown | None |
| Hospital, Building 316 | Two possible USTs | Unknown | None | -- | -- | -- |
| Fire House, Building 231 | Possible UST | Unknown | None | -- | -- | -- |
| Building 80, west of Park Residence | Possible UST | Unknown | None | -- | -- | -- |

Source: Report of Underground Storage Tank Closure, DGS (Ref. 12)

# Appendix C
# UST Details
# Fort McDowell/Angel Island

| Location | UST Status | Size | Previous Sample Results | Condition | Volume of Soil Removed | Soil Staining/ Free Product |
|---|---|---|---|---|---|---|
| **East Garrison** | | | | | | |
| Southeast of Post Exchange | Possible UST | Unknown | None | -- | -- | -- |
| Deer Pen Tank, North of Building 64 | Possible UST | Unknown | None | Unknown* | -- | -- |
| Motor Pool | Former UST Location (removed Fall 2000) | 10,000-gallon gasoline | Benzene – ND (<5)<br>Toluene – ND (<5)<br>Ethylbenzene – ND (<5)<br>m, p-Xylene – ND (<5)<br>o-Xylene – ND (<5)<br>1,2-Dibromomethane – ND (<5)<br>TPH- gasoline – ND | Poor condition, several holes noted | Unknown | None |

* An attempt was made to locate a tank at the Deer Pen (Building 64) in Fall of 2000. Glacier Environmental excavated an area near the seawall, but did not locate a tank. They speculated that the tank may have rusted away. (Ref. 12).

# Appendix C
# UST Details
# Fort McDowell/Angel Island

| Location | UST Status | Size | Previous Sample Results | Condition | Volume of Soil Removed | Soil Staining/ Free Product |
|---|---|---|---|---|---|---|
| **Ayala Cove** | | | | | | |
| Visitor's Center, Building 328 | Former UST Location (Abandoned in place Fall 2000) | Unknown | None | -- | -- | -- |
| Residence, Building 329 | Former UST Location (Removed Fall 2000) | 1,000-gallon heating oil | TPH-diesel<br>– ND (bottom samples)<br>– 38 mg/kg (excavated stockpile) | Good condition, minor rust | 15 cubic yards | None |
| Residence Area, southwest of Visitor's Center | Former UST Location (Removed 2001) | 1,000-gallon heating oil | TPH-diesel<br>– ND to 17 mg/kg (bottom samples)<br>– 850 mg/kg (excavated stockpile) | Good condition, minor rust | 15 cubic yards | Stained soil |
| Residence, between Buildings 331 and 332 | Former UST Location (Removed 2001) | Unknown | Petroleum Hydrocarbons – Diesel | -- | -- | -- |

Source: Report of Underground Storage Tank Closure, DGS (Ref. 12)

# Appendix C
# UST Details
# Fort McDowell/Angel Island

| Location | UST Status | Size | Previous Sample Results | Condition | Volume of Soil Removed | Soil Staining/ Free Product |
|---|---|---|---|---|---|---|
| **West Garrison Point Blunt** | | | | | | |
| Nike Battery Generator Pad | Possible UST | Unknown | None | -- | -- | -- |
| Mount Livermore IFC | Possible UST | Unknown | None | -- | -- | -- |
| **West Garrison** | | | | | | |
| Lighthouse | Possible UST | Unknown | None | -- | -- | -- |

Source: Report of Underground Storage Tank Closure, DGS (Ref. 12)

# APPENDIX D

# GEOPHYSICAL SURVEY REPORT

DATE: 5 August 2002

TO: Margaret Berry, TN & Associates, Inc.

THROUGH: Susan Young, WESTON

FROM: Brett E. Pasapane, WESTON Senior Geophysicist

SUBJECT: Report for Geophysical Investigation at Angel Island, California

## INTRODUCTION

Roy F. Weston, Inc. (WESTON®) performed a geophysical investigation for TN & Associates, Inc. on multiple sites at Angel Island, California on 11 through 19 June 2002. The objectives of the geophysical investigation are to provide subsurface information to locate and identify underground storage tanks (USTs) at multiple sites, locate and delineate two former landfills and perform a metal detection survey at a beach area to find potential cannonballs. The geophysical results will be used to focus subsequent intrusive activities associated with Site Investigation activities at Angel Island. Subsurface imaging of the site was conducted utilizing a complement of terrain conductivity electromagnetic (EM), time-domain electromagnetic metal detection (TDEM), and ground penetrating radar (GPR) methods. Also, surface "sweeps" were conducted, where appropriate, utilizing a Scheibel AN/19-2 all-metals detector and a Metrotech 9890 line locator in conjunction with the geophysical instrumentation. The results of the geophysical investigation are provided in this letter report.

## SITE INVESTIGATION

The geophysical investigation was conducted within multiple sites. The sites and geophysical survey objective are as follows:

- West Garrison Parade Grounds: landfill delineation.
- Ayala Cove Landing Dock Area: landfill delineation.
- North Garrison- Hospital (Building 316): potential UST(s).
- North Garrison- Fire House (Building 231): potential UST.
- North Garrison- West of Park Residence (Building 80): potential UST.
- North Garrison- 1,000-inch Rifle Range/Boy Scout Camp: potential UST.
- East Garrison- Southeast of Post Exchange: potential UST.
- East Garrison- Former Motor Pool: potential UST.
- West Garrison- Lighthouse: potential UST.
- Point Blunt-Nike Battery Generator Pad: potential UST.
- Mount Livermore- Nike Control Station: potential UST.
- Sand Springs Beach: potential cannonball area.

The following presents a brief description of the geophysical methods performed during the investigation.

The EM surveys were conducted using a Geonics, Ltd. EM31™ terrain conductivity meter interfaced with a Trimble Pro XRS Differential Global Positioning System (DGPS) unit for real-time differential positioning to sub-meter accuracy. This site reconnaissance instrument measures apparent conductivity in units of millisiemens per meter (mS/m) in materials with conductivity ranging up to 1,000 mS/m. The EM31 unit was manually carried on approximate 10-foot parallel traverses with data collected continuously at approximate 1.0 to 3.0-foot intervals in the vertical dipole mode for maximum depth penetration. Contour plots of the EM quadrature component (conductivity) and inphase component (metal detection) were prepared using Oasis montaj™ contour plotting software.

The TDEM survey was conducted at the Sand Springs Beach site using a Geonics, Ltd. EM61-MK2™ high sensitivity metal detector interfaced with a Trimble Pro XRS DGPS unit for real-time differential positioning to sub-meter accuracy. The EM61-MK2 is a battery-powered system that operates with a maximum output response of 10,000 millivolts (mV). This system consists of two 1.0 x 0.5 meter air-cored coils with the top coil 28 cm above the bottom coil. A transmitter within the coils generates a pulsed magnetic field that induces eddy currents in near-by metallic objects. The bottom receiver coil measures the response decay rate of these eddy currents at time gates of 216, 366, and 660 microseconds (μs) and the top coil measures the response decay rate at 660 μs. The multiple time gates allow for enhanced target characterization. The EM61-MK2 unit was manually towed on the beach sand on approximate 3-foot parallel traverses with data collected continuously at 0.5-foot intervals. A contour plot of the EM61-MK2 time gate 3 (660 μs) was prepared using Oasis montaj™ contour plotting software.

The GPR surveys were conducted at the potential UST sites using a Geophysical Survey Systems, Inc. (GSSI) SIR System $10A^+$ GPR unit, coupled to a 500-megahertz (MHz) antenna. The SIR System $10A^+$ is a multi-channel unit that automatically displays, processes, and records cross-sectional, variable color profiles of the subsurface. The antenna was manually pulled along orthogonal traverses within a relative grid coordinate system.

Where possible, geophysical data were located and mapped interactively using the DGPS unit. The position coordinates were referenced to the NAD83 California Zone 3 State Plane coordinate system. Some areas were geophysically surveyed utilizing a relative grid coordinate system.

A discussion of the geophysical survey results for each site is provided below.

## RESULTS

West Garrison Parade Grounds

The objective at the West Garrison Parade Ground site was to locate fill material that may have been buried during historical demolition activities. Fill material may include wood, metal and other housing construction debris. To delineate the potential "landfill" materials, an EM31 survey was performed on 12 June 2002. The survey area was approximately 575 ft. by 170 ft. and was bounded by the paved road that surrounded the site. Cultural surface features were surveyed utilizing a DGPS unit and subsequently placed on the EM figures.

Overall, the background conductivity throughout the site ranges from 36 to 48 mS/m indicating moist, silty soil conditions within the grassy portion of the site. This is represented by green color contour intervals as shown on the quadrature component map on Figure 1. The yellow, orange and red color contours (48 to 85 mS/m) surrounding the survey area may be due to fill material beneath the paved roadway surface. The violet color contours (85 + mS/m) are due to cultural features at the western portion of the site such as the retaining wall, possible buried foundations, sidewalks, etc. The dark blue color contours at the eastern portion of the site, trending east west on Figure 1 are probably due to a buried metal pipe (approximately 200 ft. long). The light blue color contours (20 to 36 mS/m) are indicative of potential fill material, which possess contrasting dielectric properties with the surrounding material.

The data from the inphase (metal detection) component, shown on Figure 2, concurs with the quadrature data and reveals the same conditions. Background inphase readings occur predominantly in the grassy portions of the site and are represented by the green color contours on Figure 2. The orange to red to violet and dark blue color contours surrounding the site also represent cultural features above and below the ground surface. Dark blue color contours at the northeast portion of the site are indicative of buried metallic objects within the suspected fill area.

Suspect fill material locations were given at the site for subsequent intrusive activities. The five test pits performed were surveyed utilizing the DGPS unit and placed on EM Figures 1 and 2. Table 1 below contains the test pit endpoint locations.

**Table 1: Test Pit Locations**

| Test Pit | Easting | Northing |
|---|---|---|
| TP-1a | 6001019.825 | 2141329.446 |
| TP-1b | 6001008.555 | 2141325.811 |
| TP-2a | 6001175.538 | 2141296.162 |
| TP-2b | 6001159.162 | 2141292.527 |
| TP-3a | 6001333.705 | 2141355.832 |
| TP-3b | 6001320.479 | 2141352.399 |
| TP-4a | 6001326.100 | 2141409.641 |
| TP-4b | 6001316.292 | 2141401.534 |
| TP-5a | 6001401.583 | 2141412.662 |
| TP-5b | 6001388.586 | 2141409.856 |

Ayala Cove Landing Dock Area

The objective at the Ayala Cove Landing Dock Area was to locate and delineate landfill boundaries within the narrow site at the northwest portion of the island. A complement of geophysical methods, a reconnaissance EM and a focused GPR survey were performed on 13 June 2002 to characterize the site. The 40 ft. by 240 ft. site, located adjacent to the Park headquarters, was bordered on the west and north by the San Francisco Bay (and rip-rap), the east by a cliff face and a boat ramp to the south. The site contained numerous cultural features on the surface including a pick-up truck, boat trailer, aluminum shed and other metallic objects. These objects, which caused some interference, could not be moved prior to the survey.

Overall, the background conductivity at the site ranges from 60 to 90 mS/m, which is indicative of the shallow water table (approximately 5 feet below ground surface {bgs}) and possible fill material. This is represented by the green color contours as shown on the quadrature component map on Figure 3. The low conductivity represented by the blue color contours (23 to 50 mS/m) is indicative of shallow bedrock along the cliff face. The northwest portion of the site exhibits elevated conductivity and is represented by the yellow, orange and red color contours (100 to 200+ mS/m) on Figure 3. This may be due to buried fill material and in part to surface metal. The most significant conductivity feature is located in the southern portion of the site, adjacent to the boat ramp. High conductivity (300+ mS/m), represented by the violet color contours may be indicative of fill material and hydrocarbon-contaminated soil that was observed during subsequent test trenching.

The inphase component (metal detection) corroborates the quadrature data and also reveals EM influence from the boat trailer and pick-up truck in the mid-portion of the site and the metal shed further north along the eastern edge. This is represented by the violet and red color contours on Figure 4, respectively. An unknown metal object exists at the southeast portion of the site and is represented by dark blue color contours.

GPR transects were conducted over the site at areas that exhibited EM anomalies. The locations of the GPR transects were surveyed utilizing a DGPS unit and subsequently placed on EM Figures 3 and 4. Overall, the GPR data revealed chaotic radar signatures adjacent to the cliff face and along the northwest edge of the site. These radar waveforms are indicative of shallow bedrock and course fill material, respectively. Also, high amplitude horizontal reflectors indicative of compacted fine-grained soil/fill were found in the parking and driving areas of the site.

North Garrison Hospital (Building 316)

The geophysical objective at the former Hospital Building 316 was to locate two potential USTs. A GPR survey was performed on 18 June 2002 along the front and parking area toward the south portion of the former Hospital. The ground surface consisted of concrete and contained utility pipes and metal covers. A suspected fill pipe

cap with a letter "F" on top was observed on the concrete surface, adjacent to a metal manhole cover.

Overall, radar signatures indicative of USTs were not observed. However, anomalous radar reflectors were observed adjacent to the manhole cover and "F" cap at approximate grid coordinate 30N/10W, as shown on Figure 5. This area and the metal covers on the surface should be further characterized. Another suspect anomaly area is toward the northern portion of the site at grid coordinate 105N/0W to 10W. Radar signatures indicative of possible utilities exist at a depth of 1 ft. bgs.

Also, a concrete cutout exists at grid coordinate 78N/7W-15W, which exhibits a radar anomaly approximately 1 ft. bgs. This anomaly is indicative of a buried utility pipe.

North Garrison Fire House (Building 231)

The objective of the geophysical survey at the Fire House was to locate a potential UST presumably located on the north side of the Fire House. A GPR survey and a site "sweep" utilizing a Scheibel metal detector and a Metrotech line locator were performed on 12 June 2002, between the building structure and the road to locate the UST. The site contained a grassy area with concrete sidewalks in an area measuring approximately 30 ft. by 80 ft. as shown on Figure 6.

Based on the geophysical survey information, GPR signatures indicative of a UST were located at relative grid coordinates 12N to 14N/15W to 19W as shown on Figure 6. The UST radar signature was in the form of a hyperbolic reflector at a depth of approximately 1.5 bgs, which is illustrated on the inset on Figure 6. The metal detection sweep confirmed the presence of a metallic object at this location. The outline of the suspected UST was spray painted on the ground surface.

North Garrison West of Park Residence (Building 80)

The objective of the geophysical investigation at the area west of Park Residence Building 80 was to locate a potential UST buried adjacent to a former building foundation structure. The area appearing to be a historic bathhouse structure at the site contained numerous metallic objects on the surface both inside and outside of the surrounding foundation. Some of the larger metal objects include sewer and water lines, a boiler, AST and a furnace. These cultural features, in addition to overgrown vegetation, inhibited the performance of a comprehensive geophysical investigation. Therefore, an EM and/or GPR survey were not performed. However, a site "sweep" utilizing a Scheibel metal detector and a Metrotech line locator attached to the furnace was performed to locate a potential UST. The results of the site sweep confirmed that there was too much metal debris on the surface to locate a UST. It is recommended that the site be free and clear of metallic surface debris and overgrown vegetation in order to effectively locate the potential UST.

North Garrison 1,000-inch Rifle Range/Boy Scout Camp

The objective of the geophysical investigation at the 1,000-inch Rifle Range/Boy Scout Camp was to locate a suspected UST adjacent to a historical building foundation. This was accomplished on 12 June 2002 by performing a GPR survey surrounding the foundation perimeter. The site consisted of a grass to hard "dirt" surface within a 50 ft. by 50 ft. area as shown on Figure 7.

Based on the geophysical survey information, GPR signatures indicative of a UST were located at relative grid coordinates 4N to 9N/13W to 16W at a depth of approximately 1-foot bgs. As shown in the inset on Figure 7, the UST signature was in the form of a hyperbolic reflector. The outline of the suspect UST was spray painted on the ground surface.

East Garrison Southeast of Post Exchange

The objective of the geophysical investigation at the area southeast of the Post Exchange was to locate a potential UST buried adjacent to a concrete pad along a walkway slope. A GPR survey and a site "sweep" utilizing a Scheibel metal detector and a Metrotech line locator were performed on 13 June 2002, between the paved walkway and a concrete vault. The approximate 20 ft. by 50 ft. area was on a grass and dirt slope and is depicted on Figure 8. The top portion of the slope (west end) contains a 6 ft. by 9 ft. concrete pad with a protruding metal pipe. Down slope (east end), a concrete vault was observed, which contained a partially exposed UST with a man-way on the end.

GPR signatures indicative of this UST were observed between the western edge of the vault to a large diameter tree as shown on Figure 8. The inset on Figure 8 depicts the UST as a hyperbolic reflector approximately 1.5 ft. bgs. Anomalous radar reflectors indicative of a buried pipe were located down slope of the concrete pad. The metal detector surface sweep confirmed the presence of the pipe and the UST. No other GPR signatures or metal detector "hits" indicative of a UST were found.

East Garrison Former Motor Pool

The objective of the geophysical investigation at the former Motor Pool was to locate a suspected UST adjacent to a concrete seawall and an excavation from a prior UST search. A GPR survey and a site "sweep" utilizing a Scheibel metal detector were performed on 19 June 2002 adjacent to the excavation and an old wooden structure. The grassy site was approximately 20 ft. by 30 ft. and contained a pile of soil containing various metallic debris and objects (see Figure 9). The excavation, which is approximately 8 ft. deep, contains two metal pipes that stick up.

Based on the geophysical survey information, GPR signatures indicative of a UST were located at relative grid coordinates 22S to 25S/3W to 7W at a depth of approximately 1.5 ft. bgs. As shown in the inset on Figure 9, the UST signature was in the form of a

hyperbolic reflector. The outline of the suspect UST was spray painted on the ground surface.

West Garrison Lighthouse (Point Stuart)

The Point Stuart Lighthouse was inaccessible to safely mobilize and perform a geophysical investigation to locate a potential UST. All parties on site agreed that the dangers associated with getting to the site (steep, rocky cliffs and water hazards) were not included in the amended scope of work. Therefore, a geophysical investigation was not performed.

Point Blunt NIKE Battery Generator Pad

The objective of the geophysical investigation at the NIKE Battery Generator Pad was to locate a suspected UST adjacent to the main building structure and a pad area up slope, along the road to the main building. The areas are approximately 40 ft. by 60 ft. and 10 ft. by 25 ft., respectively. A GPR survey and a site "sweep" utilizing a Scheibel metal detector were performed on 18 June 2002 at both areas. The main building, shown on Figure 10 is paved at the front (west) and contains a berm/slope with heavy vegetation surrounding the north, east and south portions of the site. The pad adjacent to the road appears to be fill material surrounded by a concrete "curb" structure.

The GPR data collected at the main building revealed anomalous radar signatures at the southwest portion of the site. However, the data does not reveal signatures indicative of a UST. As shown on Figure 10, an anomaly exists at relative grid coordinate 0N to 5N/21W to 23W at a depth of 4 ft. bgs. This anomaly may be indicative of a buried foundation. Another anomaly located at grid coordinates 15N to 20N/23W to 28W reveals reflectors that are typical of a back-fill area.

Radar reflectors indicative of a buried utility were observed at the pad area (west end of the pad) at a depth of approximately 1-foot bgs. The anomalous radar reflectors at this location appear too small in size (approximately 1 ft. width) to be indicative of a UST. Further characterization may be needed to ascertain the identity of this anomaly and the anomalies adjacent to the main building.

Mount Livermore NIKE Control Station

The potential UST site at the Mount Livermore NIKE Control Station was inaccessible; therefore, the geophysical investigation was not performed. The road leading to the site was barricaded off due to construction to restore the top of the mountain to its original topography. All parties on site agreed that the geophysical investigation would not be performed at this site.

Sand Springs Beach Cannonball Area

The objective of the geophysical investigation at Sand Springs Beach was to locate metallic anomalies indicative of cannonballs that were reportedly dumped down a ravine. The isolated beach area is approximately ½ mile west of the Coast Guard station at Point Blunt and is bordered by a steep cliff face/heavily vegetated ravine to the north, rocky coast to the east and west and the San Francisco Bay to the south. A metal detection survey utilizing the EM61-MK2 integrated with a DGPS unit was performed on 14 June 2002 within an approximate 50 ft. by 500 ft. area of beach.

The results of the EM61-MK2 survey reveal metallic anomalies on the beach that are depicted by the red to violet color contours shown on Figure 11. Most notably, the anomaly box at the northwest portion of the site (centered at grid coordinate 6004872 E / 2139699 N) represents unknown metal objects with a response greater than 2,000 mV. This location represents the most probable location for a buried cannonball(s). Also, surface debris such as tires and a wooden dock platform with metal was observed on the beach and was subsequently surveyed and placed on Figure 11. These objects have an EM response of approximately 1,000 mV or less. It is recommended that the anomalies shown on Figure 11 be "ground-truthed" to ascertain the exact identity of the objects.

During a reconnaissance of the area, 2 cannonballs were observed along the coast at distances of approximately 113 ft. and 425 ft. from the southeast portion of the survey area. These locations were surveyed with the DGPS and their coordinates are reported on Table 2.

**Table 2: Known Cannonball Locations**

| Cannonball | Easting | Northing |
|---|---|---|
| 1 | 6005326.240 | 2139501.360 |
| 2 | 6005631.632 | 2139428.193 |

A picture of the approximate 15-inch diameter cannonball is shown on Figure 12.



**Figure 12: Cannonball #2**

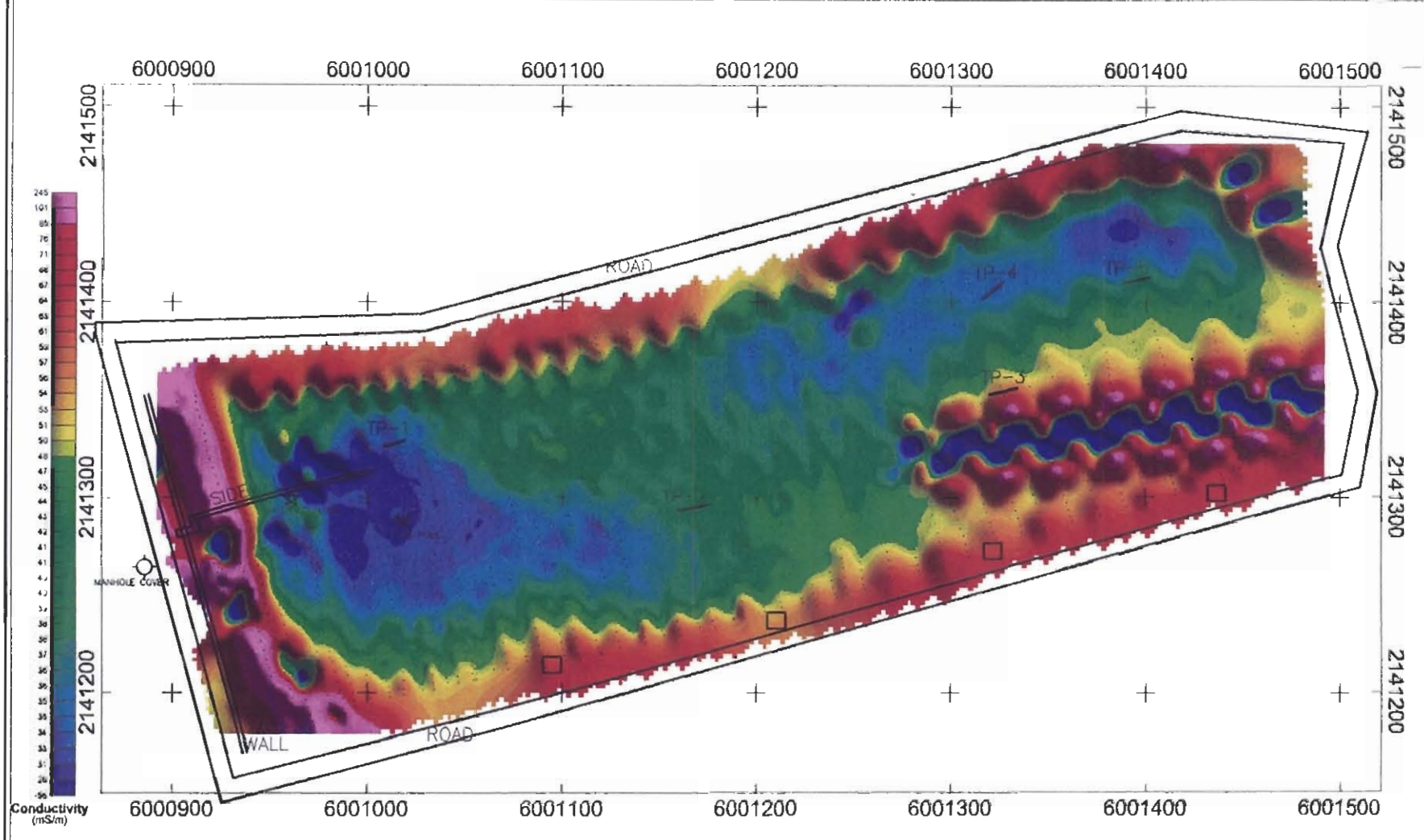



FIGURE 1

Scale 1:960

50 0 50 100

US survey foot

NAD83 / California CS83 zone 3

| TN & Associates, Inc. |
| --- |
| **Angel Island, CA**<br>**West Garrison Parade Ground Site** |
| Terrain Conductivity Survey (EM31)<br>Quadrature Component |
| ***Roy F. Weston, Inc.*** |

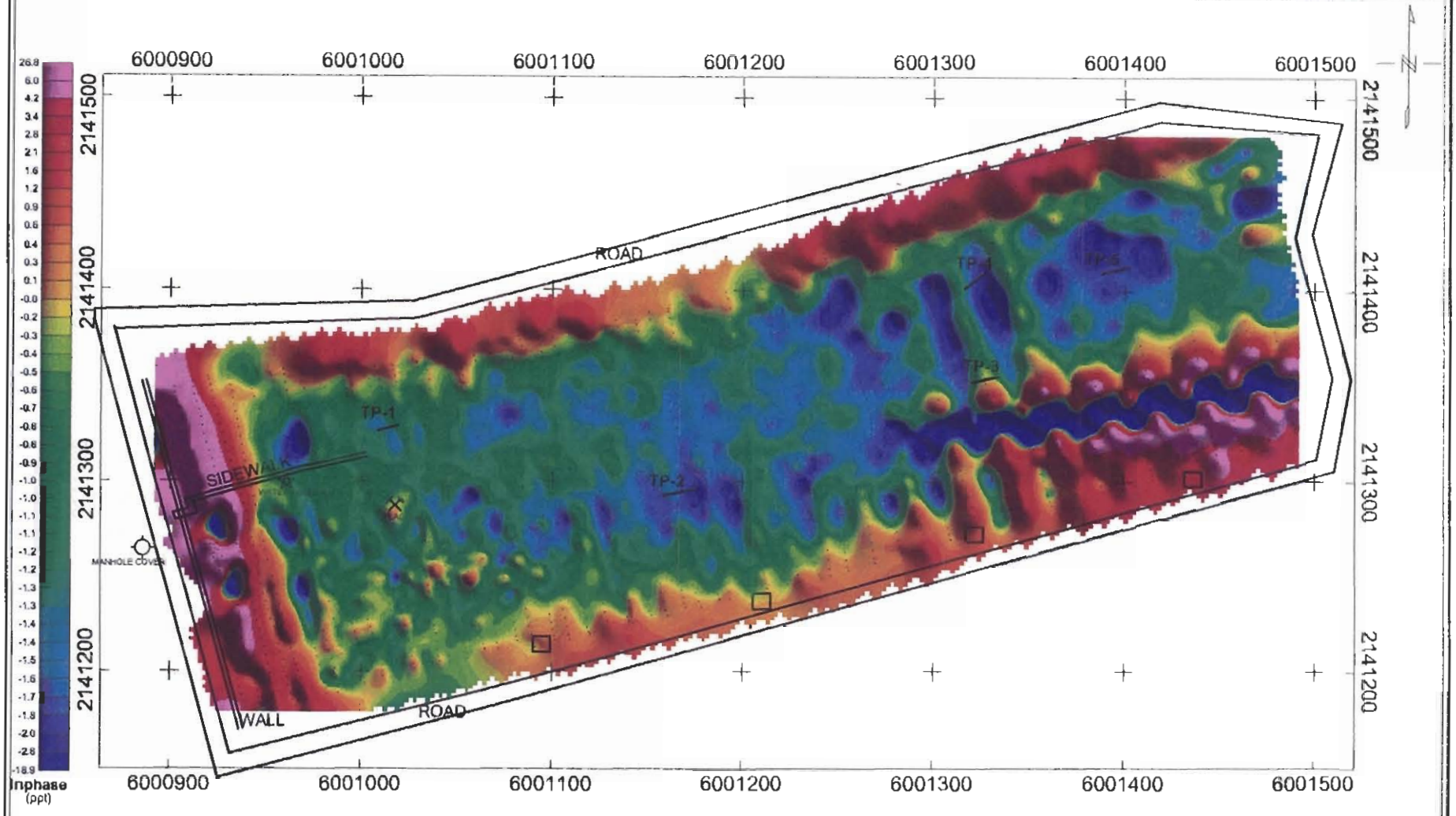



FIGURE 2

Scale 1:960

50 0 50 100

US survey foot

NAD83 / California CS83 zone 3

| TN & Associates, Inc. |
| --- |
| **Angel Island, CA**<br>**West Garrison Parade Ground Site** |
| Terrain Conductivity Survey (EM31)<br>Inphase Component |
| ***Roy F. Weston, Inc.*** |

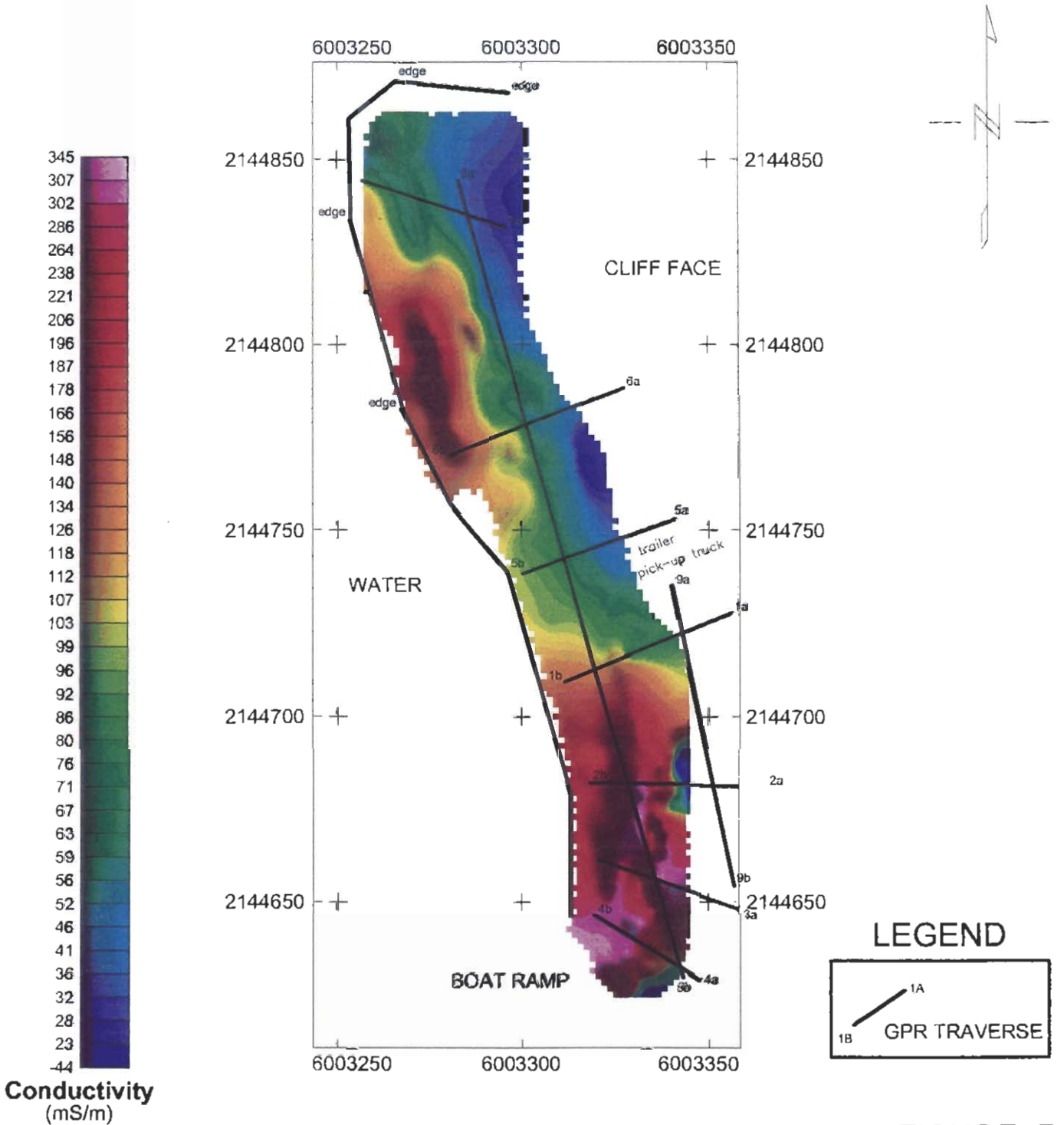



FIGURE 3

TN and Associates, Inc.

**Angel Island, CA**
**Ayala Cove Landing Area**
**Terrain Conductivity Survey (EM31)**

Quadrature Component

***Roy F. Weston, Inc.***

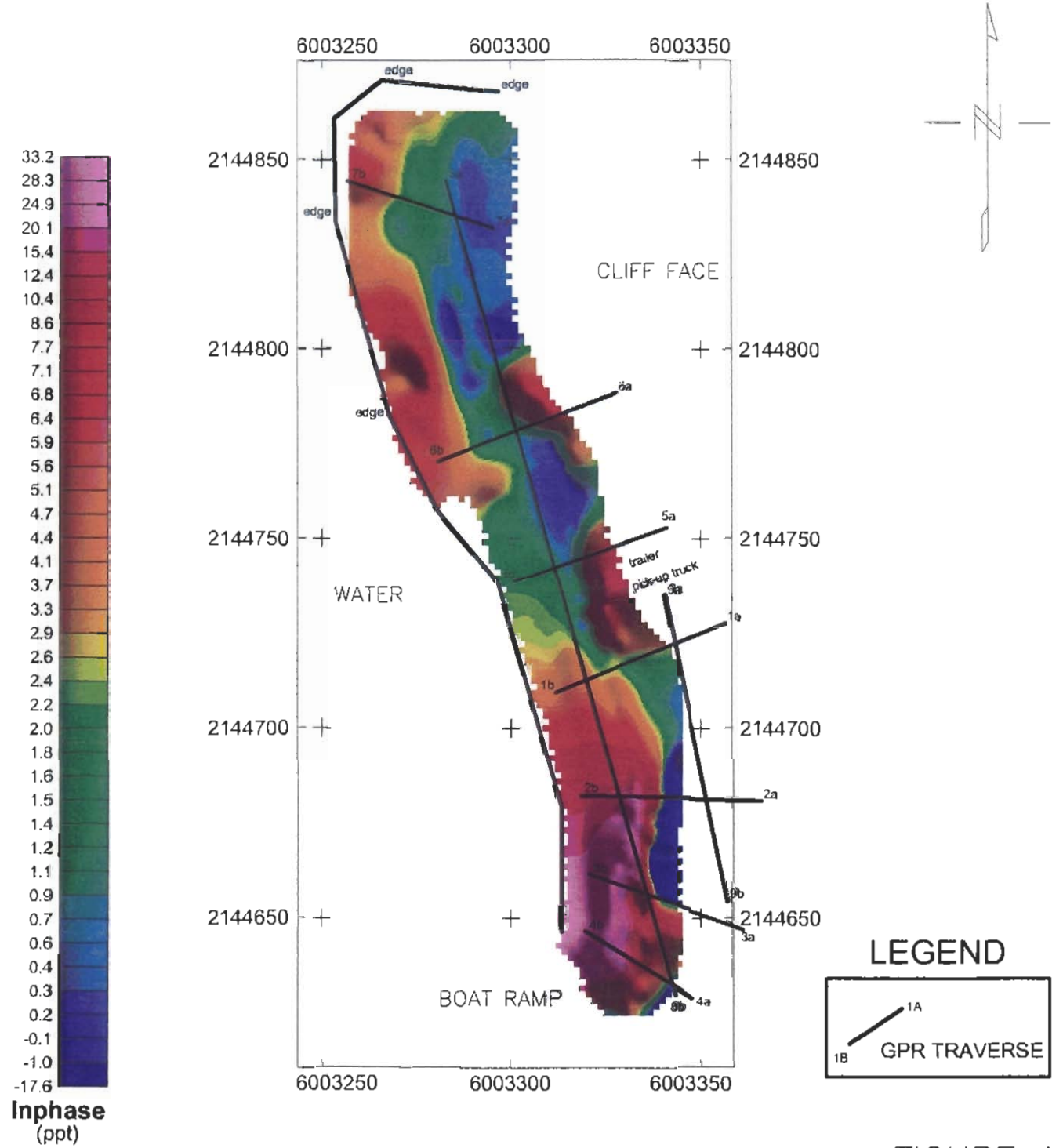
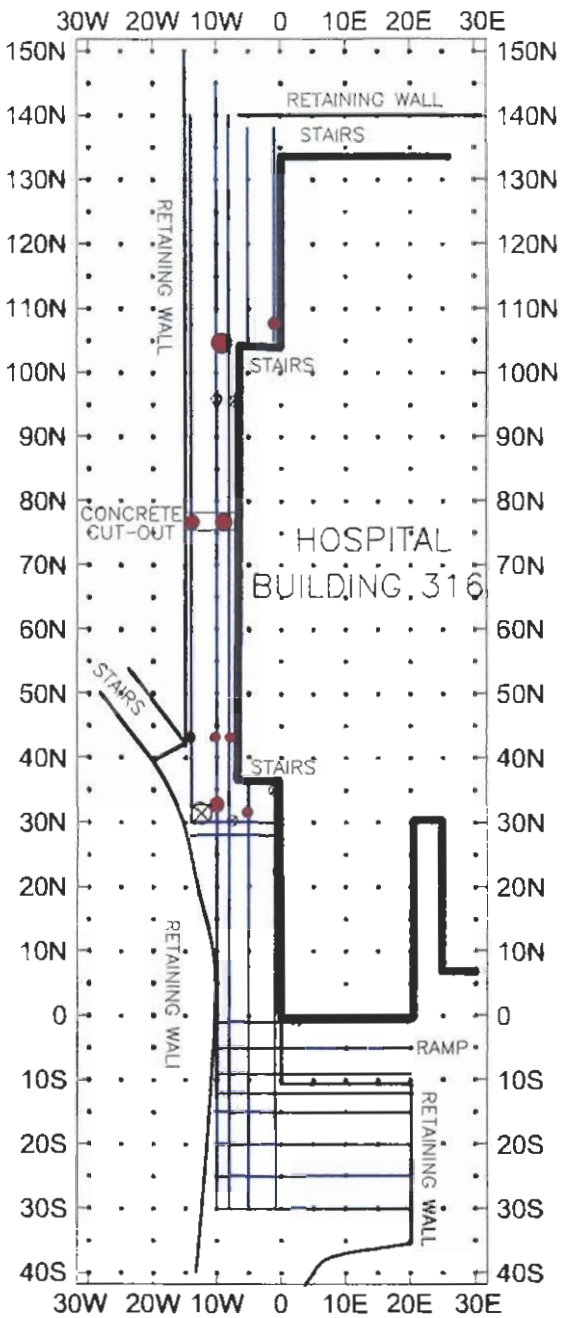
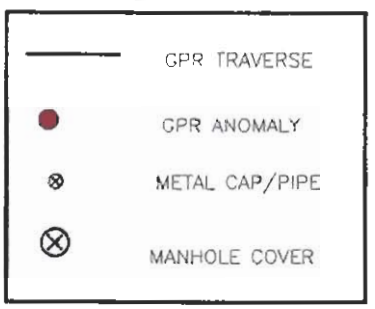



FIGURE 4

| TN and Associates, Inc. |
|---|
| **Angel Island, CA**<br>**Ayala Cove Landing Area**<br>**Terrain Conductivity Survey (EM31)** |
| Inphase Component |
| ***Roy F. Weston, Inc.*** |



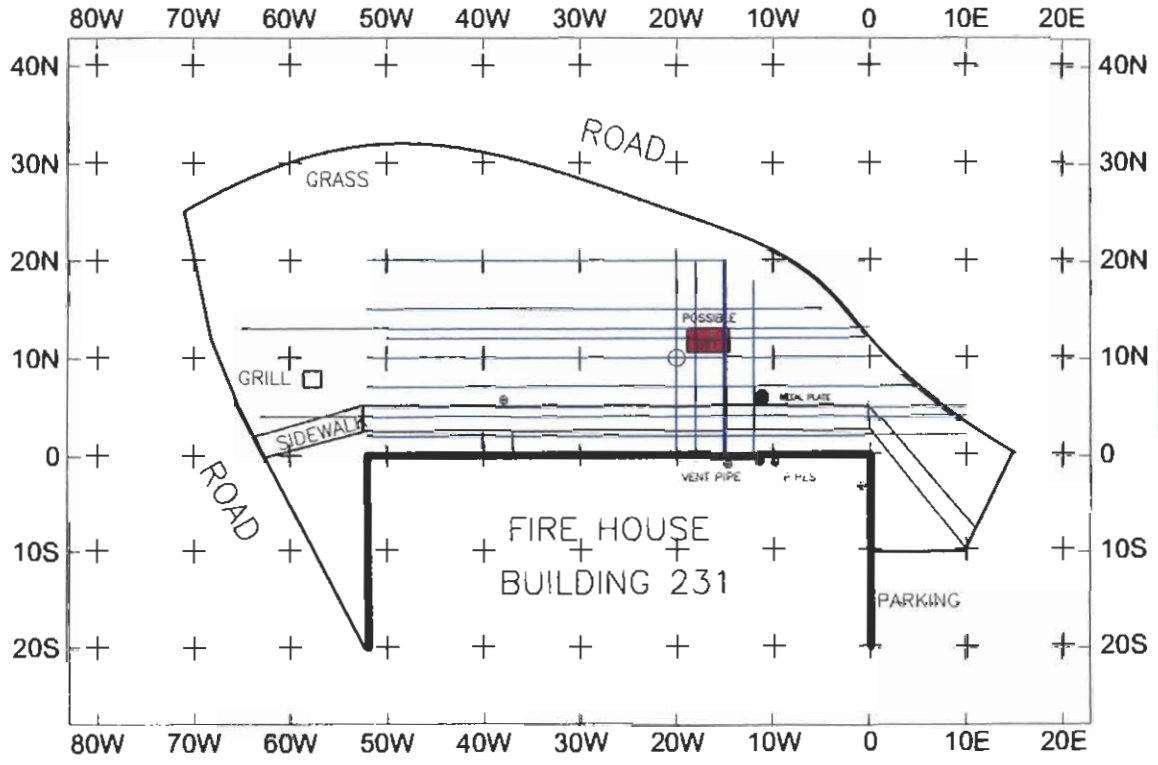

Scale 1:360

25 0

feet

FIGURE 5

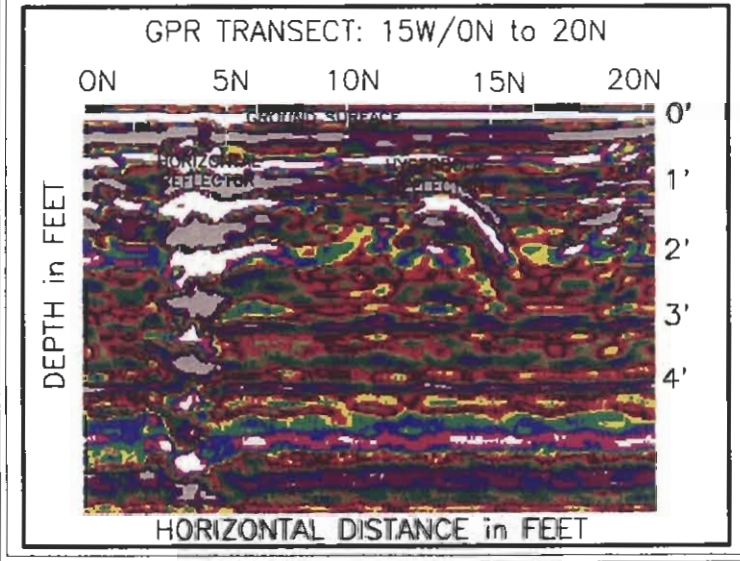
| TN and Associates, Inc. |
|---|
| **Angel Island, CA**<br>**North Garrison: Hospital Building 316**<br>**UST Search** |
| GPR Survey |
| ***Roy F. Weston, Inc.*** |






LEGEND




Scale 1:240

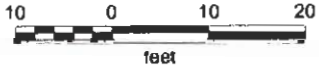
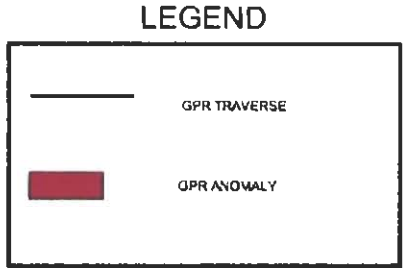
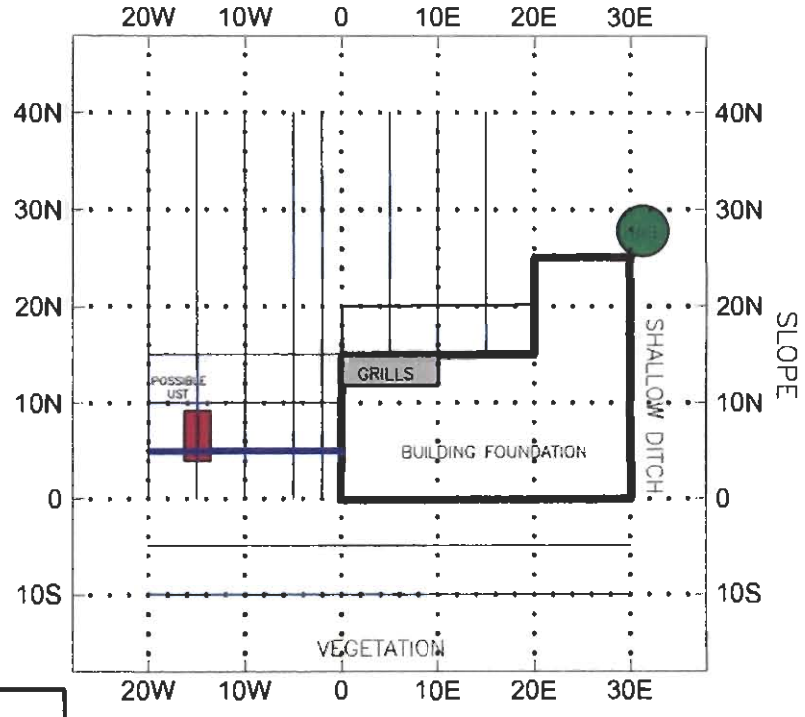
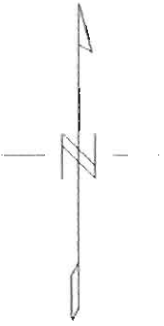



FIGURE 6

| TN and Associates, Inc. |
|---|
| **Angel Island, CA**<br>**North Garrison: Fire House Building 231**<br>**UST Search** |
| GPR Survey |
| ***Roy F. Weston, Inc.*** |




Scale 1:240

10 0 10 20

feet

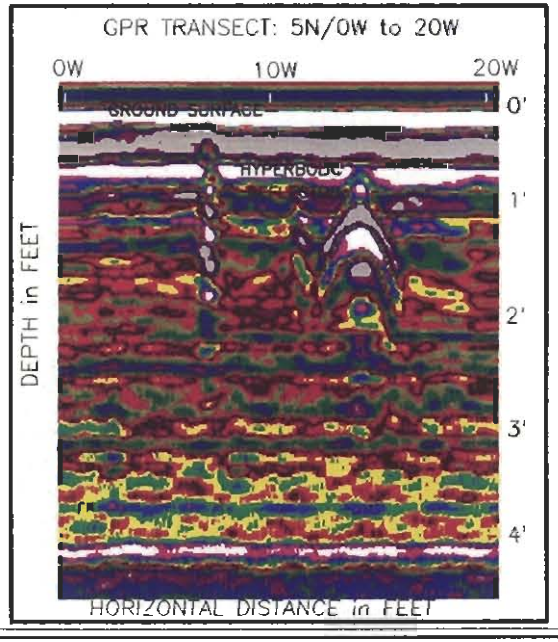
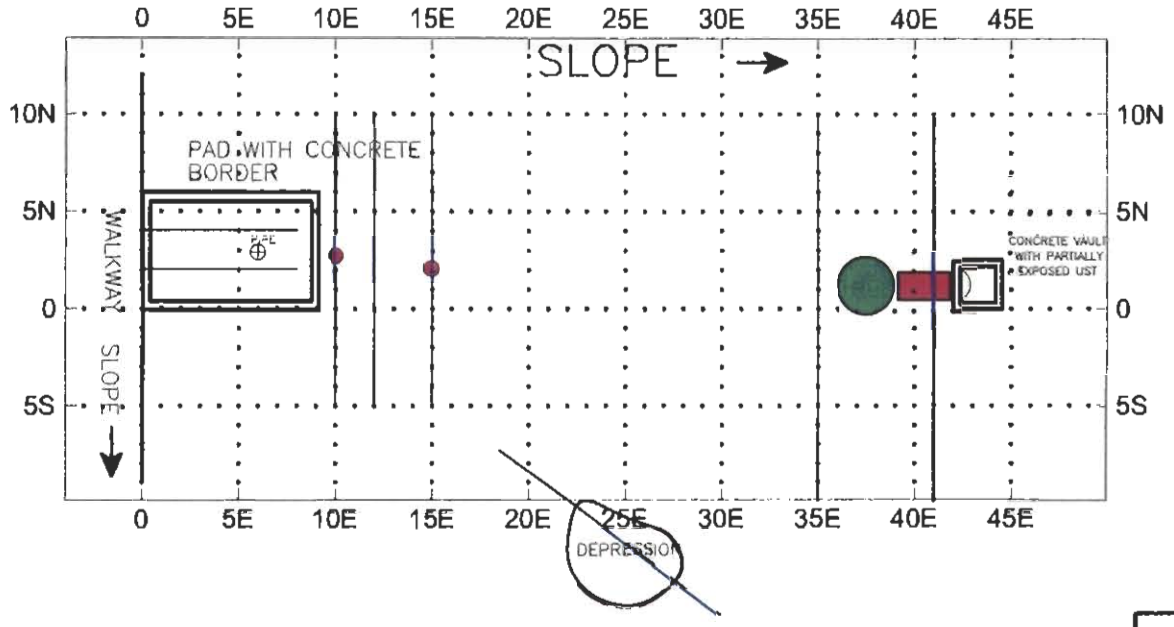
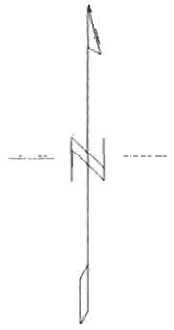
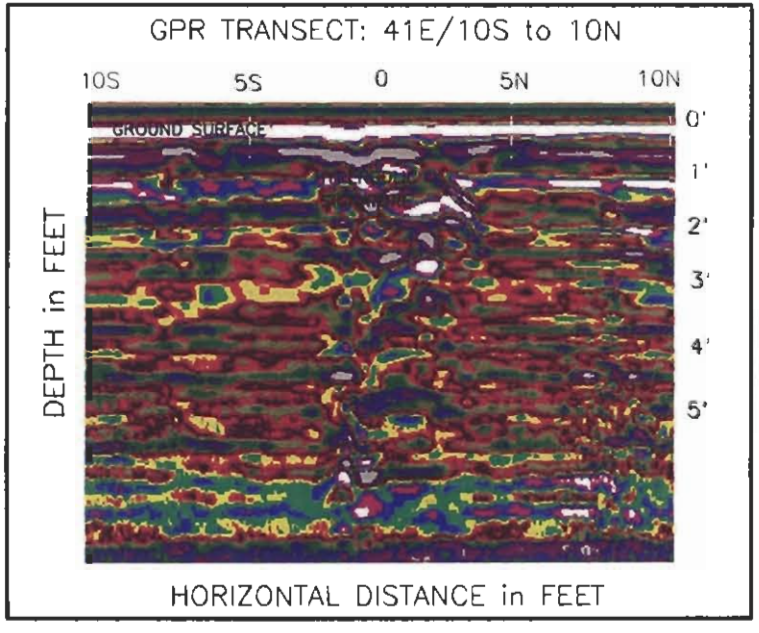



FIGURE 7

| TN and Associates, Inc. |
| --- |
| **Angel Island, CA**<br>**North Garrison: 1000-inch Rifle Range/Boy Scout Camp**<br>**UST Search** |
| GPR Survey |
| ***Roy F. Weston, Inc.*** |






Scale 1:120

5 0 5 10

feet

LEGEND

GPR TRAVERSE

GPR ANOMALY

PIPE

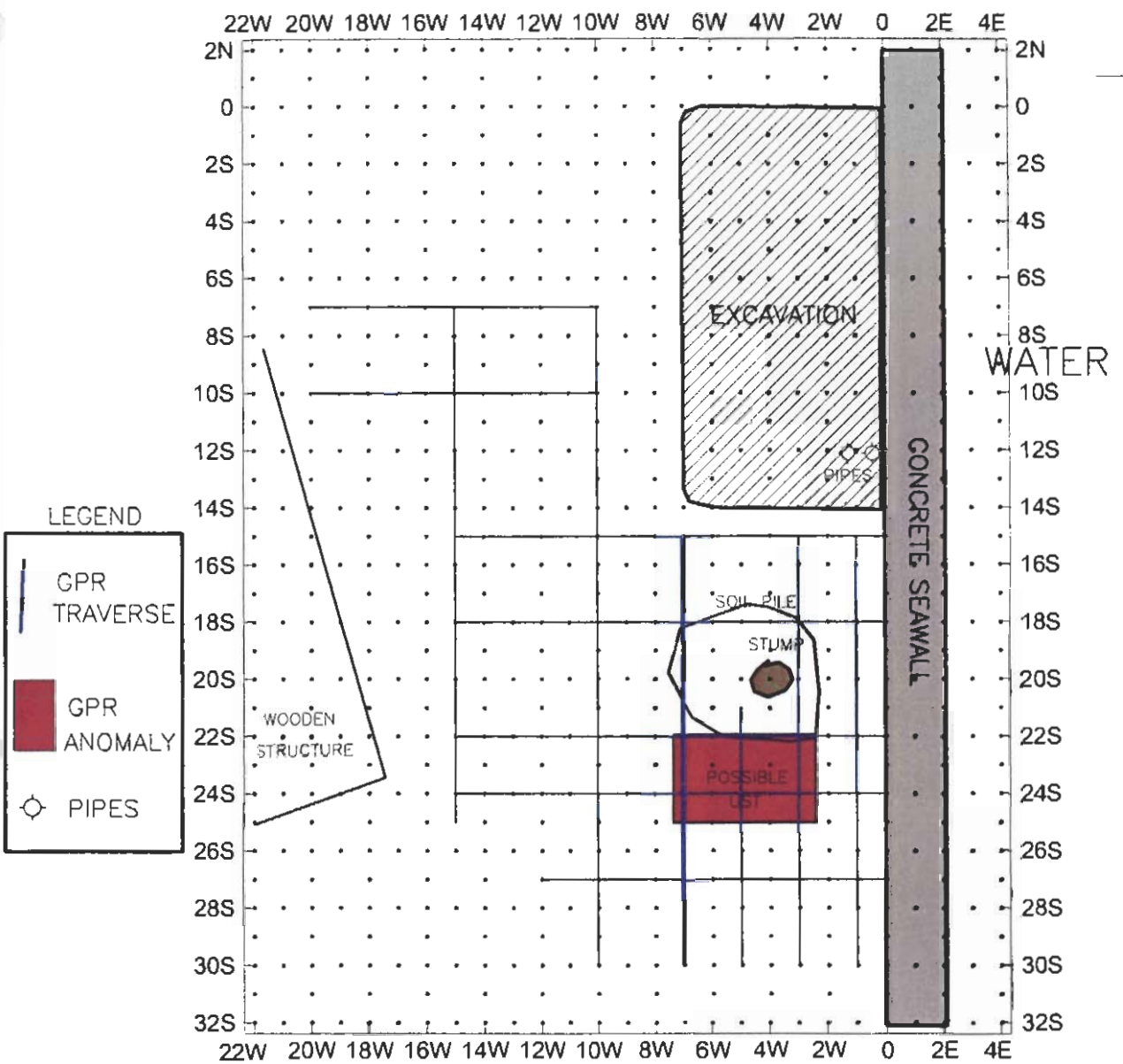
FIGURE 8

TN and Associates, Inc.

**Angel Island, CA**
**East Garrison: Southeast of Post Exchange**
**UST Search**

GPR Survey

***Roy F. Weston, Inc.***




Scale 1:72

2.5 0 2.5 5

feet

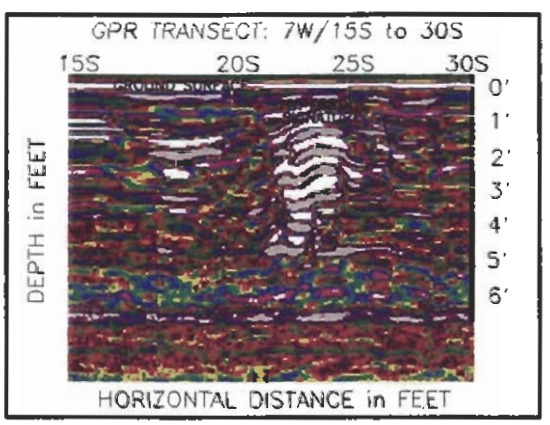



FIGURE 9

TN and Associates, Inc.

**Angel Island, CA**
**East Garrison: Motor Pool Area**
**UST Search**

GPR Survey

***Roy F. Weston, Inc.***

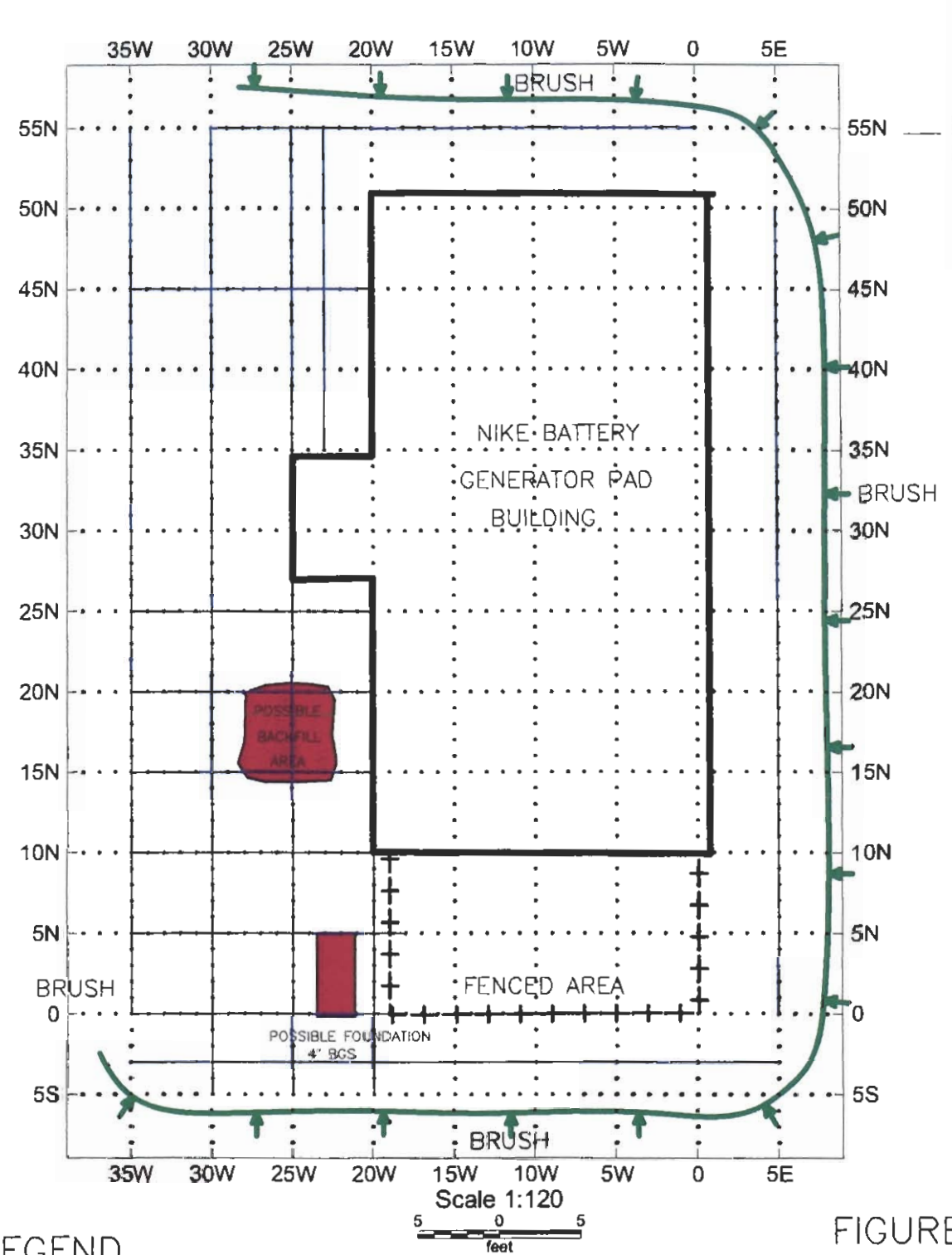



FIGURE 10

LEGEND

- GPR TRAVERSE
- BRUSH LINE WITH SLOPE DIRECTION
- GPR ANOMALY

TN and Associates, Inc.

**Angel Island, CA**
**Point Blunt: NIKE Battery Generator Pad**
**UST Search**

GPR Survey

***Roy F. Weston, Inc.***

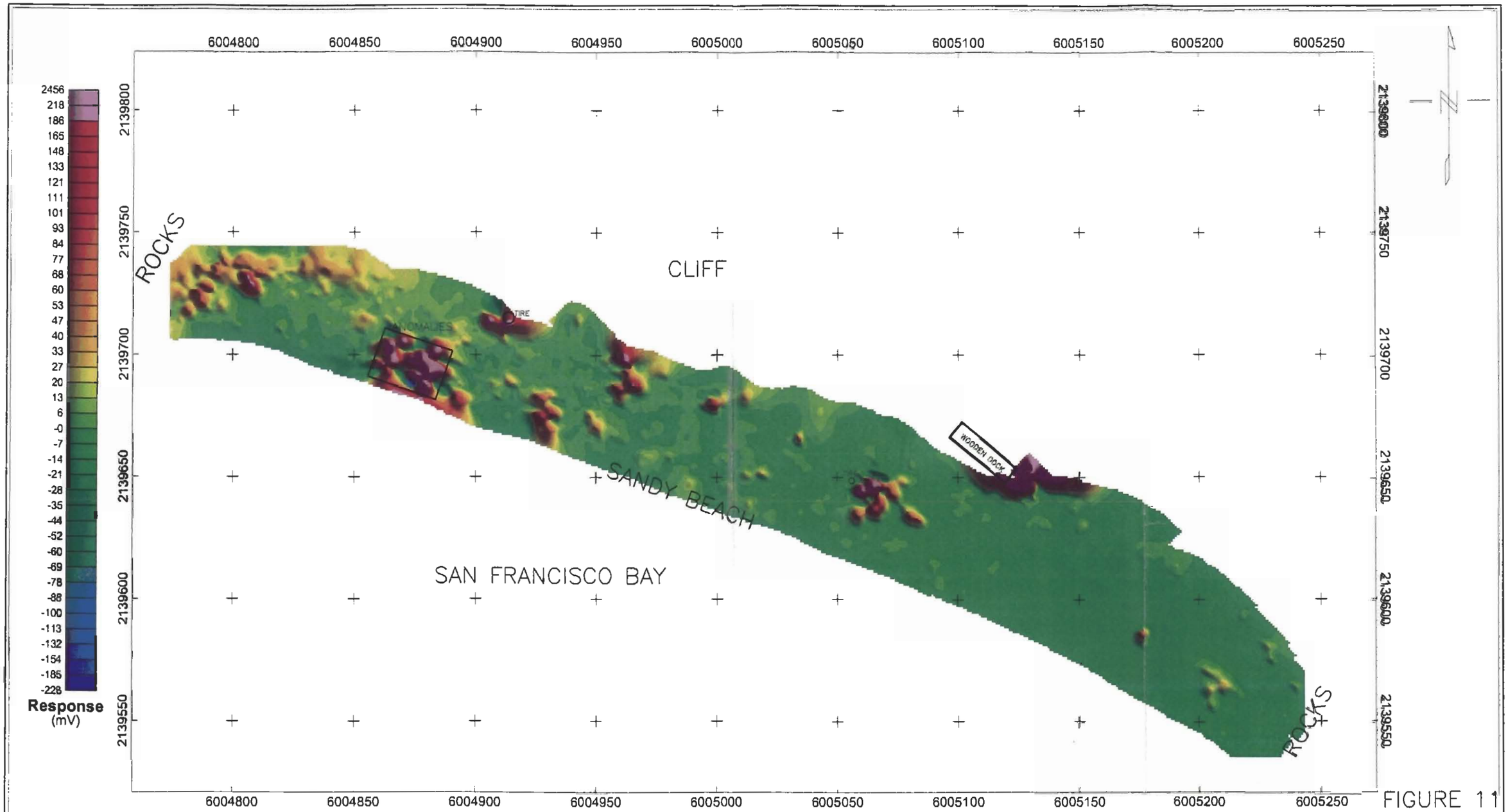



FIGURE 11

| |
|---|
| TN and Associates, Inc. |
| **Angel Island, CA**<br>**Sand Springs Beach**<br>**Cannonball Search** |
| Metal Detection Survey: EM61-MK2<br>Time Gate 3 (660 microseconds) |
| ***Roy F. Weston, Inc.*** |

# APPENDIX E

# SOIL LITHOLOGIC LOGS

**T N & Associates, Inc.**
**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION: -
DRILLER: Don Pearson
DATE BEGAN: 6/18/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: South of former UST, Building 205, North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/18/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-NG-205-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Hand Auger | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | SW | WELL GRADED SAND W/ GRAVEL: 60% angular fine to course and, 30% angular gravel to 30mm, 10% silt; pale yellowish brown (10YR 6/2); dry; no odor. | | Topsoil | |
| | | 0 | | | GW | WELL GRADED SAND W/ GRAVEL: 80% angular gravel to 30mm, 20% angular fine to coarse sand; medium bluish gray (5B 5/1); dry; no odor. | | Weathered bedrock. Weathering surfaces are moderate yellow brown. | |
| | | 0 | | | SW | WELL GRADED SAND W/ GRAVEL: 70% angular fine to course sand, 20% angular gravel to 20mm, 10% silt, medium bluish gray (5B 5/1) heavily mottled with moderate yellow brown; damp; no odor. | | Friable weathered bedrock. | |
| 5 | | 0 | | | SW | WELL GRADED SAND W/ GRAVEL: 70% angular fine to course and, 20% angular gravel to 20mm, 10% silt, medium bluish gray (5B 5/1) heavily mottled with moderate yellow brown; damp; no odor. | | Pulverized bedrock. | |
| | | 0 | | | SW | WELL GRADED SAND W/ GRAVEL: 70% angular fine to course and, 20% angular gravel to 20mm, 10% silt, medium bluish gray (5B 5/1) heavily mottled with moderate yellow brown; damp; no odor. | | Refusal @ 8' bgs.<br>Sample collected @ 7.5'–8' for TPH Analysis. | |
| | | | | | | Refusal @ 8' | | | |
| 10 | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION: -
DRILLER: Don Pearson
DATE BEGAN: 6/18/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: North side of former, Building 205, North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/18/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-NG-205-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | SW | WELL GRADED SAND W/ GRAVEL: 60% subrounded to subangular fine to coarse sand, 30% subangular gravel to 30mm, 10% silt; dark yellow brown (10YR 4/2); damp; no odor. | | | |
| | | 0 | | | SW | WELL GRADED SAND W/ GRAVEL: 60% subrounded to subangular fine to coarse sand, 30% subangular gravel to 30mm, 10% silt; dark yellow brown (10YR 4/2); damp; no odor. | | | |
| 5 | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 80% angular grovel to 40mm, 20% angular fine to coarse sand; medium bluish gray (5G5/1); weathering surfaces are moderate yellow brown; dry; no odor. | | Pulverzied bedrock or boulder. | |
| | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 80% angular gravel to 40mm, 20% angular fine to coarse sand; medium bluish gray (5G5/1); weathering surfaces are moderate yellow brown; dry; no odor. | | | |
| 10 | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 80% angular grovel to 40mm, 20% angular fine to coarse sand; medium bluish gray (5G5/1); weathering surfaces are moderate yellow brown; dry; no odor. | | Samples collected 9'-10' for lab analysis. | |
| | | | | | | Refusal at 10' bgs. | | | |
| | | | | | | Boring backfilled with Bentonite/Cement grout. | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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Engineering and Science

# BORING LOG

PEMACO, INC.
MAYWOOD, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION: -
DRILLER: Don Pearson
DATE BEGAN: 6/18/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: West of former UST near foundation, Building 205, North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/18/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-NG-205-3**

LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Hand Auger | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | Topsoil | | | |
| | | 4.3 | | | CL | SANDY LEAN CLAY: 65% semi-plastic clay, 25% angular fine to medium sand, 10% silt; moderate yellow brown (10Yr 5/4); damp; no odar. | | Sample collected 0.5-1 for lab analysis. | |
| | | 0 | | | SW | GRAVELLY WELL GRADED SAND: 70% angular fine to coarse sand, 30% angular gravel to 20mm; medium bluish gray (5G5/1) heovily mottled with moderate yellow brown; dry; no odor. | | Pulverzied boulder. | |
| | | 0 | | | SW | WELL GRADED SAND: 90% angular fine to coarse sand, 10% ongular gravel to 10mm; moderate yellow brown (10YR 5/4); dry; no odor. | | Friable weathered bedrock. | |
| 5 | | 0 | | | CL | SANDY LEAN CLAY: 70% semi-plastic clay, 30% angular fine to medium sand; moderate yellow brown (10YR 5/4) mottled with medium bluish gray; moist; no odor. | | Weathered bedrock. | |
| | | 0 | | | CL | SANDY LEAN CLAY: 70% semi-plastic clay, 30% angular fine to medium sand; moderate yellow brown (10YR 5/4) mottled with medium bluish gray; moist; no odor. | | Sample collected 7'-8' for lab analysis. | |
| | | | | | | Refusol at 8' bgs. | | | |
| | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.:
TOP OF CASING ELEVATION:
DRILLER:
DATE BEGAN: 6/26/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: North end of former UST, Building 241, North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/26/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-NG-241-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | SW | GRAVELLY WELL GRADED SAND: 50% fine to coarse sand, 40% gravel to 20mm, 10% silt; dark yellow brown; damp; no odor. | | | |
| 5 | | 0 | | | CL | LEAN CLAY W/ SILT: 70% semi-plastic clay, 20% silt, 10% fine to coarse angular sand; moderate yellow brown (10YR 5/4); trace pebbles and orgonics; moist; no odor. | | | |
| 10 | | 0 | | | CL | LEAN CLAY W/ SILT: 70% semi-plastic clay, 20% silt, 10% fine to coarse angular sand; moderate yellow brown (10YR 5/4); increasing sand content with depth; trace pebbles ond organics; moist; no odor. | | | |
| | | 0 | | | ML | SANDY SILT: 50% silt, 40% fine sand, 10% clay; moderate yellow brown; damp; no odor. | | Sampled collected at 11'-12' for lab analysis. | |
| 15 | | | | | | Refusal at 12' | | | |
| | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 20 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.:
TOP OF CASING ELEVATION:
DRILLER:
DATE BEGAN: 6/27/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: South end of former UST, Building 241, North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/27/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-NG-241-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | ML | SANDY SILT: 55% silt, 30% fine sand, 15% clay; moderate yellow brown (10YR 5/4); moist; medium stiff; no odor. | | | |
| 5 | | 0 | | | CH | FAT CLAY WITH SILT: 70% plastic clay, 20% silt, 10% angular fine to coarse sand; light olive gray (5Y 5/2) mottled with light brown; moist; medium stiff; no odor. | | Locally abundant angular pebbly intervals. | |
| 10 | | 0 | | | CH | FAT CLAY WITH SILT: 70% plastic clay, 20% silt, 10% angular fine to coarse sand; light olive gray (5Y 5/2) mottled with light brown; moist; medium stiff; no odor. | | | |
| | | 0 | | | SM | SILTY SAND: 50% subangular to angular fine to medium sand, 40% silt, 10% clay; moderate yellow brown (10YR 5/4); damp; no odor. | | Sample collected 11'-12' for lab analysis. | |
| | | | | | | Abrupt refusal @ 12' | | | |
| 15 | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 20 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/27/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Former supply line, Building 241, North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/27/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-NG-241-3**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | ML | SANDY SILT: 60% silt, 30% fine sand, 10% clay; moderate yellow brown (10YR 5/4); damp; no odor. | | | |
| | | 0 | | | | | | | |
| 5 | | 0 | | | SM | SILTY SAND: 60% subangular to angular fine to coarse sand, 40% silt; moderate yellow brown (10YR 5/4); damp; no odor. | | | |
| | | 0 | | | SM | SILTY SAND: 60% subangular to angular fine to coarse sand, 40% silt; with 10% angular rock fragments to 1cm; moderate yellowish brown (10YR 5/4); damp; no odor. | | Sample collected 8.5'–9.5' for lab analysis. | |
| 10 | | | | | | Refusal @ 9.5' | | | |
| | | | | | | Boring backfilled with Bentonite/ Cement Grout. | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/25/02
DRILLING METHOD: Hand Equipment
CONTRACTOR: TN&A

LOCATION: South end of former UST, Building 242, North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/25/02
GWL DATE/TIME:
DRILL EQUIPMENT: Hand Auger

**BORING No.: B-NG-242-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Hand Auger | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | GP | Gravel. | | | |
| | | 0 | | | SW | GRAVELLY WELL GRADED SAND: dark yellow brown; damp; no odor. | | | |
| | | | | | | Refusal @ 2.5' bgs.<br>No sample collected. Bottom of boring approx. 3' above former tank bottom. | | | |
| 5 | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Thomas Rowell
DATE BEGAN: 6/25/02
DRILLING METHOD: Hand Equipment
CONTRACTOR: TN&A

LOCATION: Downslope west from former UST, Building 242 North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/25/02
GWL DATE/TIME:
DRILL EQUIPMENT: Hand Auger

**BORING No.: B-NG-242-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Hand Auger | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | SW | GRAVELLY WELL GRADED SAND: moderate yellow brown; damp; no odor. | | | |
| | | 0 | | | | | | | |
| 5 | | | | | | Auger Refusal @ 4' bgs<br>No Sample collected, bottom of boring approx. 1' above former tank bottom. | | | |
| | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/25/02
DRILLING METHOD: Hand Equipment
CONTRACTOR: TN&A

LOCATION: North end of former UST, Building 242, North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/25/02
GWL DATE/TIME:
DRILL EQUIPMENT: Hand Auger

**BORING No.: B-NG-242-3**

LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Hand Auger | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | GW | WELL GRADED GRAVEL | | | |
| | | 25 | | | SW | GRAVELLY WELL GRADED SAND: moderate yellowish brown. | | | |
| | | 53 | | | CH | SANDY FAT CLAY: moderate yellowish brown mottled with olive gray; damp; faint hydrocarbon odor. | | | |
| 5 | | 54 | X | | | Gravel or Boulder encountered.<br>Refusal @ 5.5' bgs<br><br>Boring backfilled with Bentonite/Cement Grout. | | Samples collected 5'–5.5' for lab analysis. | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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# BORING LOG

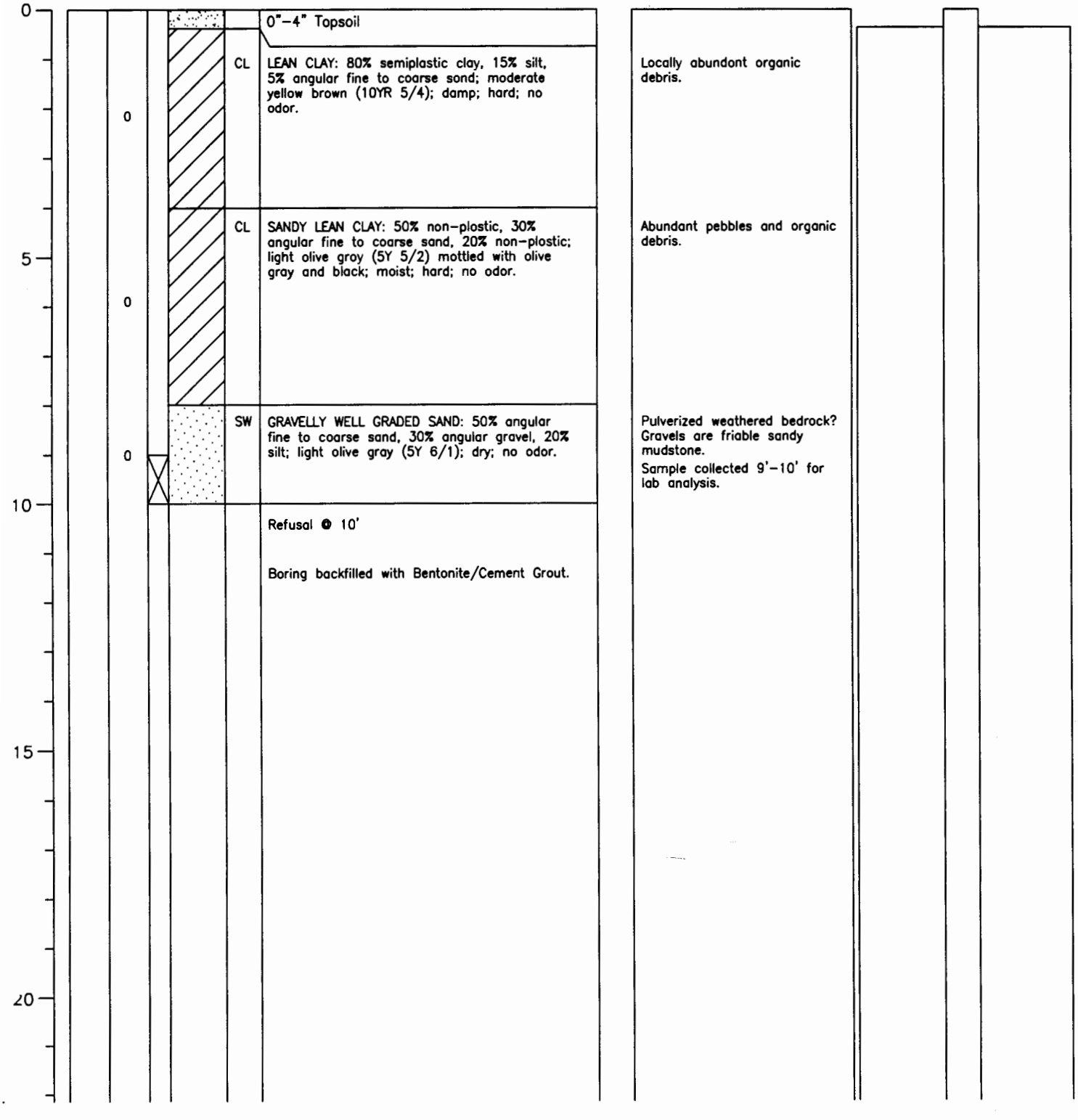
FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/01/02
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/27/02
DRILLING METHOD: Direct Push
CONTRACTOR: Greg Drilling

LOCATION: Former Suppy Line, East of Water Tank, North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/27/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-NG-EWT-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>CONTINUOUSLY CORED WITH MACROCORE | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | 0"–4" Topsoil | | | |
| | | 0 | | | CL | LEAN CLAY: 80% semiplastic clay, 15% silt, 5% angular fine to coarse sond; moderate yellow brown (10YR 5/4); damp; hard; no odor. | | Locally abundont organic debris. | |
| 5 | | 0 | | | CL | SANDY LEAN CLAY: 50% non-plastic, 30% angular fine to coarse sand, 20% non-plastic; light olive groy (5Y 5/2) mottled with olive gray and black; moist; hard; no odor. | | Abundant pebbles and organic debris. | |
| | | 0 | | | SW | GRAVELLY WELL GRADED SAND: 50% angular fine to coarse sand, 30% angular gravel, 20% silt; light olive gray (5Y 6/1); dry; no odor. | | Pulverized weathered bedrock? Gravels are friable sandy mudstone.<br>Sample collected 9'–10' for lab analysis. | |
| 10 | | | | | | Refusal @ 10'<br><br>Boring backfilled with Bentonite/Cement Grout. | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |



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Engineering and Science

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/01/02
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/27/02
DRILLING METHOD: Direct Push
CONTRACTOR: Greg Drilling

LOCATION: North end of Former UST, East of Water Tank, North Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/27/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-NG-EWT-2**

LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>CONTINUOUSLY CORED WITH MACROCORE | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | 0"–4" Topsoil | | | |
| | | 0 | | | CL | LEAN CLAY W/ SAND AND GRAVEL: 40% semi-plastic clay, 20% angular fine to course sand, 20% augular gravel to 30mm; 10% silt light olive gray mottled with dark yellowish orange; dry; no odor. | | Weathered mudstone with a cobbly layer @ 3' dark yellow orange (10YR 6/6), friable. | |
| 5 | | 0 | | | CH | SANDY FAT CLAY: 50% plastic clay, 30% angular fine to coarse sand, 10% gravel, 10% silt; light olive gray (5Y 6/1); damp; very stiff; no odor. | | Weathered metasediment? Medium bluish gray on fresh surface, very friable, locally plastic. | |
| | | 0 | | | CH | SANDY FAT CLAY: 50% plastic clay, 30% angular fine to coarse sand, 10% gravel, 10% silt; light olive gray (5Y 6/1); damp; very stiff; no odor. | | Sample collected 8'–9' for lab onalysis. | |
| 10 | | | | | | Refusal @ 9' | | | |
| | | | | | | Boring Backfilled with Bentonite/Cement Grout. | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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Engineering and Science

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/01/02
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN:
DRILLING METHOD: Direct Push
CONTRACTOR: Greg Drilling

LOCATION: South end of former UST, East of Water Tank, North Garrison
PAGE: 1 of 1
DATE COMPLETED:
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-NG-EWT-3**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (CONTINUOUSLY CORED WITH MACROCORE) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | CL | LEAN CLAY W/SILT AND SAND: 60% semi-plastic clay, 20% silt, 20% angular fine to coarse sand; light alive gray mottled with dark yellowish orange; damp; no odor. | | Cement debris in top 1'. Weathered mudstone. | |
| | | 0 | | | CL | LEAN CLAY W/SILT: 60% non-plastic clay, 20% silt; 10% angular fine to coarse sand, 10% angular gravel to 20mm; light olive gray; moist; no odor. | | Weathered mudstone, medium bluish gray on fresh surface. | |
| 5 | | | | | | Refusal @ 5' | | Sample collected 4' – 5' for lab analysis. | |
| | | | | | | Boring Backfilled with Bentonite/Cement Grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/21/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Suspected UST at deer pen location, Motor Pool Area
PAGE: 1 of 1
DATE COMPLETED: 6/21/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-DPT-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 70% angular gravel to 30mm, 30% fine to coarse sand; gravels are medium bluish gray (5B 5/1); sand is moderate yellowish brown; dry; no odor. | | Fill– moderate yellow brown | |
| | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 70% angular gravel to 30mm, 30% fine to coarse sand; gravels are medium bluish gray (5B 5/1); sand is moderate yellowish brown; dry; no odor. | | | |
| 5 | | 0 | | | SW | WELL GRADED SAND W/ GRAVEL: 80% subrounded to angular fine to coarse sand, 20% angular gravel to 30mm; moderate yellow brown (10YR 5/4); damp; no odor. | | | |
| | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 80% angular gravel to 30mm, 20% subangular fine to coarse sand; gravel are medium bluish gray, sands are moderate yellow brown; damp; no odor. | | Black staining (burnt?) and rust colored odd–shaped gravels at 7.8'. | |
| | | | | | | | | Samples collected 6'–7' for lab analysis. | |
| 10 | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 80% subrounded to subangular gravel to 20mm, 20% subrounded fine to coarse sand; olive black (5Y 2/1); wet; faint burnt odor. | | Possible staining. | |
| | | 0 | | | GP | POORLY GRADED GRAVEL: greenish gray (5GY 6/1); dry. | | Pulverized sandstone boulder or bedrock. | |
| | | | | | | Refusal @ 12' bgs | | | |
| | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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Engineering and Science

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION: -
DRILLER: Don Pearson
DATE BEGAN: 6/20/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Former drum storage area, motor pool
PAGE: 1 of 1
DATE COMPLETED: 6/20/02
GWL DATE/TIME: -
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-DSA-1**

LOGGED BY: Jacques Marcillac
GWL DEPTH: ?
GWL EQUIPMENT: water level meter
CHECKED BY: Perry Russell R.G.#5777

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | GW | WELL GRADED GRAVEL: 80% angular gravel, 10% fine sand, 10% semi-plastic clay; medium bluish gray (5G 5/1); damp; no odor. | | Subsurface is comprised of large pulverized boulders with pockets of moderate yellow brown sandy clay; filling spaces between the boulders. | |
| | | 0 | | | GW | WELL GRADED GRAVEL: 80% angular gravel, 10% fine sand, 10% semi-plastic clay; medium bluish gray (5G 5/1); damp; no odor. | | | |
| 5 | | | | | GW | WELL GRADED GRAVEL: 100% angular gravel to 40mm; medium bluish gray (5G 5/1); dry; no odor. | | Pulverized boulder. Sample collected at 6'–7' for lab analysis. | |
| | | 0 | | | | | | | |
| 10 | | | | | | SANDY LEAN CLAY: 50% plastic clay, 40% angular fine to medium sand; 10% angular gravel to 20mm; moderate yellow brown (10YR 5/4); moist; no odor. | | | |
| | | 0 | | | CL | | | | |
| | | 0 | | | GW | WELL GRADED GRAVEL: 100% angular gravel to 40mm; medium bluish gray; dry; no odor. | | Sample collected at 11'–12' for lab analysis. Pulverized boulder/ bedrock. | |
| | | | | | | Refusal at 12' bgs. | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/20/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Former Drum Storage Area, Motor Pod
PAGE: 1 of 1
DATE COMPLETED: 6/20/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-DSA-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH: ?
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Hand Auger | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | ML | SANDY SILT WITH CLAY: 40% silt, 35% fine to coarse sand, 20% clay, 5% gravel to 10mm; dark yellow brown; damp; hard; no odor. | | | |
| | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 80% subangular to angular gravel to 30mm, 20% angular fine to coarse sand; medium bluish gray; dry; no odor. | | Pulverized boulder | |
| 5 | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 80% subangular to angular gravel to 30mm, 20% angular fine to coarse sand; medium bluish gray; dry; no odor. | | Pulverized Boulder<br>Sample collected 5'–6' for lab analysis. | |
| 10 | | | | | | Refusal @ 12'<br>Boring backfilled with Betonite/Cement Grout. | | Samples collected 11'–12' for lab analysis. | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
LOCATION: Former Drum Storage Area, Motor Pool
**BORING No.: B-MP-DSA-3**

TOP OF CASING ELEVATION: -
PAGE: 1 of 1

DRILLER: Don Pearson
LOGGED BY: Jacques Marcillac

DATE BEGAN: 6/20/02
DATE COMPLETED: 6/20/02
GWL DEPTH: ?

DRILLING METHOD: DPT
GWL DATE/TIME: -
GWL EQUIPMENT: -

CONTRACTOR: Gregg Drilling
DRILL EQUIPMENT: Geoprobe
CHECKED BY: Jacques Marcillac RG 7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | GW | WELL GRADED GRAVEL: 90% subangular gravel to 40mm, 10% fine to coarse sand; medium bluish gray; dry; no odor. | | Pulverized boulders or bedrock Local 2" intervals of moderate yellow brown sand. | |
| 5 | | 0 | | | GW | WELL GRADED GRAVEL: 90% subangular gravel to 40mm, 10% fine to coarse sand; medium bluish gray; dry; no odor. | | Sample collected 5'–6' for lab analysis. | |
| | | 0 | | | GW | WELL GRADED GRAVEL: 90% subangular gravel to 40mm, 10% fine to coarse sand; medium bluish gray; dry; no odor. | | | |
| 10 | | | | | | Refusal @ 12' | | Sample collected 11'–12' for lab analysis. | |
| 15 | | | | | | | | | |
| -0 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/19/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: South end of oil change rack, Motor Pool Area
PAGE: 1 of 1
DATE COMPLETED: 6/19/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-OCR-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT: visual
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0.3 | | | GW | WELL GRADED GRAVEL WITH SAND: 60% angular gravel to 30mm, 20% angular fine to coarse sand, 10% silt, 10% clay; olive gray (5GY 5/1); damp; no odor. | | Fill (?) | |
| | | 1.0 | | | GP | POORLY GRADED GRAVEL: 90% subangular gravel to 40mm, 10% angular fine to coarse sand; light olive gray (5Y 5/1); dry; no odor. | | Shattered boulder or bedrock? | |
| 5 | | 0.3 | | | GW | SANDY GRAVEL: 60% subangular gravel, 40% subangular fine to medium sand; medium bluish gray gravels in medium yellow brown sand/ silt matrix; damp; no odor. | | Sample collected 5'–6' for lab analysis. | |
| | | 0.2 | | | SW | GRAVELLY WELL GRADED SAND: 80% subrounded to subangular fine to coarse sand, 20% subangular gravel to 30mm; olive gray (5Y 4/1); moist; no odor. | | Poor recovery. | |
| 10 | | 0 | | | GP | POORLY GRADED GRAVEL: 100% angular gravel to 40mm; medium bluish gray (5B 5/1); moist to wet; no odor. | | Poor recovery.<br>Shattered bedrock or boulder.<br>Wet @ 15.5' | |
| 15 | | 0 | | | GP | POORLY GRADED GRAVEL: 100% angular gravel to 40mm; medium bluish gray (5B 5/1); saturated; no odor. | ▽ | Poor recovery.<br>Groundwater sample collected at 15'–20' | |
| 20 | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |

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# BORING LOG

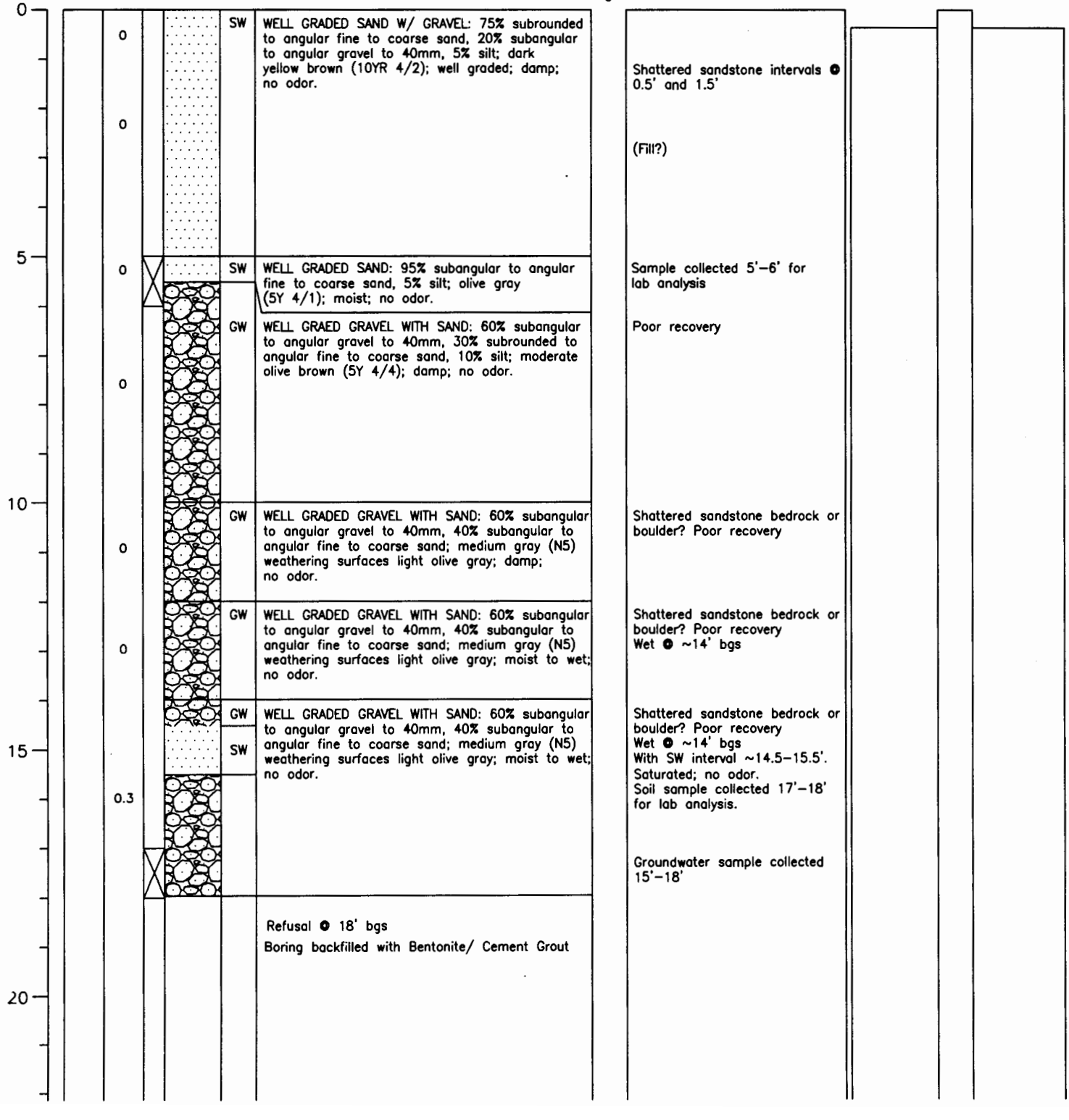
FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/18/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Center of oil Change rack, Motor Pool Area
PAGE: 1 of 1
DATE COMPLETED: 6/18/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-OCR-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH: 14.5'
GWL EQUIPMENT: visual
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | SW | WELL GRADED SAND W/ GRAVEL: 75% subrounded to angular fine to coarse sand, 20% subangular to angular gravel to 40mm, 5% silt; dark yellow brown (10YR 4/2); well graded; damp; no odor. | | Shattered sandstone intervals ⊙ 0.5' and 1.5' | |
| | | 0 | | | | | | (Fill?) | |
| 5 | | 0 | | | SW | WELL GRADED SAND: 95% subangular to angular fine to coarse sand, 5% silt; olive gray (5Y 4/1); moist; no odor. | | Sample collected 5'–6' for lab analysis | |
| | | 0 | | | GW | WELL GRAED GRAVEL WITH SAND: 60% subangular to angular gravel to 40mm, 30% subrounded to angular fine to coarse sand, 10% silt; moderate olive brown (5Y 4/4); damp; no odor. | | Poor recovery | |
| 10 | | 0 | | | GW | WELL GRADED GRAVEL WITH SAND: 60% subangular to angular gravel to 40mm, 40% subangular to angular fine to coarse sand; medium gray (N5) weathering surfaces light olive gray; damp; no odor. | | Shattered sandstone bedrock or boulder? Poor recovery | |
| | | 0 | | | GW | WELL GRADED GRAVEL WITH SAND: 60% subangular to angular gravel to 40mm, 40% subangular to angular fine to coarse sand; medium gray (N5) weathering surfaces light olive gray; moist to wet; no odor. | | Shattered sandstone bedrock or boulder? Poor recovery<br>Wet ⊙ ~14' bgs | |
| 15 | | 0.3 | | | GW<br>SW | WELL GRADED GRAVEL WITH SAND: 60% subangular to angular gravel to 40mm, 40% subangular to angular fine to coarse sand; medium gray (N5) weathering surfaces light olive gray; moist to wet; no odor. | | Shattered sandstone bedrock or boulder? Poor recovery<br>Wet ⊙ ~14' bgs<br>With SW interval ~14.5–15.5'.<br>Saturated; no odor.<br>Soil sample collected 17'–18' for lab analysis.<br>Groundwater sample collected 15'–18' | |
| | | | | | | Refusal ⊙ 18' bgs<br>Boring backfilled with Bentonite/ Cement Grout | | | |
| 20 | | | | | | | | | |



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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/19/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: North end of oil change rack, Motor Pool Area
PAGE: 1 of 1
DATE COMPLETED: 6/19/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-OCR-3**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 3.1 | | | GP | POORLY GRADED GRAVEL: 90% subangular to angular gravel to 40mm, 10% fine to coarse sand; greenish gray (5GY 6/1); damp; faint hydrocarbon odor. | | Pulverized boulder or bedrock | |
| 5 | | 0.3 | | | GP | POORLY GRADED GRAVEL: 90% subangular to angular gravel to 40mm, 10% fine to coarse sand; greenish gray (5GY 6/1); damp; no odar. | | Pulverized boulder or bedrock<br>Samples collected 5'–6' for lab analysis . | |
| | | 0.9 | | | SW | WELL GRADED SAND W/ GRAVEL: 60% subrounded to subangular fine to coarse sand, 40% angular gravel to 20mm; olive gray (5Y 4/1); moist; no odor. | | Gravels are bedrock or boulder fragments | |
| 10 | | 0.3 | | | GP | POORLY GRADED GRAVEL: 100% angular gravel to 40mm; medium bluish gray (5B 5/1); dry; no odor. | | Pulverized sandstone/ greenish black when wet<br>Samples collected 10'–11' for lab analysis . | |
| | | | | | | Refusal @ 11'.<br>Boring backfilled with Bentonite/Cement Grout. | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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Engineering and Science

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN:
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: West of Vehicle Lift rack, Motor pool Area.
PAGE: 1 of 1
DATE COMPLETED:
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-VLR-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | | Concrete | | | |
| | | | | | GW | WELL GRADED GRAVEL: 80% subangular gravel to 40mm, 20% subangular fine to coarse sand; gravel is medium bluish gray on fresh surfaces (5B 5/1), weathering surfaces and sand is dark yellow brown; damp; no odor. | | Fill; Large fill gravel with packets of silty sand. | |
| | | | | | | | | VOC and TPHg Samples from silty sand pockets. Samples collected 4'–5' for lab analysis. | |
| 5 | | | | | | Refusal @ 5'. | | | |
| | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/19/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: North of Vehicle Lift rack, Motor Poll Area
PAGE: 1 of 1
DATE COMPLETED: 6/19/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-VLR-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | Concrete | | | |
| | | 0 | | | SW | GRAVELLY WELL GRADED SAND: 60% fine to coarse sand, 30% subrounded to subangular gravel to 20mm; 10% silt; moderate yellow brown (10YR 5/4); damp; no odor. | | | |
| | | 0 | | | GP | POORLY GRADED GRAVEL: medium bluish gray (5B 5/1); damp; no odor. | | Samples collected 2'–3' for lab analysis. | |
| | | | | | | Refusal @ 3'. | | | |
| 5 | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/19/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: South of Vehicle Lift rack, Motor Poll Area
PAGE: 1 of 1
DATE COMPLETED: 6/19/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-VLR-3**

LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | Concrete | | | |
| | | | | | SW | GRAVELLY WELL GRADED SAND: | | | |
| | | 0 | | | | Refusal @ 1'. | | | |
| | | | | | | No samples collected | | No Recovery | |
| | | 0 | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 5 | | | | | | | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/19/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: East of Vehicle Lift rack, Motor Poll Area
PAGE: 1 of 1
DATE COMPLETED: 6/19/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-VLR-4**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | Concrete | | | |
| | | 0 | | | GW | WELL GRADED GRAVEL: 80% subangular gravel to 30mm, 20% fine to coarse sand; olive gray (5Y 4/1); damp; no odor. | | | |
| | | 0 | | | GP | POORLY GRADED GRAVEL: 100% angular gravel to 30mm; medium bluish gray (5B 5/1); dry; no odor. | | Pulverized sandstone boulders or cobble | |
| | | 0 | | | SW | WELL GRADED SAND: 80% subrounded to subangular fine to coarse sand, 20% subrounded gravel to 20mm; olive gray (5Y 4/1); moist; no odor. | | Possible hydrocarbon staining. Sample collected from 4'–5' for lab analysis. | |
| 5 | | | | | GW | Pulverized boulders/ cobbles; dry; no odor. | | | |
| | | 0 | | | | | | | |
| | | | | | | Refusal @ 8'. | | | |
| | | | | | | Boring backfilled with Bentonite/ Cement Grout | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/19/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: South end of Wash Rack, Motor Pool Area
PAGE: 1 of 1
DATE COMPLETED: 6/19/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-WR-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 60% subangular gravel to 30mm, 30% fine to coarse sand, 10% silt; dark yellow brown (10YR 4/2); damp; no odor. | | Fill | |
| 5 | | 0 | | | GW | WELL GRADED GRAVEL W/ SAND: 80% subrounded to subangular gravel to 30mm, 20% subrounded to subangular fine to coarse sand; moderate yellow brown (10YR 5/4); damp; no odor. | | Fill<br>Sample collected 5'–6' for lab analysis. | |
| 10 | | | | | | Boring backfilled with Bentonite/Cement grout. | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

**T N & Associates, Inc.**
**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/19/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: North end of Wash Rack, Motor Pool Area
PAGE: 1 of 1
DATE COMPLETED: 6/19/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-MP-WR-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | GW | WELL GRADED GRAVEL W/SAND: 75% subrounded gravel to 30mm, 20% subrounded fine to coarse sand, 5% silt; dark yellow brown (10YR 4/2); damp; no odor. | | Fill | |
| | | 0 | | | GW | WELL GRADED GRAVEL W/SAND: 75% subrounded gravel to 30mm, 20% subrounded fine to coarse sand, 5% silt; dark yellow brown (10YR 4/2); damp; no odor. | | Fill | |
| 5 | | 0 | | | GW | WELL GRADED GRAVEL W/SAND: 75% subrounded gravel to 30mm, 20% subrounded fine to coarse sand, 5% silt; dark yellow brown (10YR 4/2); damp; no odor. | | Fill<br>Samples collected 5'–6' for lab analysis. | |
| | | | | | | Refusal @ 5'. | | | |
| | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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Engineering and Science

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/20/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Downslope from North AST, East Garrison
PAGE: 1 of 1
DATE COMPLETED: 6/20/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-EG-AST-1**

LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | 0-6" Topsoil | | | |
| | | 0 | | | CH | FAT CLAY WITH SILT AND SAND: 55% plastic clay, 20% angular fine to coarse sand, 5% subangular gravel to 30mm; dark yellowish brown; moist; soft; no odor. | | | |
| 5 | | 0 | | | CH | FAT CLAY WITH SILT AND SAND: as above with increasing gravel content with depth (5-15%); moist; no odor. | | | |
| 10 | | 0 | | | CH | FAT CLAY WITH SILT AND SAND: as above with increasing gravel content with depth ;moist; no odor. | | | |
| | | 0 | | | CH | FAT CLAY: 80% plastic clay, 10% silt; 10% sand; dark greenish gray (5GY 4/1); moist; soft; faint hydrocorbon odor. | | possible hydrocarbon stoining @ 12'-16' | |
| 15 | | 0 | | | SDST | SANDSTONE BEDROCK OR BOULDER: dark greenish gray; dry; no odor. | | Samples collected 15'-16' for lab analysis. | |
| | | | | | | Refusal @ 16' | | barely friable | |
| | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 20 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/20/02
DRILLING METHOD:
CONTRACTOR:

LOCATION: Downslope from South AST, East Garrison
PAGE: 1 of 2
DATE COMPLETED: 6/20/02
GWL DATE/TIME: 6/20/02
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-EG-AST-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH: 24.5'
GWL EQUIPMENT: visual
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | 0–6" Topsoil | | | |
| | | 0 | | | ML | SANDY SILT WITH CLAY: 40% silt, 30% angular fine to coarse sand, 20% clay, 10% angular gravel to 20mm; moderate yellow brown (6YR 5/4); moist; no odor. | | | |
| | | 0 | | | SM | SILTY CLAYEY SAND: 60% angular fine to coarse sand, 20% silt, 20% clay; dark yellowish brown (10YR 4/2); damp; no odor. | | | |
| 5 | | 0 | | | CH | SILTY FAT CLAY: 60% plastic clay, 30% silt, 10% angular fine to coarse sand; dark greenish gray; moist; soft; faint hydrocarbon odor. | | | |
| | | 33.9 | | | CH | SILTY FAT CLAY: 60% plastic clay, 30% silt, 10% angular fine to coarse sand; dark greenish gray; moist; soft; faint hydrocarbon odor. | | Cored through cobble at 10'<br>Sample collected 10'–11' for lab analysis. | |
| 10 | | 0 | | | CH | SANDY FAT CLAY: 50% plastic clay, 30% angular fine to coarse sand, 10% silt, 10% angular gravel to 20mm; moist; soft; faint hydrocarbon odor. | | | |
| | | 0 | | | CH | SILTY FAT CLAY: 60% plastic clay, 30% silt, 10% angular fine to coarse sand; dark greenish gray; moist; soft; faint hydrocarbon odor. | | | |
| 15 | | 0.1 | | | CH | FAT CLAY: 80% plastic clay, 10% silt, 10% angular fine to coarse sand; dark greenish gray (5GY 4/1) mottled with medium bluish gray; moist; stiff; faint hydrocarbon odor. | | | |
| 20 | | 0 | | | CH | FAT CLAY: 80% plastic clay, 10% silt, 10% angular fine to coarse sand; dark greenish gray (5GY 4/1) mottled with medium bluish gray; moist; faint hydrocarbon odor. | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
ATE COMPLETED: 6/20/02

LOCATION: Downslope from South AST, East Garrison
PAGE: 2 of 2

**BORING No.: B-EG-AST-2**

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| | | 0 | | | CH | FAT CLAY: 80% clay, 10% silt, 10% angular fine to coarse sand; dark greenish gray (5GY 4/1) mottled with medium bluish gray; moist; stiff; faint hydrocarbon odor. | | | |
| | | 0.5 | | | CH | FAT CLAY WITH SAND: 80% plastic clay, 20% angular fine to coarse sand; moist to wet; very stiff; no odor. | ▽ | Wet from 23–24.5', saturated<br>● 24.5' | |
| 25 | | 0 | | | CH | FAT CLAY WITH SILT: 70% plastic clay, 20% silt, 10% angular fine to coarse sand; greenish black (5GY 2/1); saturated; no odor. | | Foliated highly weathered bedrock. | |
| | | | | | | Refusal ● 27' | | Groundwater sample collected 25'–27' for lab analysis. | |
| | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 30 | | | | | | | | | |
| 35 | | | | | | | | | |
| 40 | | | | | | | | | |
| 45 | | | | | | | | | |

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Engineering and Science

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/21/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Former AST, Ayala Cove
PAGE: 1 of 1
DATE COMPLETED:
GWL DATE/TIME: 6/21/02
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-AC-AST-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | GW | SANDY WELL GRADED GRAVEL: 60% angular gravel to 30mm, 30% subangular fine to coarse sand, 10% silt; pale yellowish brown (10YR 6/2); dry; no odor. | | | |
| | | 0 | | | GW | WELL GRADED GRAVEL WITH SAND: 80% angular gravel to 20mm, 20% angular fine to coarse sand; dark yellowish brown (10YR 6/6); dry; no odor. | | Semi-indurated to well indurated sandstone. Fresh surface of bedrock frags are greenish gray varying to brownish gray. | |
| | | | | | | Refusal @ 4' bgs | | Samples collected 3.5'-4' for TPH and VOC's. | |
| 5 | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/25/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Former AST, Ayala Cove
PAGE: 1 of 1
DATE COMPLETED: 6/25/02
GWL DATE/TIME: 6/25/02
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-AC-AST-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | SW | SILTY GRAVELLY WELL GRADED SAND: 60% subrounded to angular fine to coarse sand, 20% silt, 20% subrounded to angular gravel to 20mm; moderate yellow brown (10YR 5/4); dry; no odor. | | Topsoil | |
| | | 0 | | | GP | POORLY GRADED GRAVEL W/ SAND: 80% angular gravel to 30mm, 20% fine to coarse sand; dark yellowish orange (10YR 6/6); dry; no odar. | | Pulverized bedrock (?) or boulder | |
| | | 0 | | | GW | SANDY WELL GRADED GRAVEL: 60% subrounded gravel to 30mm, 40% subrounded to subangular fine to coarse sand; dark yellowish brown (10YR 4/2); moist to wet; no odor. | | | |
| 5 | | | | | | | | Poor recovery; wet at 5.5', not enough material for TPH sample, VOC's only | |
| | | | | | | Refusal @ 6' | | | |
| | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/21/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Former Disinfection Building, Ayala Cove
PAGE: 1 of 1
DATE COMPLETED: 6/21/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-AC-FDB-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | ML | SILT WITH CLAY: 70% silt, 20% non-plastic clay, 10% fine sand; dusky yellowish brown (10YR 2/2); damp; no odor. | | | |
| | | 0 | | | CL | SILTY LEAN CLAY: 60% semi-plastic clay, 30% silt, 10% fine to medium sand; dusky yellowish orange (10YR 6/6); moist; no odor. | | Locally semi-indurated, easily friable, weathered ash layer or bedrock? Pale brown (5YR 5/2) chert fragments at 3.5' | |
| 5 | | 0 | | | CL | SILTY LEAN CLAY: 60% semi-plastic clay, 30% silt, 10% fine to medium sand; dusky yellowish orange (10YR 6/6); moist; no odor. | | Increasingly weathered and plastic with depth. | |
| | | | | | | Refusal @ 6' | | Samples collected 5'-5.5' for cyanide and pesticides. | |
| | | | | | | Boring backfilled with Bentonite/Cement grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/21/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Former Disinfection Building, Ayala Cove
PAGE: 1 of 1
DATE COMPLETED: 6/21/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-AC-FDB-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | ML | SILT WITH CLAY: 70% silt, 20% non-plastic clay, 10% sand; dusky yellowish brown (10YR 2/2); damp; no odor. | | Topsoil with rootlets | |
| | | 0 | | | GW | WELL GRADED GRAVEL: 80% subrounded to subangular gravel to 30mm, 20% fine to coarse sand; dark yellowish orange (10YR 6/6); dry; no odor. | | Gravels are bedrock fragments | |
| 5 | | 0 | | | GW | CLAYEY WELL GRADED GRAVEL: 60% angular gravel to 30mm, 30% plastic clay, 10% fine to coarse sand; dark yellowish orange (10YR 6/6); moist to wet. | | Samples collected 5'–5.5' for cyanide and pesticides. Weathered bedrock | |
| | | | | | | Refusal @ 6' | | | |
| | | | | | | Boring backfilled with Bentonite/Cement grout. | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/17/02
DRILLING METHOD: DPT
CONTRACTOR: Vironex

LOCATION: Former UST between buildings 331 and 332, Ayala Cove
PAGE: 1 of 1
DATE COMPLETED: 6/17/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-AC-332-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH: ?
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | Asphalt | | | |
| | | 0 | | | CH | FAT CLAY W/SILT: 80% plastic clay, 15% silt, 5% fine to medium sand; black (N-1); moist; no odor. | | | |
| 5 | | 0 | | | OH | ORGANIC CLAY: 80% plastic clay, 15% silt, 5% fine sand; black (N-1) mottled with organics; moist; soft; faint organic odor. | | Abundant Organic Material. | |
| | | 0 | | | CH | FAT CLAY WITH SILT: 80% plastic clay, 20% silt; olive gray (5Y 6/1); moist; medium stiff; no odor. | | | |
| 10 | | 0 | | | ML | SILT WITH SAND AND CLAY: 60% non-plastic silt, 20% clay, 20% angular fine to medium sand; moderate yellow brown (10YR 5/4) mottled with greenish gray; damp; no odor. | | | |
| | | 0 | | | CL | SILTY LEAN CLAY: 60% semi-plastic clay, 30% silt, 10% fine sand; moderate yellow brown (10YR 5/4); damp; no odor. | | Sample collected 14.5' - 15' for TPH and VOC's. | |
| 15 | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 20 | | | | | | | | | |

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Engineering and Science

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/17/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: Former UST between buildings 331 and 332, Ayala Cove
PAGE: 1 of 1
DATE COMPLETED: 6/17/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-AC-332-2**
LOGGED BY: Jacques Marcillac
GWL DEPTH: ?
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | | | | | Asphalt | | | |
| | | 0 | | | CH | SANDY SILTY CLAY: 40% plastic clay, 30% silt, 30% subangular fine to coarse sand; moderate yellow brown (10YR 5/4) mottled with black; moist; no odor. | | Heterogeneous Fill Material | |
| | | 0 | | | CH | SANDY SILTY CLAY: 40% plastic clay, 30% silt, 30% subangular fine to coarse sand; moderate yellow brown (10YR 5/4) mottled with black; moist; no odor. | | | |
| 5 | | 1.2 | | | OH | ORGANIC CLAY: 80% clay, 20% silt, 5% fine sand; black (N1) slightly mottled with dark green gray nodules; moist; faint peat odor. | | Abundant organic material | |
| | | 0.5 | | | CH | FAT CLAY WITH SILT: 80% plastic clay, 20% silt; olive gray (5Y 6/1); moist; medium stiff; no odor. | | | |
| 10 | | 0.6 | | | ML | SILT WITH SAND AND CLAY: 60% silt, 20% angular fine to medium sand, 20% non-plastic clay; moderate yellow brown (10YR 5/4) mottled with greenish gray; damp; no odor. | | | |
| | | 1.3 | | | CL | LEAN CLAY: 60% semi-plastic clay, 30% silt, 10% fine sand; moderate yellow brown (10YR 5/4); moist; no odor. | | Sample collected @ 14'-15' for TPH | |
| 15 | | | | | | Boring backfilled with Bentonite/Cement Grout. | | | |
| 20 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION: -
DRILLER: Don Pearson
DATE BEGAN: 6/21/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: South side of former UST, 10' west of visitor center, Ayala Cove
PAGE: 1 of 1
DATE COMPLETED: 6/21/02
GWL DATE/TIME: -
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-AC-VC10-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH: ?
GWL EQUIPMENT: -
CHECKED BY: Jacques Marcillac RG 7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | ML | SILT: 90% non-plastic silt, 5% clay, 5% fine sand; dark yellow brown (10YR 4/2); damp; stiff; no odor. | | | |
| | | 0 | | | ML | SILT: 90% silt, 5% clay, 5% sand; moderate yellow brown (10YR 5/4) mottled with moderate brown and black; damp; no odor. | | | |
| 5 | | 0 | | | ML | CLAYEY SILT: 60% semi-plastic silt, 30% clay, 10% fine sand; moderate yellow brown (10YR 5/4) mottled with brown and black; moist; stiff; no odor. | | | |
| | | 0 | ☒ | | ML | CLAYEY SILT: 60% semi-plastic silt, 30% clay, 10% fine sand; moderate yellow brown (10YR 5/4) mottled with brown and black; moist; very stiff; no odor. | | Sample collected 10'-10.5' for TPH and VOCs. | |
| 10 | | | | | | Refusal @ 11' bgs<br>Boring backfilled with Bentonite/ Cement Grout | | | |
| 15 | | | | | | | | | |
| 0 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION:
DRILLER: Don Pearson
DATE BEGAN: 6/26/02
DRILLING METHOD: Hand Equipment
CONTRACTOR: TN&A

LOCATION: Northside of former UST, 10' West of Visitor Center, Ayala Cove
PAGE: 1 of 1
DATE COMPLETED: 6/26/02
GWL DATE/TIME:
DRILL EQUIPMENT: Hand Auger

**BORING No.: B-AC-VC10-2**
LOGGED BY: Thomas Rowell
GWL DEPTH: ?
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Hand Auger | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | ML | SILT: 90% silt; 5% clay; 5% gravel; dusky yellowish brown (10YR 2/2). | | | |
| | | 0 | | | CL | SANDY CLAY: moderate yellowish brown (10YR 5/4), mottled with light olive gray; trace dark staining. | | Sample collected at 4.5' for TPH | |
| 5 | | | | | | Refusal @ 4.75'<br><br>Boring backfilled with Bentonite/Cement Grout | | | |
| 10 | | | | | | | | | |
| 15 | | | | | | | | | |
| 20 | | | | | | | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION: -
DRILLER: Don Pearson
DATE BEGAN: 6/26/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: adjacent to fill port, north side of former UST, 80' West of visitors center, Ayala Cove
PAGE: 1 of 1
DATE COMPLETED: 6/26/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-AC-VC80-1**
LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques MarcillacR.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | CH | FAT CLAY: 60% plastic clay, 30% silt, 10% fine sand; dark yellow brown (10YR 4/2); moist; stiff; trace angular rock fragments to 1cm; no odor. | | | |
| 5 | | 0 | | | CL | LEAN CLAY: 60% non-plastic clay, 20% silt, 20% fine to coarse sand; pale yellowish brown (10YR 6/2) heavily mottled with dark yellowish orange; damp; stiff to hard; locally abundant dark angular pebbles; no odor. | | | |
| 10 | | 0 | | | CL | LEAN CLAY: 50% non-plastic clay, 30% fine to coarse angular sand, 20% silt; light olive gray (5Y 5/2) heavily mottled with light brown (5YR 5/6); moist; hard; no odor. | | | |
| 15 | | 0 | | | CL | LEAN CLAY: 50% non-plastic clay, 30% fine to coarse angular sand, 20% silt; light olive gray (5Y 5/2) heavily mottled with light brown (5YR 5/6); moist; no odor. | | Sample collected at 15'-16' for lab analysis | |
| 0 | | | | | | Boring TD = 16'<br><br>Boring backfilled with Bentonite/Cement Grout | | | |

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**Engineering and Science**

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION: -
DRILLER: Don Pearson
DATE BEGAN: 6/26/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: south side of former UST, 80' West of Visitor Center
PAGE: 1 of 1
DATE COMPLETED: 6/26/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-AC-VC80-2**

LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION<br>ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED. | GW ELEVATION | REMARKS<br>Continuous Core | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | CL | LEAN CLAY: 50% non-plastic clay, 30% silt, 20% fine to medium angular sand; dark yellow brown (10YR 4/2) mottled with dark yellow orange; moist; no odor. | | | |
| | | 0 | | | CL | LEAN CLAY: 60% non-plastic clay, 20% silt, 20% fine to coarse angular sand; pale yellow brown (10YR 6/2) heavily mottled with dark yellow orange; moist; locally abundant angular pebbles and charcoal; no odor. | | | |
| 5 | | 0 | | | CL/ ML | LEAN SILTY CLAY W/ SAND: 40% non-plastic clay, 40% silt, 20% fine sand; moderate yellow brown (10YR 5/4) heavily mottled with pale yellowish orange; damp; semi-indurated; no odor. | | | |
| | | 0 | | | CL/ ML | LEAN SILTY CLAY W/ SAND: 40% non-plastic clay, 40% silt, 20% fine sand; moderate yellow brown (10YR 5/4) heavily mottled with pale yellowish orange; damp; no odor. | | | |
| 10 | | 0 | | | | | | | |
| | | 0 | | | | | | Sample collected at 15'-16' for lab analysis. | |
| 15 | | 0 | | | | Boring TD = 16' | | | |
| | | | | | | Boring backfilled with Bentonite/ Cement Grout. | | | |
| 20 | | | | | | | | | |

**TN & A** T N & Associates, Inc.
Engineering and Science

# BORING LOG

FORT MCDOWELL
ANGEL ISLAND, CALIFORNIA

PROJECT No.: 2001070/02/2041
TOP OF CASING ELEVATION: -
DRILLER: Don Pearson
DATE BEGAN: 6/26/02
DRILLING METHOD: DPT
CONTRACTOR: Gregg Drilling

LOCATION: adjacent to former UST fuel line 80' west of Visitors Center, Ayala Cove
PAGE: 1 of 1
DATE COMPLETED: 6/26/02
GWL DATE/TIME:
DRILL EQUIPMENT: Geoprobe

**BORING No.: B-AC-VC80-3**

LOGGED BY: Jacques Marcillac
GWL DEPTH:
GWL EQUIPMENT:
CHECKED BY: Jacques Marcillac R.G.#7421

| DEPTH (feet) | BLOW COUNT (blows/6") | PID (ppm) | SAMPLE | GRAPHIC | USCS | DESCRIPTION (ALL LITHOLOGIC PERCENTAGES ARE APPROXIMATE UNLESS OTHERWISE NOTED.) | GW ELEVATION | REMARKS (Continuous Core) | WELL CONSTRUCTION |
|---|---|---|---|---|---|---|---|---|---|
| 0 | | 0 | | | CH | FAT CLAY WITH SILT AND SAND: 60% plastic clay, 25% silt, 15% fine to medium sand; moderate yellow brown (10YR 5/4) mottled with dark organic debris; damp; stiff; no odor. | | | |
| | | 0 | | | | | | | |
| 5 | | 0 | | | CL | SILTY LEAN CLAY WITH SAND: 50% non-plastic clay, 30% silt, 20% fine to medium sand; moderate yellow brown (10YR 5/4) mottled with dark yellow oronge; moist; hard; locally abundant chorcoal; no odor. | | | |
| | | 0 | | | | | | | |
| 10 | | 0 | | | CH | FAT CLAY WITH SILT AND SAND: 60% plastic clay, 20% silt, 20% fine, to coorse sand; light olive gray (5Y 5/2) mottled with light brown; moist; trace orgonic debris; no odor. | | | |
| | | 0 | | | | | | | |
| 15 | | 0 | | | CH | FAT CLAY WITH SILT AND SAND: 60% plastic clay, 20% silt, 20% fine, to coarse sand; light olive gray (5Y 5/2) mottled with light brown; moist; trace angular rock fragments to 10mm; no odor. | | Sample collected at 15'-16' for lab analysis. | |
| | | | | | | Boring TD = 16' | | | |
| | | | | | | Boring backfilled with Bentonite/cement grout. | | | |
| 20 | | | | | | | | | |

# APPENDIX F

# TPH FINGERPRINT ANALYSIS DISCUSSION

# TPH Fingerprint Analysis Discussion
# Fort McDowell / Angel Island

## 1.0 Introduction

Environmental samples were collected for total petroleum hydrocarbons (TPH) analyses in support of the Environmental Site Investigation\Preliminary Assessment (PA\SI) at Fort McDowell/Angel Island, Marin County, California. Samples were taken by T N & Associate, Inc., (TN&A) staff at an aboveground storage tank (AST) location and at a marine beach location and delivered under chain-of-custody to Curtis & Tompkins, Ltd., laboratory of Berkeley, CA. The samples were analyzed for solvent extractable TPH by EPA SW-846 Method 3510\8015B. The resulting chromatographic profiles (fingerprints) were evaluated to determine if the type of TPH present in the AST and beach samples might have originated from a similar source of contamination.

## 2.0 AST Samples

Two soil samples designated by the field team as sample ID's EG1005 and EG2005 were collected from the AST site. Extractable TPH analyses were performed and the laboratory provided analytical data packages with sample test results and laboratory raw data including gas chromatograms. Chromatograms were also provided for diesel fuel and motor oil reference standards analyses under the same experimental conditions.

A comparison of the AST samples to the diesel fuel reference standard chromatogram provides evidence that diesel fuel is absent from the soil samples. Each chromatogram shows evidence of a petroleum hydrocarbon profile. However, the chromatographic apex of the profile appearing on the analysis of samples EG1005 and EG2005 is approximately 10 minutes; whereas the diesel fuel reference standard apex is present around 7 minutes.

When compared to the motor oil reference standard the data suggests a type of lubricating oil or high boiling point fuel oil is present in the soil sample. A second chromatographic apex appears in the chromatographic profile for EG1005 and EG2005 at approximately 17 minutes. A third chromatographic shoulder appears on the profile for EG1005 and EG2005 at approximately 21 minutes. The motor oil chromatographic apex appears at approximately 15 minutes.

The AST sample appear to have two and possibly three type of hydrocarbon mixtures with predominate retention times of 10, 17, and 21 minutes. The chromatographic profiles for AST samples EG1005 and EG2005 are included in Attachment A. The chromatographic profiles for the diesel fuel and motor oil reference standards are included in Attachment C.

## 3.0 Beach Samples

Eight soil samples designated NG1011, NG1012, NG1013, NG1014, NG1015, NG1016, NG1017, and NG1018 were collected from the beach site. Extractable TPH analyses were performed. Beach sample analyses were analyzed in conjunction with reference standards for diesel fuel and motor oil. The chromatograms for samples NG1011 through NG1018 were compared to the AST samples EG1005 and EG2005 to determine if they had similar chromatographic profiles.

The chromatographic profiles for the eight beach samples NG1011 through NG1018 exhibited the second chromatographic apex at approximately 17 minutes suggesting a lubricating oil product

similar to the one found in AST samples EG1005 and EG2005.

The chromatographic profiles for five of the eight beach samples (NG1012, NG1013, NG1015, NG1016, and NG1017) exhibited the first apex at approximately 10 minutes indicating a petroleum product similar to the one found in AST samples EG1005 and EG2005. Samples NG1011, NG1014, and NG1018 exhibited a significant peak sloping consistent with a petroleum hydrocarbon mixture exposed to weathering conditions that may be present at a marine beach.

The chromatographic results for four of the eight beach samples (NG1014, NG1015, NG1016, and NG1018) exhibited the third shoulder at approximately 21 minutes similar to the one found in AST samples EG1005 and EG2005.

The chromatographic results for beach samples NG1011 through NG1018 are included in Attachment B.

## 4.0 Conclusions

There is strong evidence to suggest that the petroleum hydrocarbons present in beach samples NG1011 through NG1018 may be from a similar source materials as the petroleum hydrocarbons found in AST sample EG1005 and EG2005. Strong evidence is also present that indicates significant weathering and loss of the lighter TPH compounds in the beach samples.

# ATTACHMENT A

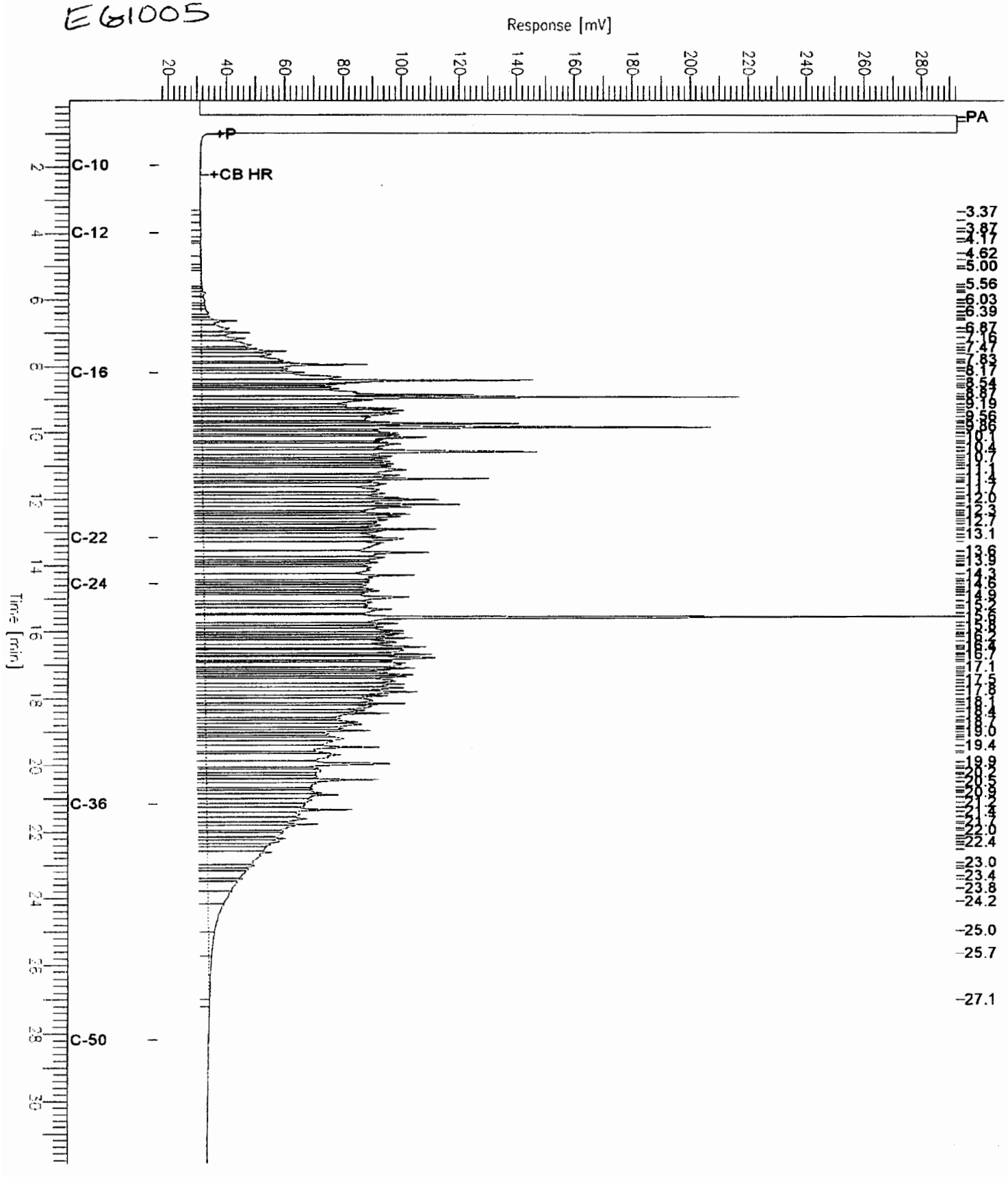
AST Samples EG1005 and EG2005

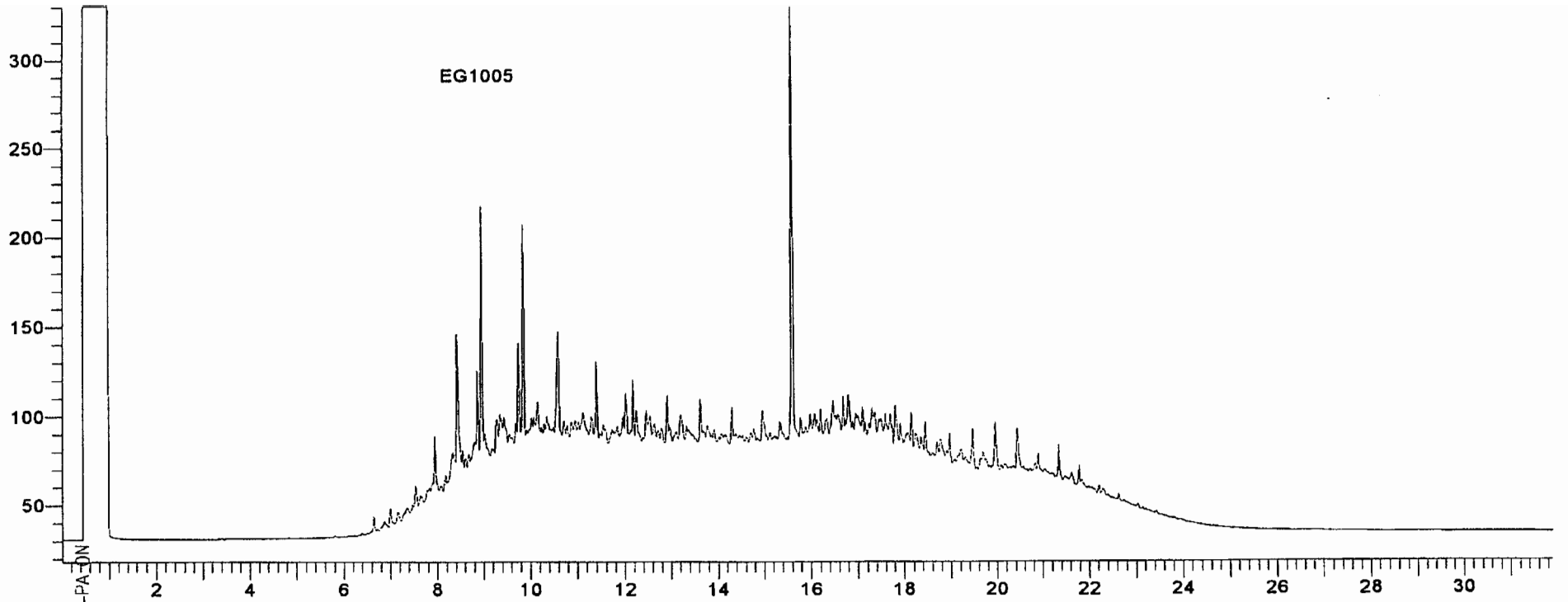
# Chromatogram

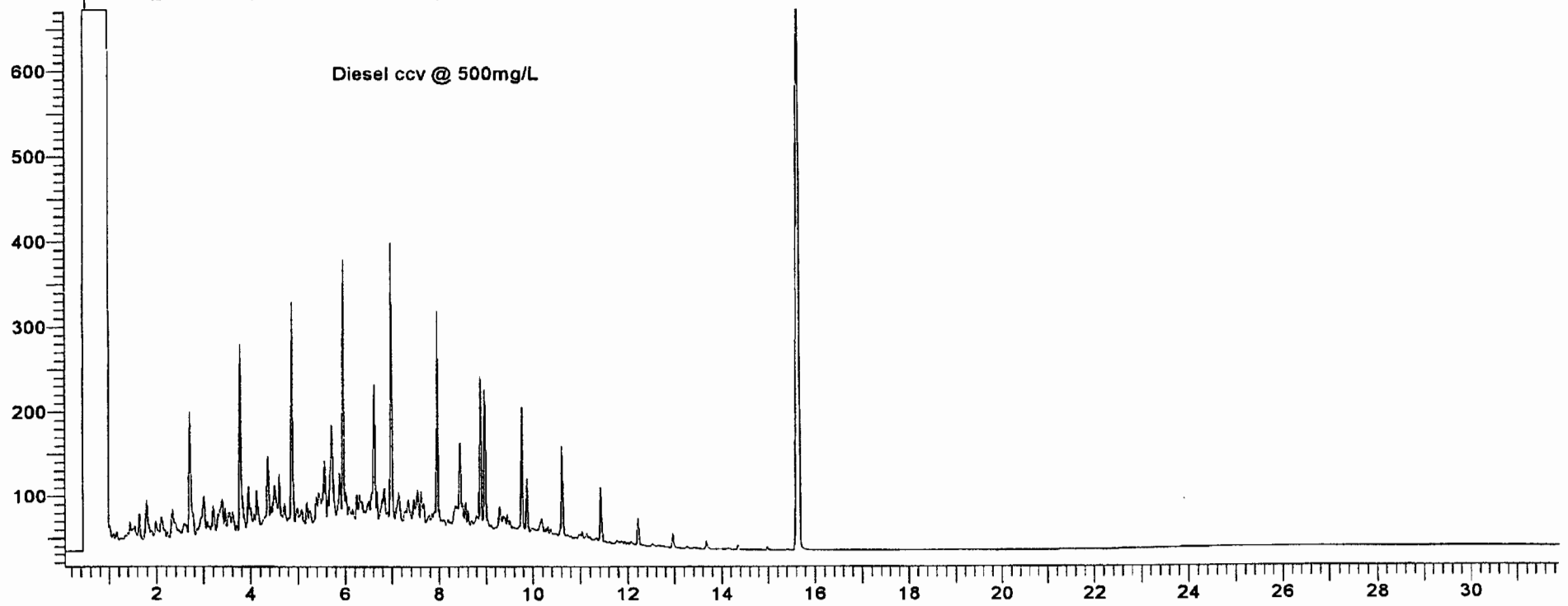
Sample Name : 159382-003,fp
FileName : G:\GC17\CHA\182A037.RAW
Method : ATEH179.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 17 mV

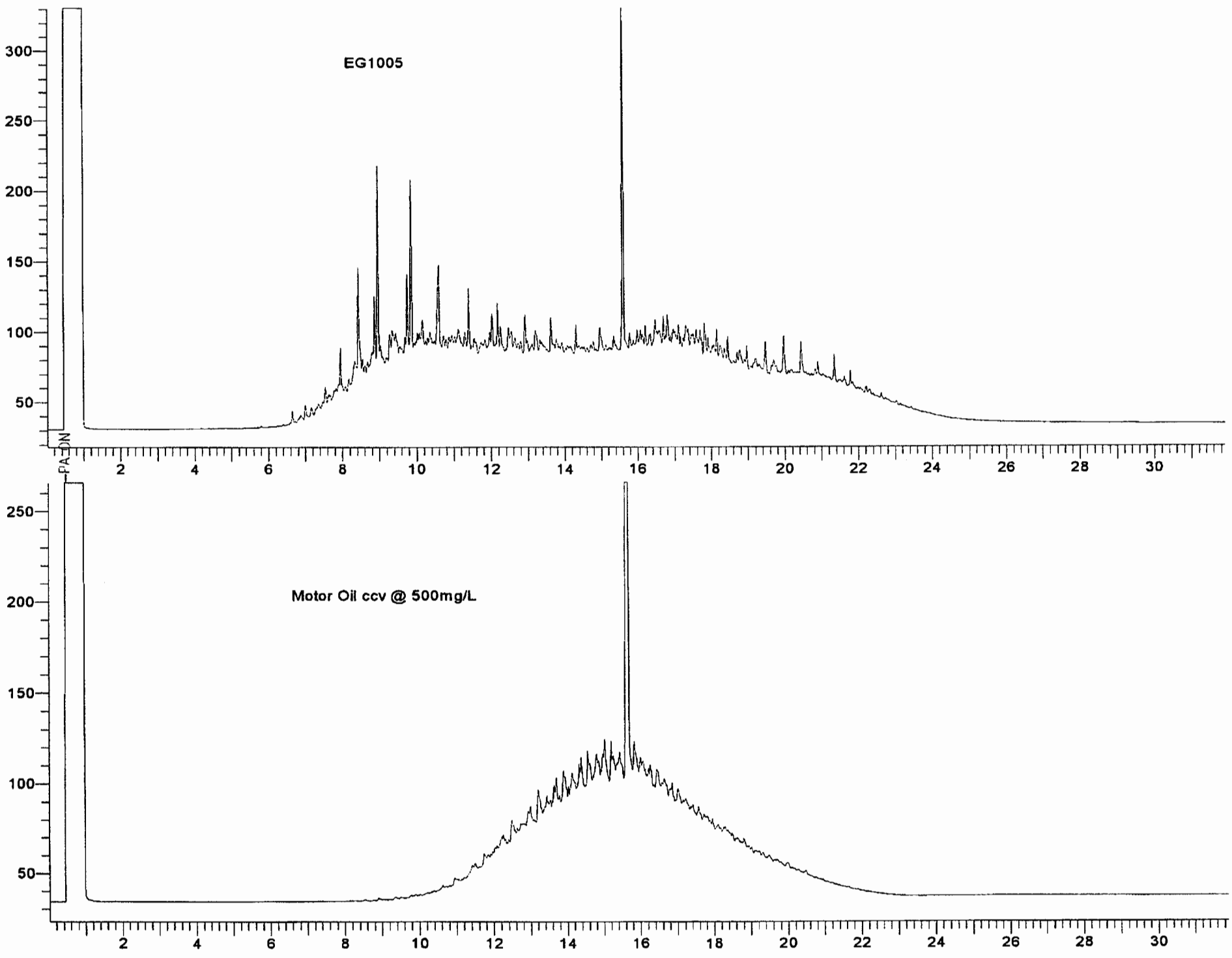
Sample #: Page 1 of 1
Date : 07/03/2002 10:43 AM
Time of Injection: 07/02/2002 08:19 PM
Low Point : 17.02 mV High Point : 292.60 mV
Plot Scale: 275.6 mV

EG1005




EG1005
300
250
200
150
100
50
PA DN
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30


Diesel ccv @ 500mg/L
600
500
400
300
200
100
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30

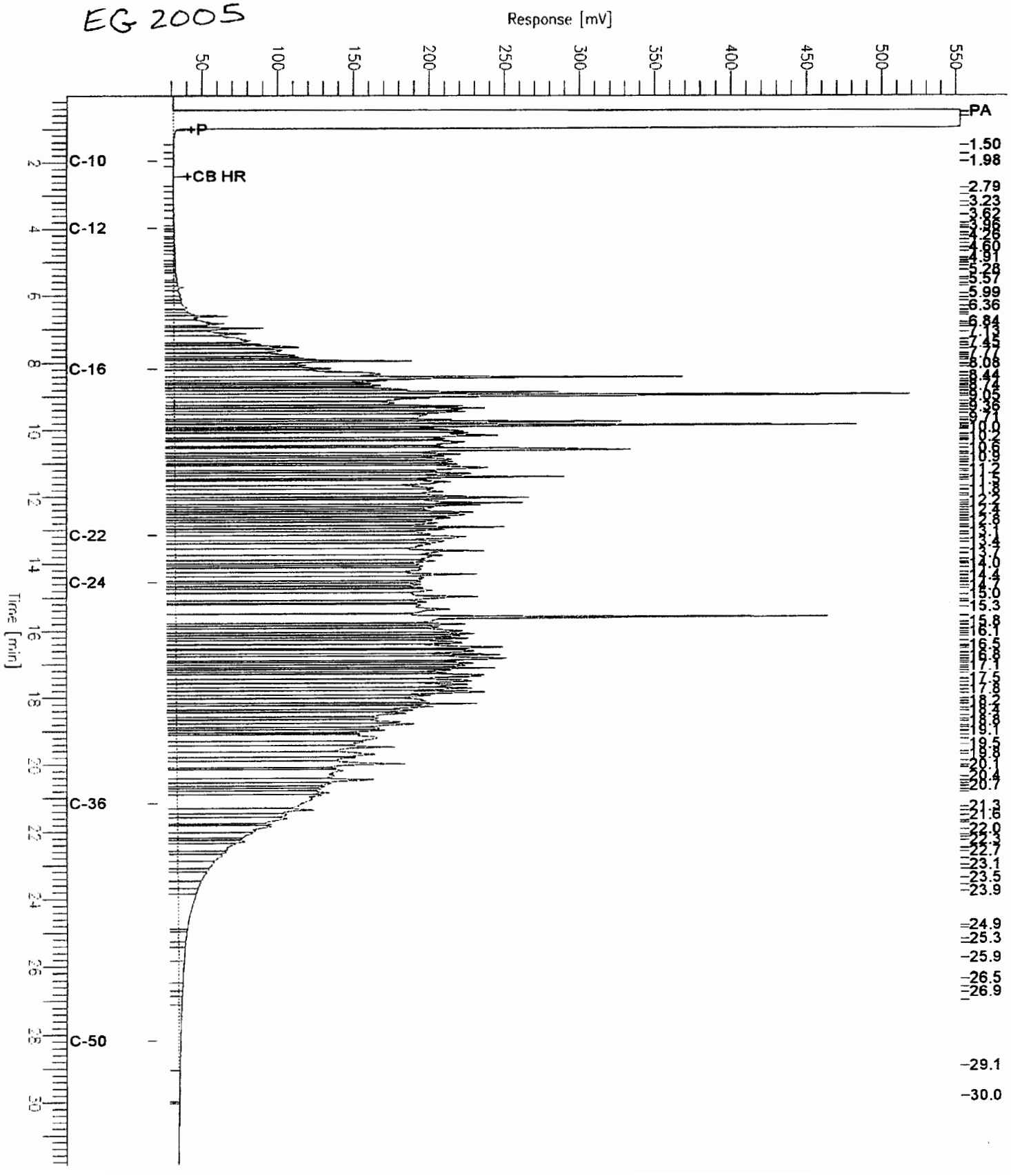

EG1005
Motor Oil ccv @ 500mg/L

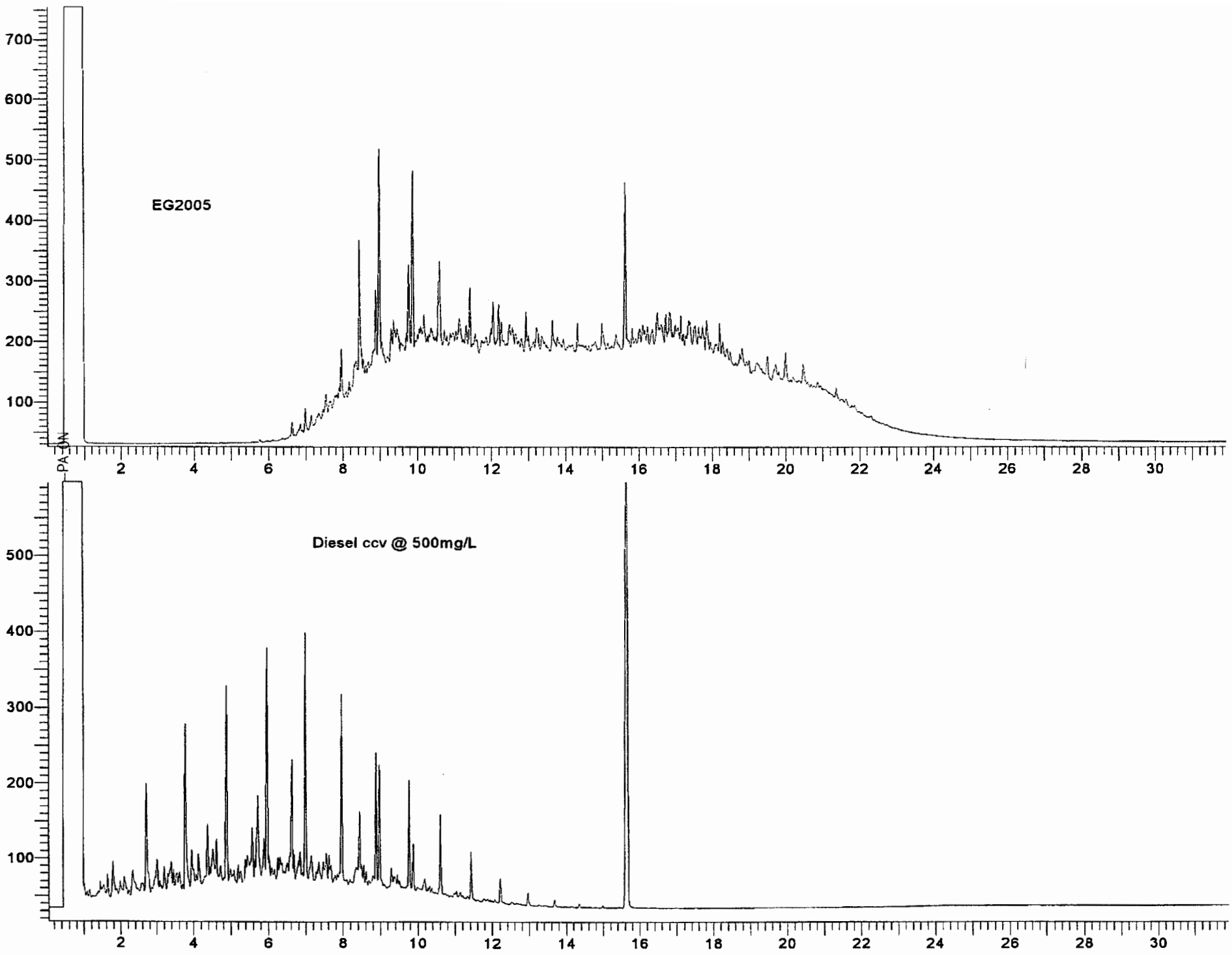
# Chromatogram

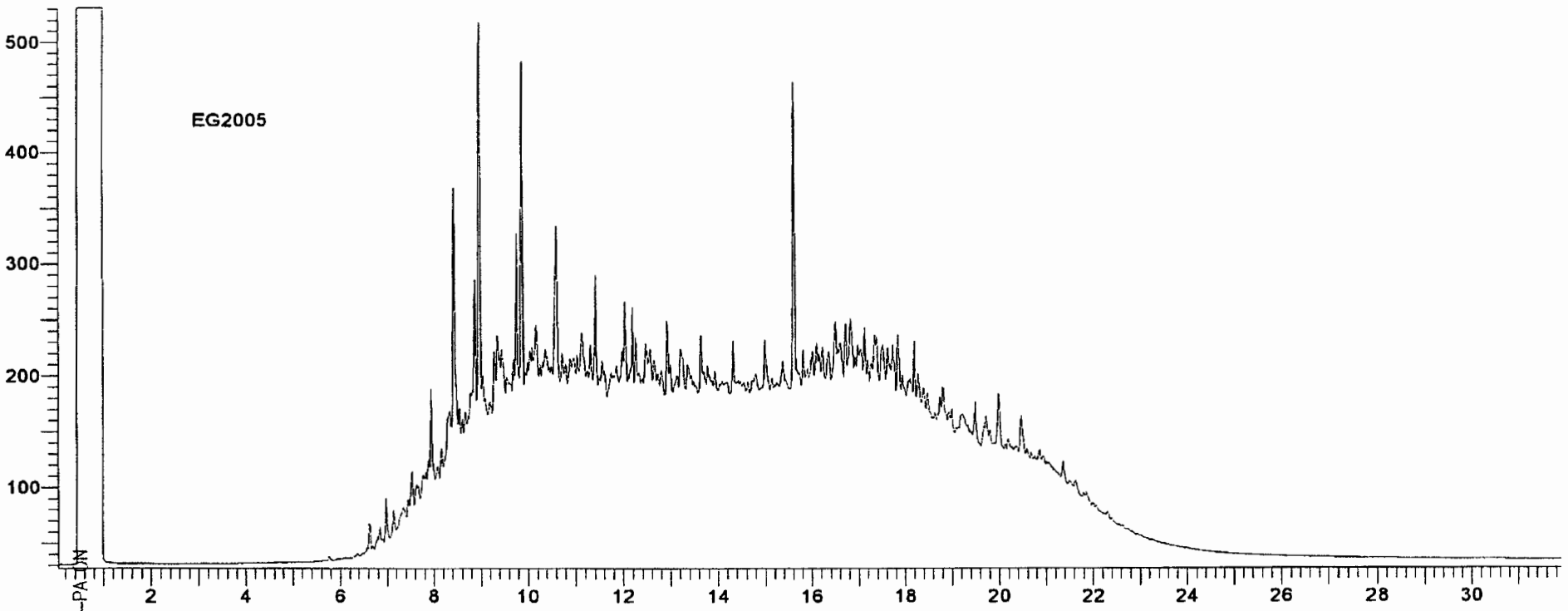
Sample Name : 159382-004,fp
FileName : G:\GC17\CHA\182A038.RAW
ethod : ATEH179.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 21 mV

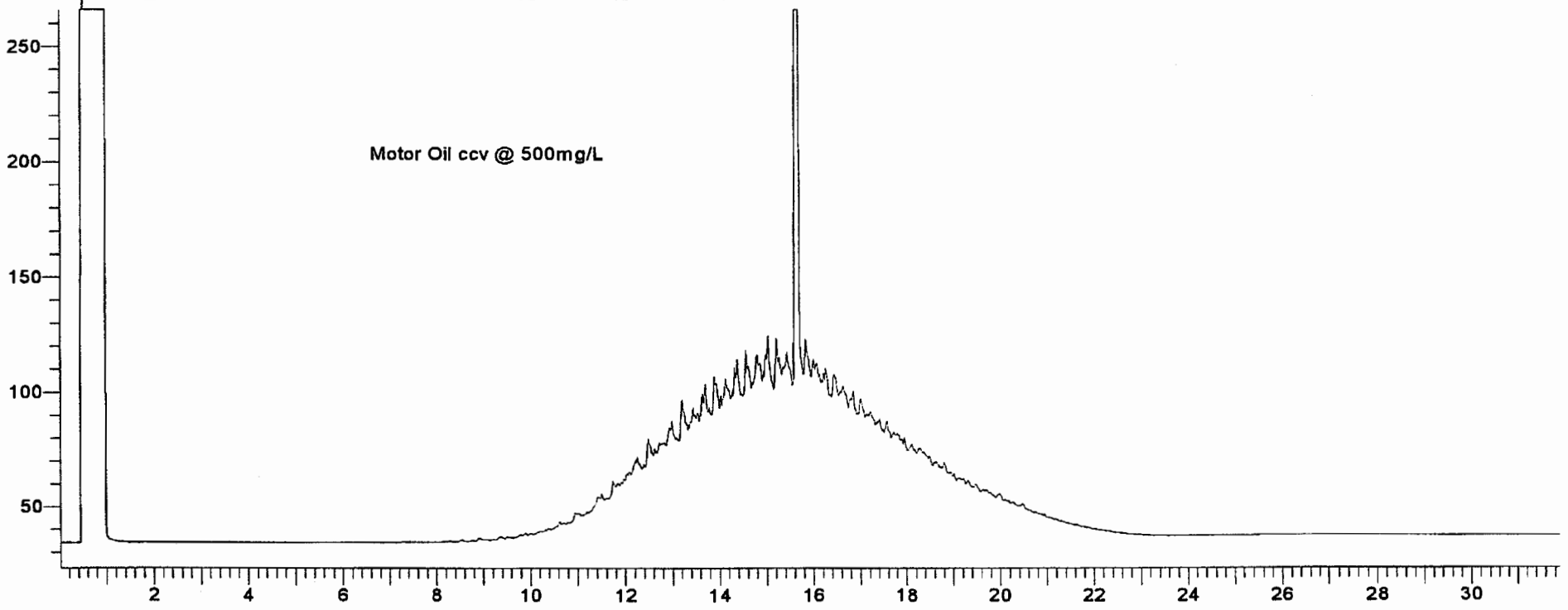
Sample #: Page 1 of 1
Date : 07/03/2002 10:44 AM
Time of Injection: 07/02/2002 09:00 PM
Low Point : 20.83 mV High Point : 553.03 mV
Plot Scale: 532.2 mV

EG 2005




EG2005
PA ON
700
600
500
400
300
200
100
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30
Diesel ccv @ 500mg/L
500
400
300
200
100
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30


EG2005
PA_DN
500
400
300
200
100
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30


Motor Oil ccv @ 500mg/L
250
200
150
100
50
2
4
6
8
10
12
14
16
18
20
22
24
26
28
30

# ATTACHMENT B

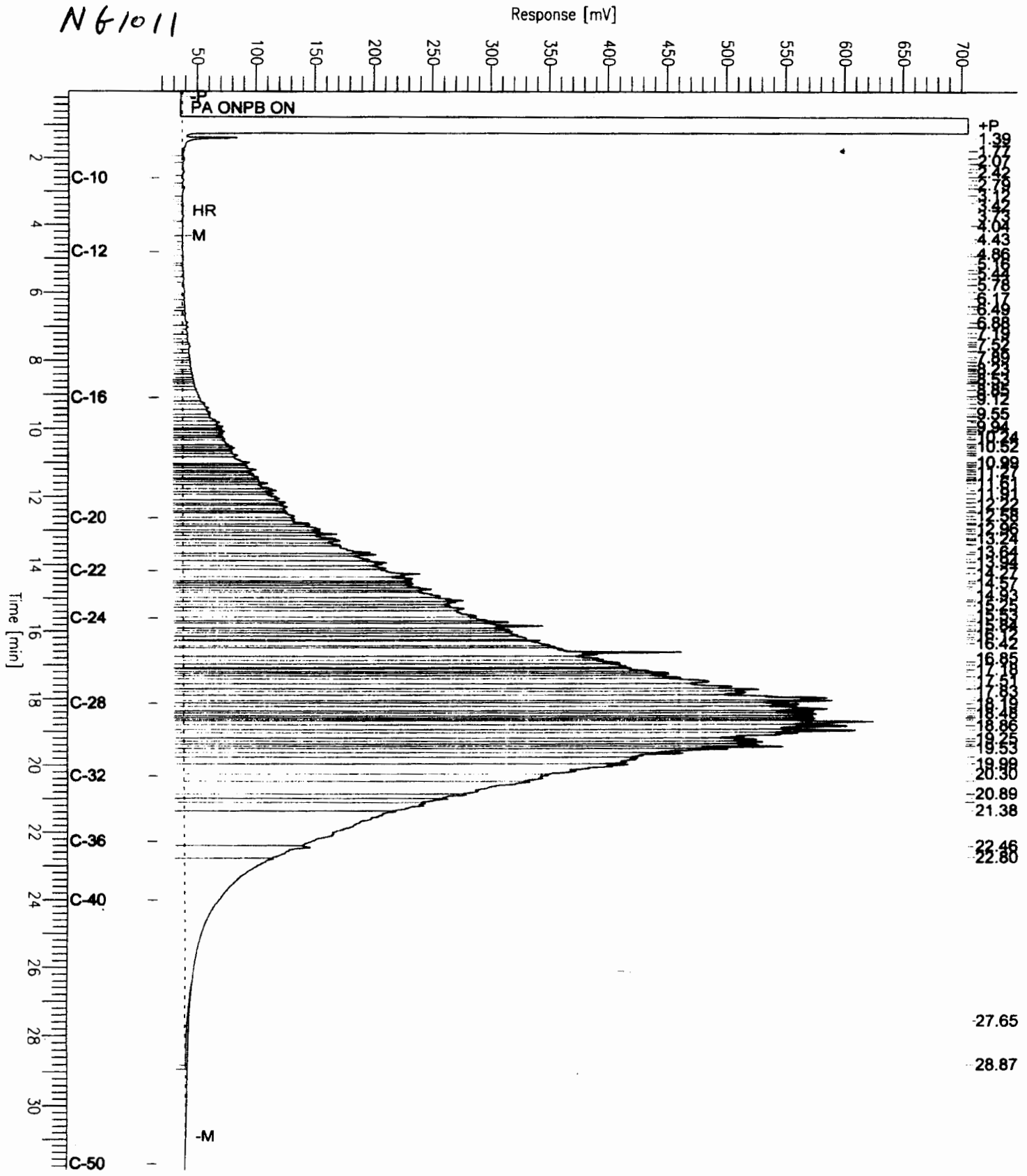
Beach Samples NG1011 through NG1018

# Chromatogram

Sample Name : 159328-001sg,73324
FileName : G:\GC13\CHB\181B013.RAW
Method : BTEH172.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 17 mV

Sample #: 73324 Page 1 of 1
Date : 7/1/02 08:48 AM
Time of Injection: 7/1/02 02:13 AM
Low Point : 17.49 mV High Point : 705.96 mV
Plot Scale: 688.5 mV

N61011

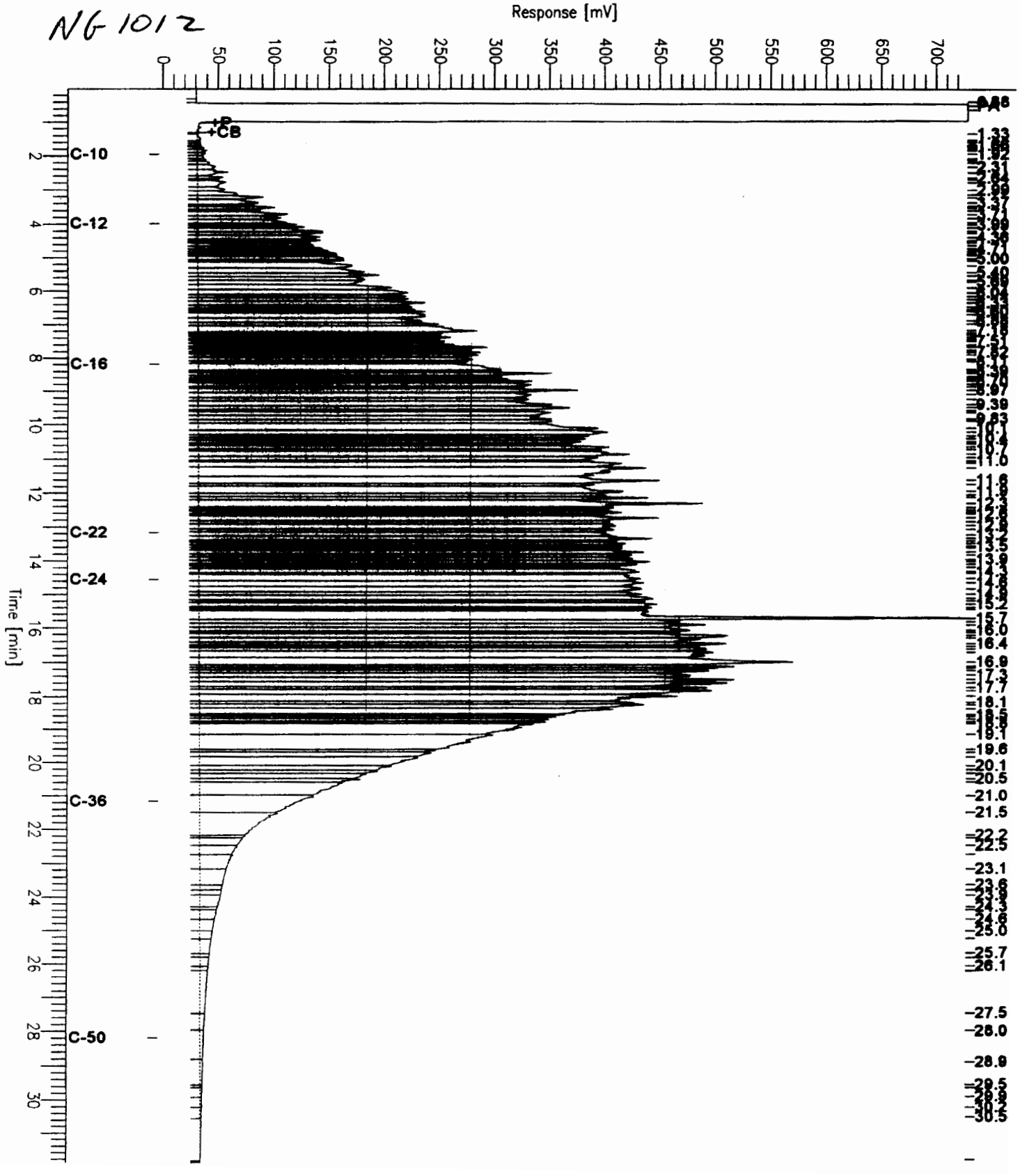


# Chromatogram

Sample Name : 159328-002sg,73324
FileName : G:\GC17\CHA\178A033.RAW
Method : ATEH179.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: -3 mV

Sample #: 73324 Page 1 of 1
Date : 06/30/2002 06:46 PM
Time of Injection: 06/28/2002 05:53 PM
Low Point : -2.98 mV High Point : 729.01 mV
Plot Scale: 732.0 mV

NG 1012

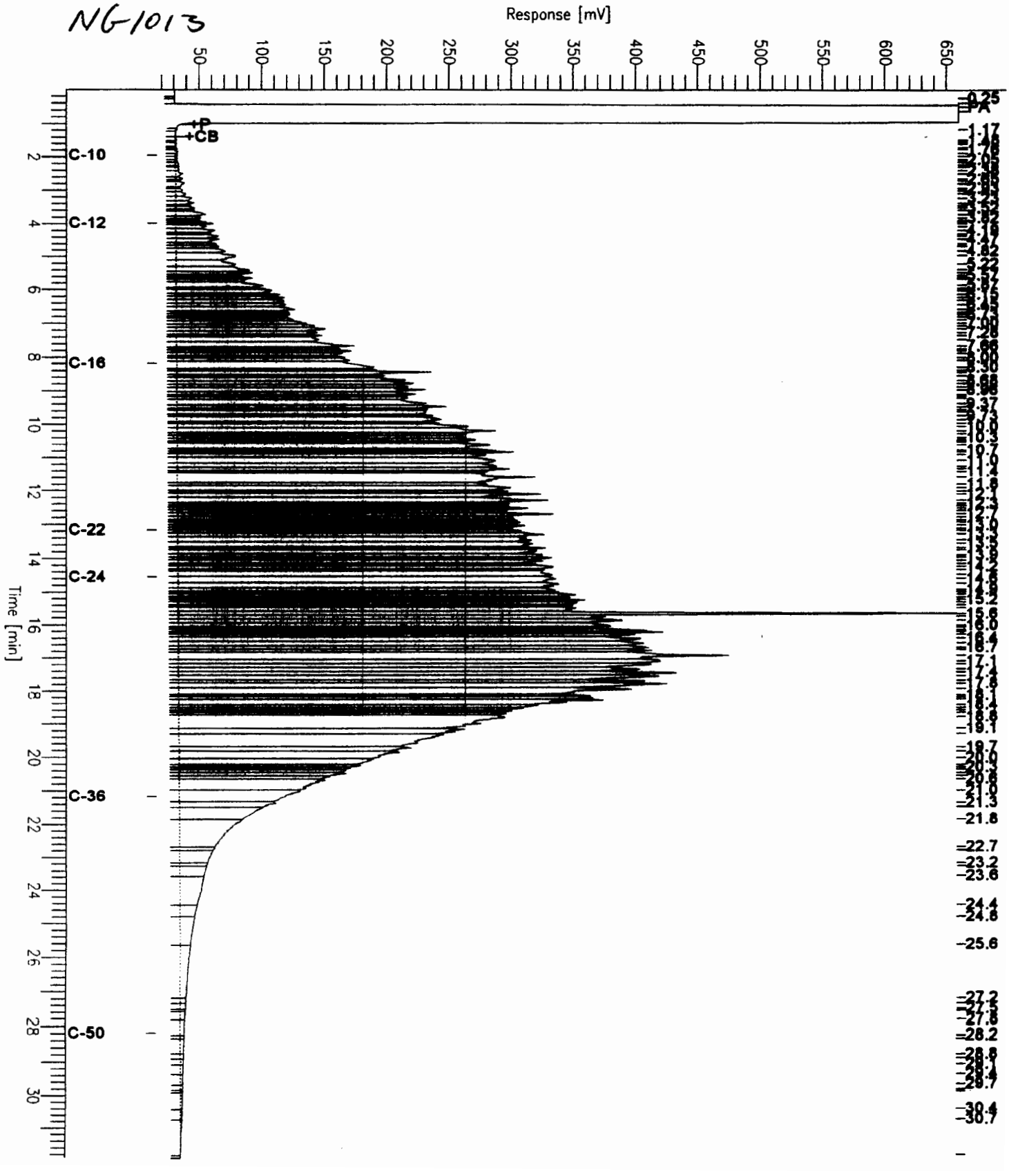


# Chromatogram

Sample Name : 159328-003sg,73324
FileName : G:\GC17\CHA\178A034.RAW
Method : ATEH179.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 16 mV

Sample #: 73324 Page 1 of 1
Date : 06/30/2002 06:47 PM
Time of Injection: 06/28/2002 06:34 PM
Low Point : 16.35 mV High Point : 659.93 mV
Plot Scale: 643.6 mV

NG1013

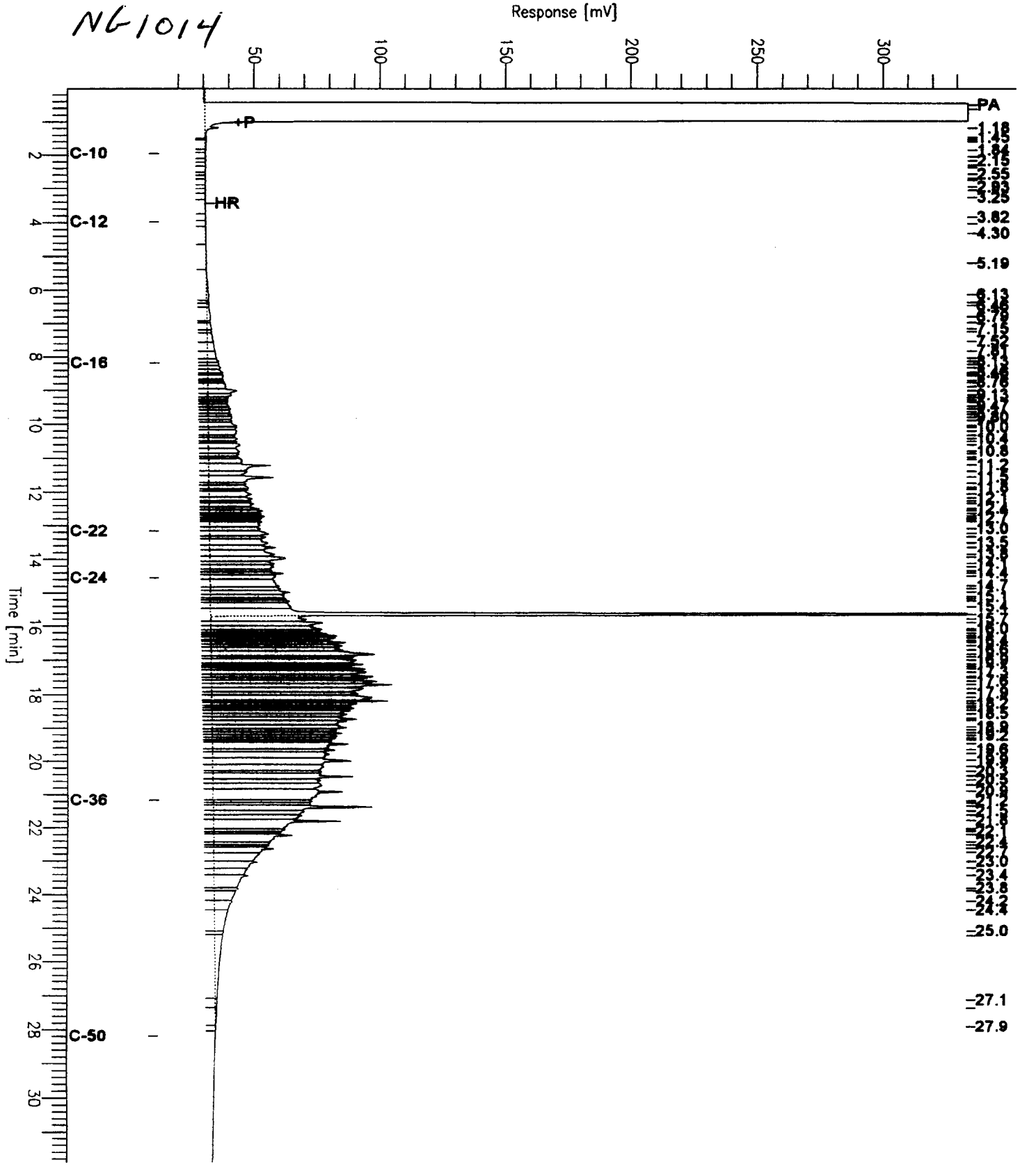


# Chromatogram

Sample Name : 159328-004sg,73324
FileName : G:\GC17\CHA\178A029.RAW
Method : ATEH179.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 12 mV

Sample #: 73324 Page 1 of 1
Date : 06/30/2002 06:44 PM
Time of Injection: 06/28/2002 03:09 PM
Low Point : 12.33 mV High Point : 334.26 mV
Plot Scale: 321.9 mV

NG1014

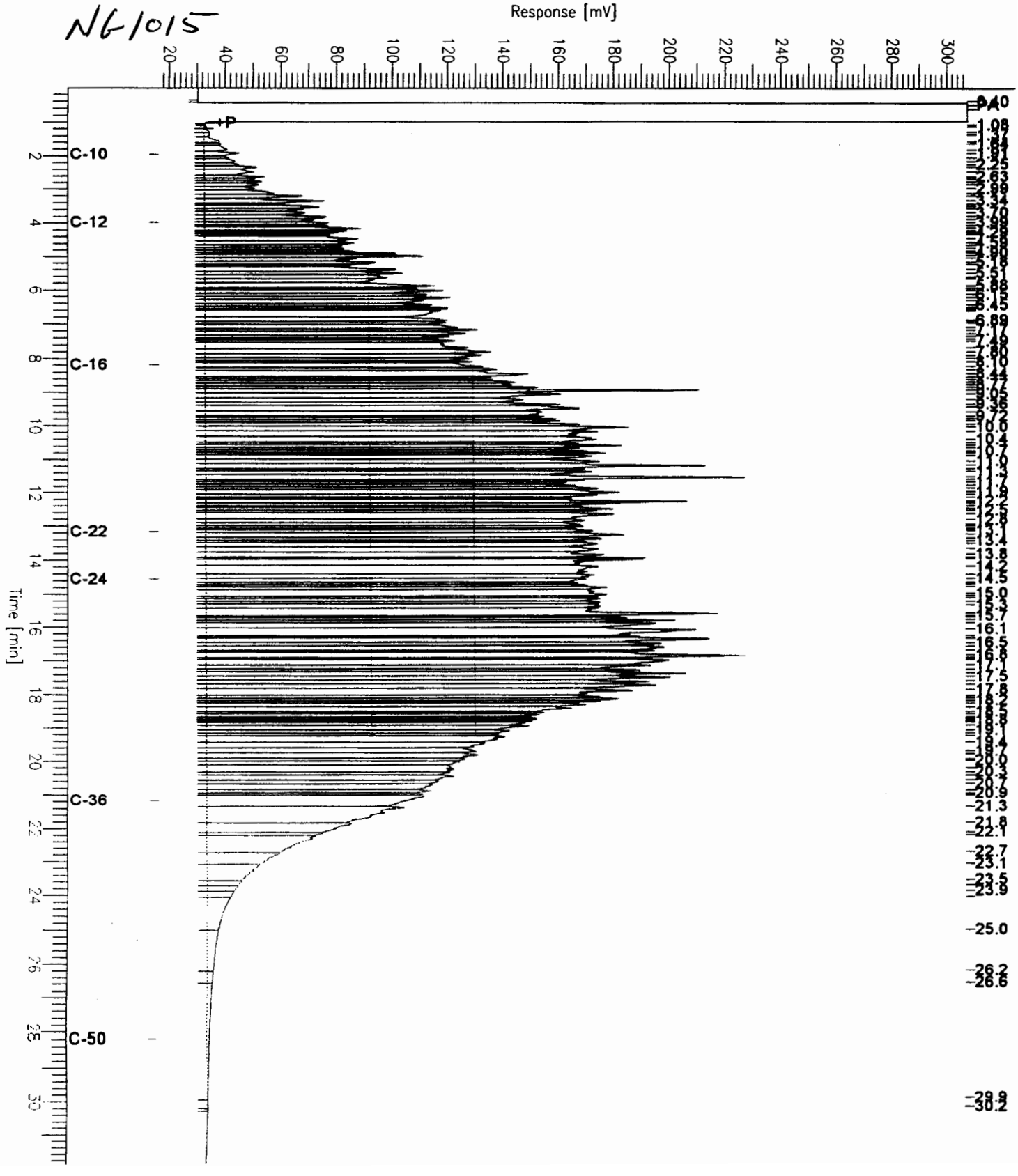


# Chromatogram

Sample Name : 159328-005sg,73324
FileName : G:\GC17\CHA\178A028.RAW
Method : ATEH179.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 16 mV

Sample #: 73324 Page 1 of 1
Date : 06/30/2002 06:43 PM
Time of Injection: 06/28/2002 02:28 PM
Low Point : 16.31 mV High Point : 307.53 mV
Plot Scale: 291.2 mV

NG1015

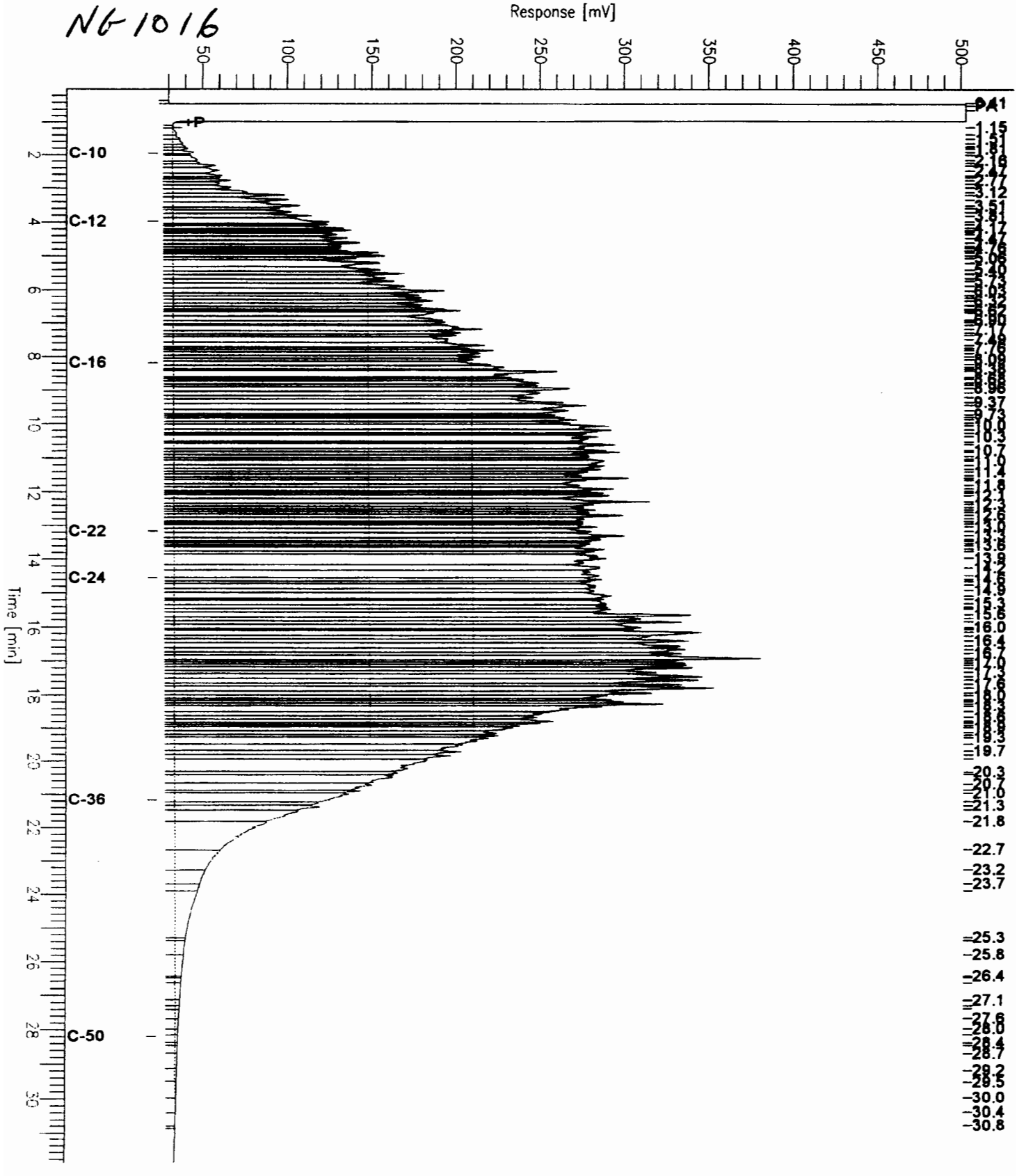


# Chromatogram

Sample Name : 159328-006sg,73324
FileName : G:\GC17\CHA\178A032.RAW
Method : ATEH179.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 24 mV

Sample #: 73324 Page 1 of 1
Date : 06/30/2002 06:46 PM
Time of Injection: 06/28/2002 05:12 PM
Low Point : 23.85 mV High Point : 502.87 mV
Plot Scale: 479.0 mV

NG 1016

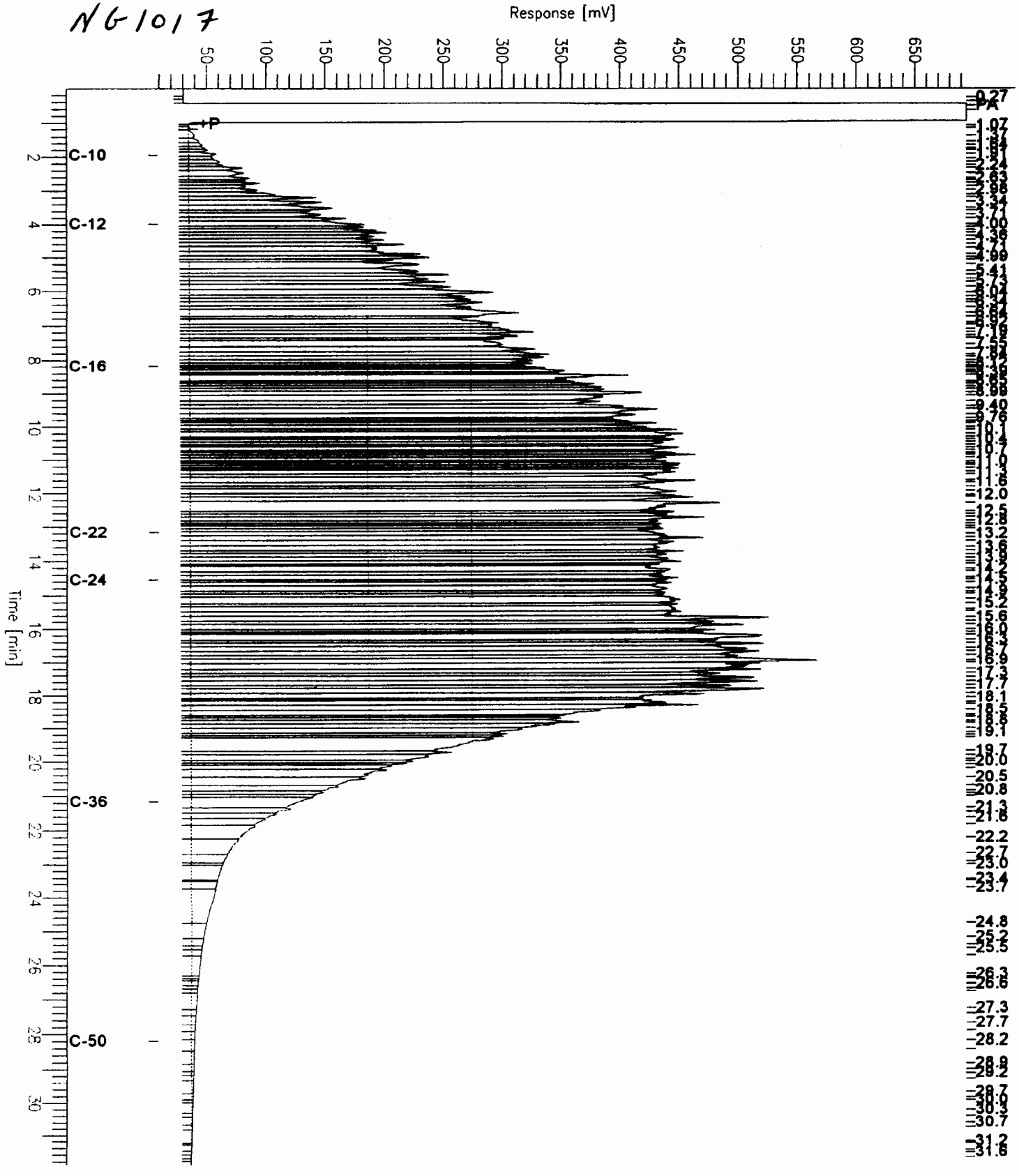


# Chromatogram

Sample Name : 159328-007sg,73324
FileName : G:\GC17\CHA\178A036.RAW
Method : ATEH179.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 9 mV

Sample #: 73324 Page 1 of 1
Date : 06/30/2002 06:48 PM
Time of Injection: 06/28/2002 07:57 PM
Low Point : 8.91 mV High Point : 694.56 mV
Plot Scale: 685.6 mV

NG1017

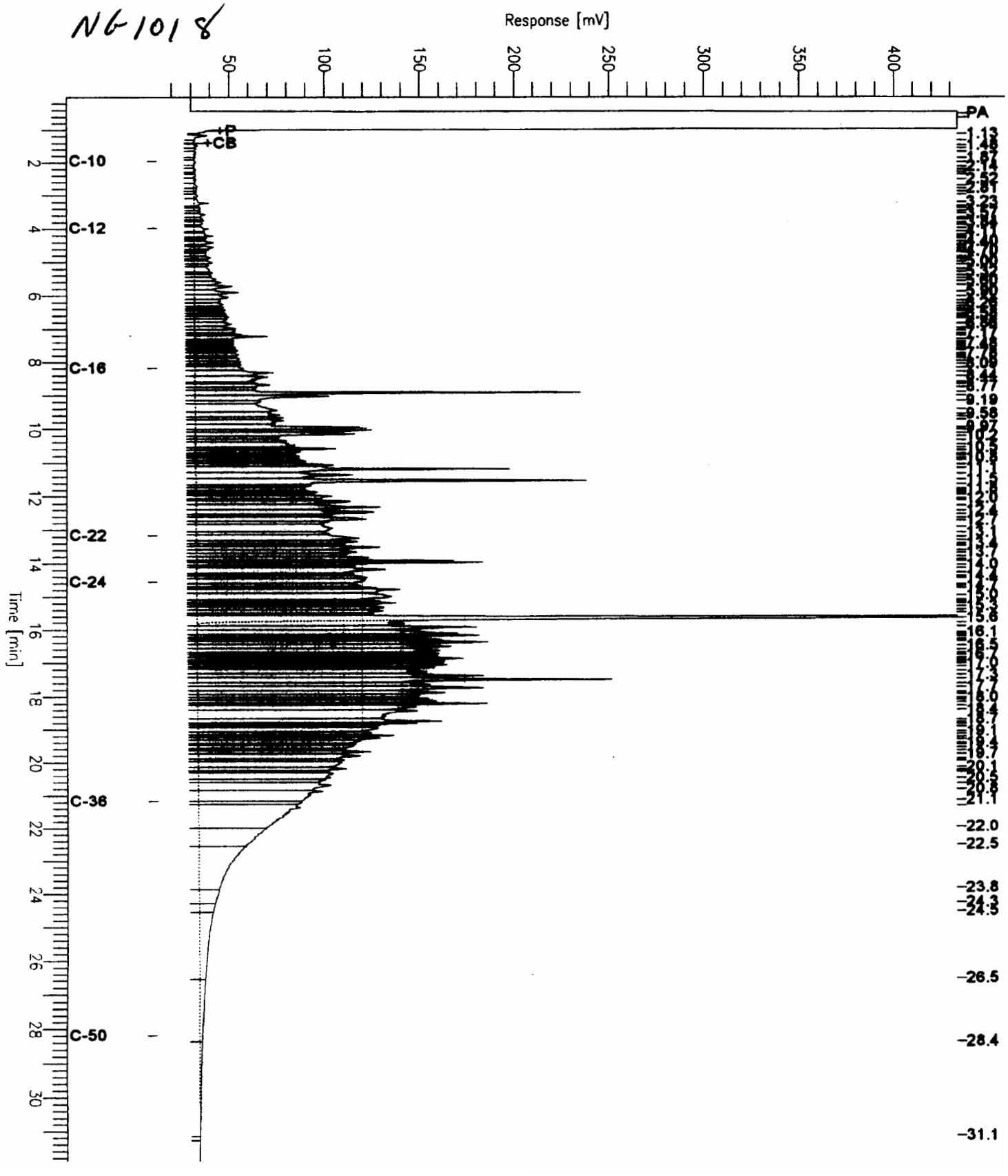


# Chromatogram

Sample Name : 159328-008sg,73324
FileName : G:\GC17\CHA\178A030.RAW
Method : ATEH179.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 12 mV

Sample #: 73324 Page 1 of 1
Date : 06/30/2002 06:45 PM
Time of Injection: 06/28/2002 03:50 PM
Low Point : 12.23 mV High Point : 433.88 mV
Plot Scale: 421.7 mV

NG-1018



# ATTACHMENT C

Diesel Fuel and Motor Oil Standards

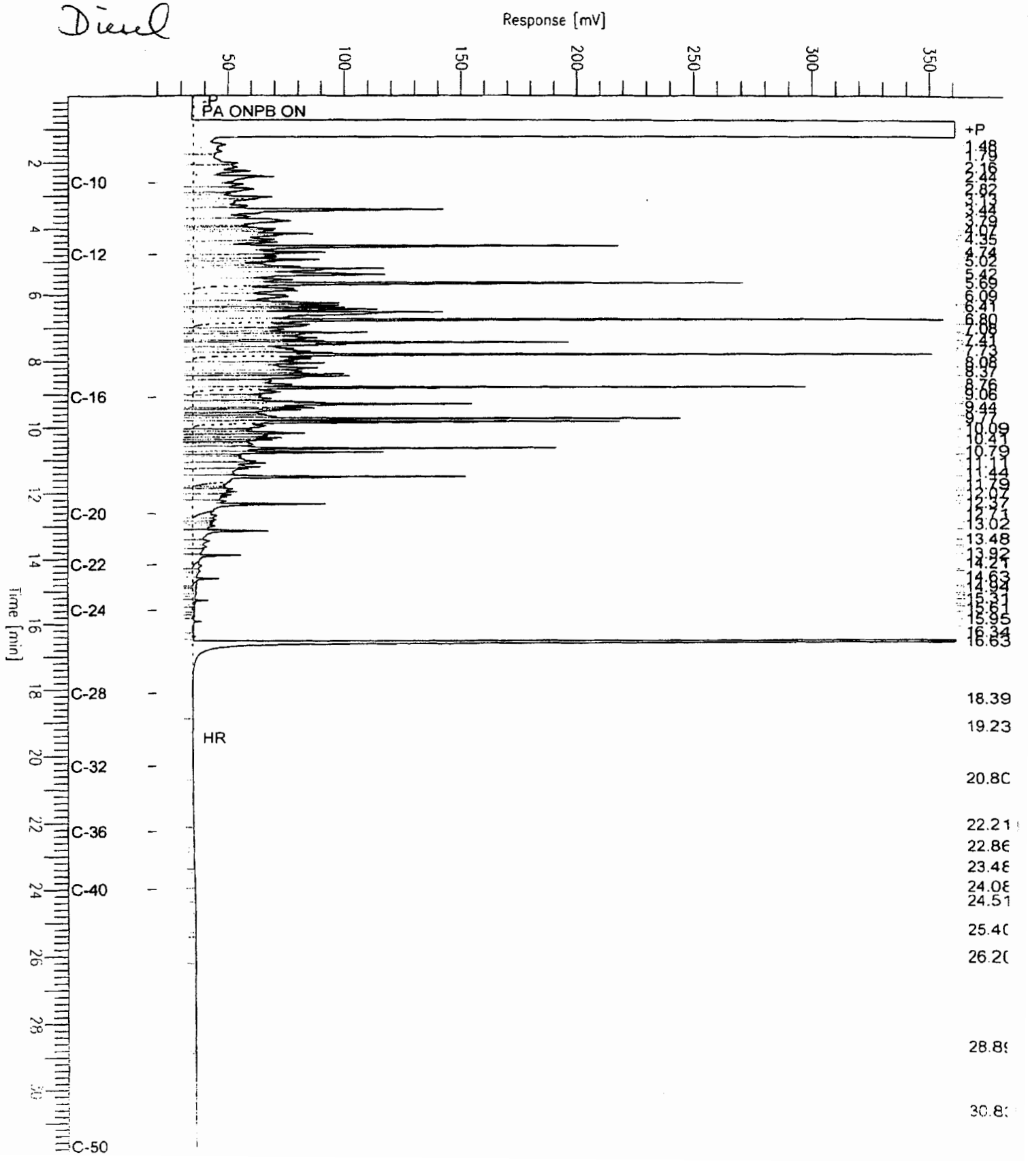
# Chromatogram

ample Name : ccv,02ws0995,dsl
ileName : G:\GC13\CHB\178B002.RAW
Method : BTEH172.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 20 mV

Sample #: 500mg/L
Date : 6/27/02 08:02 AM
Time of Injection: 6/27/02 07:24 AM
Low Point : 19.97 mV High Point : 361.02 mV
Plot Scale: 341.0 mV



Diesel



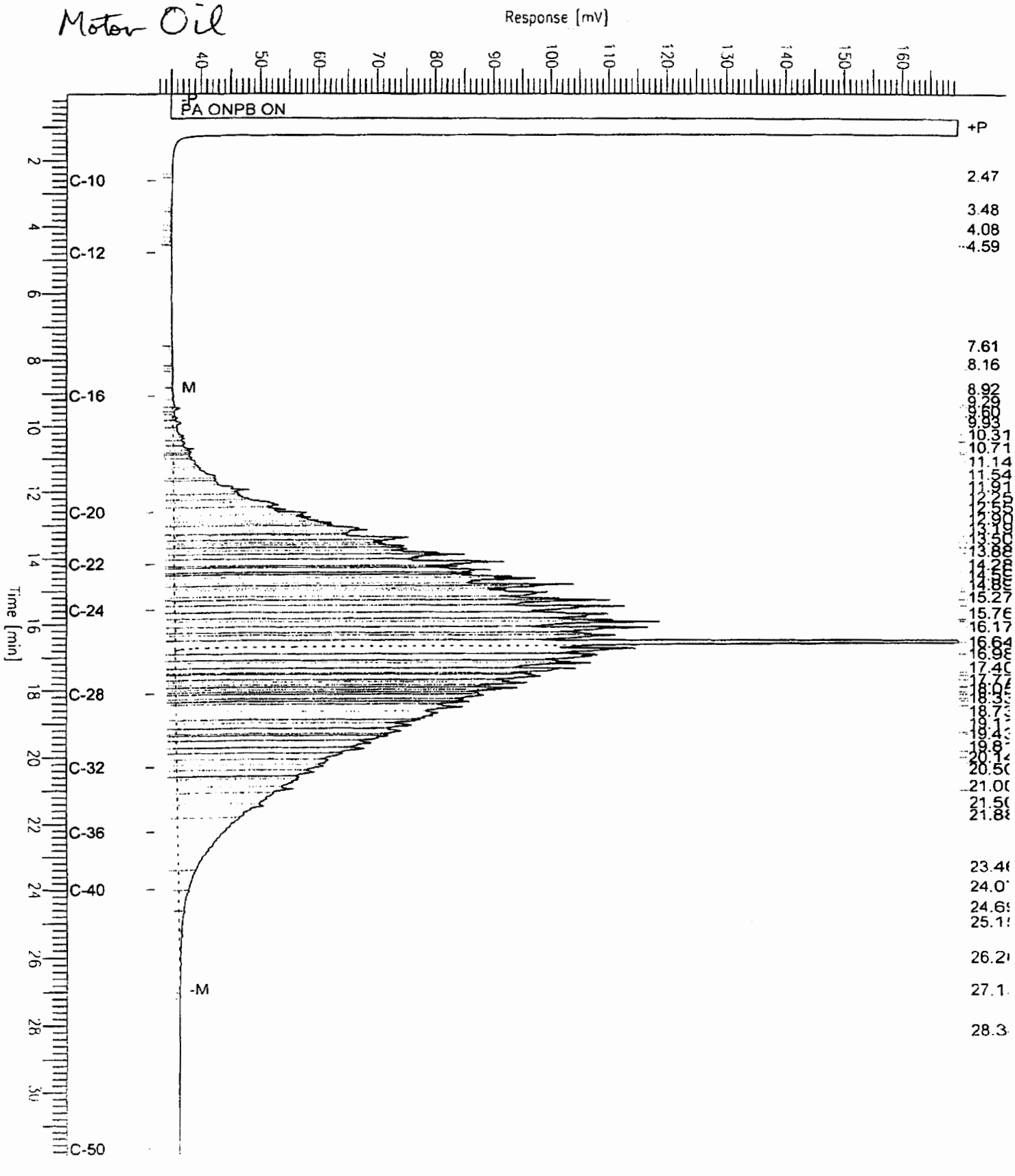
# Chromatogram

Sample Name : ccv,02ws0899,mo
FileName : G:\GC13\CHB\178B003.RAW
Method : BTEH172.MTH
Start Time : 0.01 min End Time : 31.91 min
Scale Factor: 0.0 Plot Offset: 32 mV

Sample #: 500mg/L
Date : 6/27/02 08:36 AM
Time of Injection: 6/27/02 08:03 AM
Low Point : 32.34 mV High Point : 169.55 mV
Plot Scale: 137.2 mV



Motor Oil



# APPENDIX G

# DATA VALIDATION REPORT

# Data Validation Report

**Angel Island/Fort McDowell**
**Marin County, California**

**December 10, 2002**

**Prepared by TN & Associates, Inc.**

# Overview

TN & Associates, Inc. (TN&A) conducted multimedia sampling and analysis as part of an Environmental Site Investigation\Preliminary Assessment (PA\SI) at Angel Island - Fort McDowell, Marin County, California. This report describes the data validation task of analytical data generated in support of the PA\SI.

Between the dates of June 16th and June 27th, 2002, TN&A collected soil and water samples and associated field quality control samples. Environmental samples were taken at 113 soil locations and 4 water locations. Field quality control samples include 11 field duplicate, 6 equipment blank, and 9 trip blank samples. A summary of the samples collected is shown in Attachment 1 of Appendix H. A summary of the validated sample results is shown in Attachment 2. The laboratory prepared project-specific samples for 12 matrix spike/matrix spike duplicate (MS/MSD) analyses. Overnight carrier delivered samples under chain-of-custody procedures to Curtis & Tompkins, Ltd. in Berkeley, CA for analytical testing.

All analyses were conducted at the Curtis and Tompkins facility located at 2323 Fifth Street, Berkeley, CA 94710. Curtis and Tompkins is a California accredited lab, Certificate No. 01107CA, expiration date 01/31/2003, and is a USACE-approved laboratory.

Analyses for metals were performed using U.S. EPA SW-846 Method 6010B\7470. Analyses for cyanide were performed using U.S. EPA Method 335.2. Analyses for volatiles were performed using U.S. EPA SW-846 Method 8260B. Analyses for semi-volatiles were performed using U.S. EPA SW-846 Method 8270C. Analyses for pesticides were performed using U.S. EPA SW-846 Method 8081. Analyses for PCBs were performed using U.S. EPA SW-846 method 8082. Analyses for TPH-DRO were performed using U.S. EPA SW-846 modified Method 3550\8015. Analyses for TPH-GRO were performed using U.S. EPA SW-846 modified Method 5030\8015.

After laboratory analyses were completed and reviewed, Curtis & Tompkins assembled a hardcopy data package and electronic data deliverable (EDD), which were delivered to TN&A. Curtis & Tompkins provided 19 data packages with EDDs, which include laboratory work group ID numbers 159234, 159264, 159265, 159267, 159304, 159309, 159313, 159328, 159329, 159330, 159340, 159341, 159344, 159361, 159362, 159363, 159382, 159404, and 159419.

# Data Quality Evaluation

The quality of the analytical data was evaluated according to project-specific quality assurance guidelines. The purpose of the Data Quality Evaluation (DQE) process is to assess data usability for the project decision-making process.

Before analytical data are released by the laboratory, the laboratory analyst and senior staff members review the data to ensure that method-specific requirements are met, that calculations are proper and correct, and that quality control (QC) parameters are within the specified limits of review for them. Any deficiencies identified in their review are described in the case narrative included in the analytical data package delivered to TN&A, which are reviewed during data evaluation.

After TN&A project staff received the data packages, they are inventoried and reviewed according to matrix-specific protocols established for data quality objectives established for the project. The data review process is documented on checklists, which are maintained in the project files.

Data validation includes review of the following QC audits when they are required by the analytical method being used.

- Case narrative, chain of custody, and sample receipt forms
- Sample preservation, sample preparation/extraction and run logs, sample storage, and holding time
- Recovery of LCS, MS/MSD, surrogates, and internal standard spikes
- Relative % difference (RPD) of MS/MSD, laboratory duplicates, and field duplicates
- Method blanks, equipment blanks, trip blanks, and instrument calibration blanks
- Instrument and detector tuning, initial and continuing calibrations, and retention times
- Confirm that the correct method of analysis was performed as described in the QAPP
- Confirm that the parameter specific reporting limits (RL) and all QC acceptance criteria conform to the project QAPP
- Select the preferred result when multiple analyses are reported (e.g., if there is a dilution, which results from the two analyses should be reported.)

## Field Duplicates

The field duplicate results provide precision information that indicates whether the field sampling technique and laboratory analytical technique are reproducible. Eleven field duplicate samples were collected at an approximate frequency of 10% of field samples collected.

The precision measurement is determined using the relative percent difference (RPD) between the duplicate sample results. A summary of the field duplicate pairs, calculated RDP, and precision objectives are summarized in Attachment 3 (Field Duplicate Results).

## Field Blanks

The presence of parameters in a field or trip blank indicates a potential for analytical bias. When an analyte is detected in one or more of the blanks and in the associated samples, the appropriate data qualifier was applied to the sample results. If the blank and the sample results are lower than the reporting limit, and the sample result is less than 5 times (10 times for common laboratory contaminants) the blank concentration, the sample result is raised to the reporting limit and qualified as undetected (U). If the sample result is above the reporting limit but less than 5 times (10 times for common laboratory contaminants) the blank concentration, the sample result was qualified as undetected (U).

A summary of the parameters measured in at least one field or trip blank sample is summarized in Attachment 4 (Field and Trip Blank Summary of Detections).

### Hardcopy Data Packages

Project completeness is calculated at 100 percent. The EDD consists of 7661 valid results of 7661 total results (excluding laboratory quality control samples and re-analyzed data) of the data undergoing data validation. No major issues were identified as a result of data validation. Minor issues are described below.

During the validation process, qualifying flags were appended to analytical results whenever problems with sampling or analysis may have compromised the integrity of those results. A list of project data qualifiers is shown in Table 1. Project data qualifiers are added to the laboratory Form 1 reports. As per National Functional Guidelines (NFG), sample results below the laboratory reporting limits but above method detection limits are qualified as estimated and flagged "J" unless other factors (such as blank contamination) cause the result to be qualified as undetected or rejected.

**TABLE 1**
List of Project Qualifiers
*(Fort McDowell Site Investigation)*

| Qualifier | Description |
|---|---|
| [=] | The analyte was positively identified. |
| J | The analyte was positively identified; however, the concentration value is an estimate. Also used if a results was measured at a concentration below the Contract Required Quantification Limit (CRQL) or Contract Required Detection Limit (CRDL). |
| U | The analyte was analyzed for, but not detected. |
| UJ | The analyte was analyzed for, but not detected. The associated numerical value is an estimate. |

Field samples are qualified for the introduction of contaminants resulting from laboratory and field activities as measured in the laboratory method blank, field blank, and trip blank audit samples.

### Electronic Data Deliverable

All of the sample results from the electronic data deliverable were verified by comparing the results to the validated laboratory Form 1's. The database contained a total of 7661 results.

## Major Issues

### Organic Analysis by GC\MS and GC\ECD

No major issues were identified during the data validation effort.

### Organic Analysis by GC

No major issues were identified during the data validation effort.

### Inorganic Analysis by ICP and CVAA

No major issues were identified during the data validation effort.

### General Chemistry Analysis

No major issues were identified during the data validation effort.

## Minor Issues

### Volatile Organic Analysis by GC\MS

### SDG 159234

This SDG was combined with SDGs 159267, 159264, and 159265 for validation.

Methylene chloride was detected in the laboratory method blank samples and field blank samples up to 0.97 ug/kg. Soil sample detections for methylene chloride less than the blank action level of 9.7 ug/kg are qualified as "U" due to possible sample contamination.

Acetone was detected in the laboratory method blank samples and field blank samples up to 1.5 ug/L. Soil sample detections for acetone less than the corrected blank action level are qualified as "U" due to possible sample contamination.

Benzene was detected in the laboratory method blank samples and field blank samples up to 0.1 ug/L. Soil sample detections for Benzene less than the corrected blank action level are qualified as "U" due to possible sample contamination.

The RRF for the initial calibration of 2-chloroethyl-vinyl ether on 6/19/02 for instrument MSVOA03 was low at 0.0261. Results for 2-chloroethyl-vinyl ether in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The RRF for the initial calibration of 2-chloroethyl-vinyl ether on 6/13/02 for instrument MSVOA09 was low at 0.0484. Results for 2-chloroethyl-vinyl ether in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of vinyl acetate on 6/26/02 for instrument MSVOA09 was high at 117%. Results for vinyl acetate in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

### SDG 159304

Methylene chloride was detected in the laboratory method blank samples and field blank samples up to 2.8 ug/kg. Soil sample detections for methylene chloride less than the blank action level of 28 ug/kg are qualified as "U" due to possible sample contamination.

Acetone was detected in the laboratory method blank samples and field blank samples up to 1.5 ug/L. Soil sample detections for acetone less than the corrected blank action level are qualified as "U" due to possible sample contamination.

Bromomethane was detected in the laboratory method blank samples and field blank samples up to 0.7 ug/L. Soil sample detections for bromomethane less than the corrected blank action level are qualified as "U" due to possible sample contamination.

Freon-113 was detected in the laboratory method blank samples and field blank samples up to 0.5 ug/L. Soil sample detections for freon-113 less than the corrected blank action level are qualified as "U" due to possible sample contamination.

Methyl-tert-butyl ether was detected in the laboratory method blank samples and field blank samples up to 0.1 ug/L. Soil sample detections for methyl-tert-butyl ether less than the corrected blank action level are qualified as "U" due to possible sample contamination.

Trichloroethene was detected in the laboratory method blank samples up to 0.5 ug/L. Soil sample detections for dichlorodifluoromethane less than the corrected blank action level are qualified as "U" due to possible sample contamination.

Ethyl benzene was detected in the laboratory method blank samples and field blank samples up to 0.2 ug/L. Soil sample detections for ethyl benzene less than the corrected blank action level are qualified as "U" due to possible sample contamination.

1,3,5-Trimethylbenzene was detected in the laboratory method blank samples and field blank samples up to 0.4 ug/L. Soil sample detections for 1,3,5-trimethylbenzene less than the corrected blank action level are qualified as "U" due to possible sample contamination.

2-Chlorotoluene was detected in the laboratory method blank samples and field blank samples up to 0.3 ug/L. Soil sample detections for 2-chlorotoluene less than the corrected blank action level are qualified as "U" due to possible sample contamination.

The RRF for the initial calibration of 2-chloroethyl-vinyl ether on 6/19/02 for instrument MSVOA03 was low at 0.0261. Results for 2-chloroethyl-vinyl ether in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of vinyl acetate on 6/28/02 for instrument MSVOA06 was high at 106%. Results for vinyl acetate in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of chloroethane on 6/24/02 for instrument MSVOA02 was high at 54%. Results for chloroethane in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of 2-hexanone on 6/24/02 for instrument MSVOA02 was high at 52%. Results for 2-hexanone in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of n-butyl benzene on 6/24/02 for instrument MSVOA02 was high at 32%. Results for n-butyl benzene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

## SDG 159328

This SDG was combined with SDGs 159329, 159330, 159341, and 159344 for validation.

The surrogate recovery for bromofluorobenzene in sample NG1016 was high at 154%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The surrogate recovery for bromofluorobenzene in sample NG1017 was high at 145%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The surrogate recovery for bromofluorobenzene in sample MP1002 was high at 132%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The surrogate recovery for bromofluorobenzene in sample MP1003 was high at 133%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The surrogate recovery for bromofluorobenzene in sample MP1004 was high at 133%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The surrogate recovery for bromofluorobenzene in sample MP1005 was high at 138%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The surrogate recovery for bromofluorobenzene in sample MP1006 was high at 141%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The surrogate recovery for bromofluorobenzene in sample MP1007 was high at 137%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The surrogate recovery for bromofluorobenzene in sample MP2001 was high at 136%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The surrogate recovery for bromofluorobenzene in sample AC1003 was high at 134%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The surrogate recovery for bromofluorobenzene in sample A1003 was high at 140%. Positive detects for VOCs in this sample are qualified as "J" due to possible high bias.

The MS/MSD recoveries for trichloroethene in sample 159360-005 were high at 156% and 160%. No action was taken based on MS/MSD recoveries alone.

Methylene chloride was detected in the laboratory method blank samples and field blank samples up to 2.7 ug/kg. Soil sample detections for methylene chloride less than the blank action level of 27 ug/kg are qualified as "U" due to possible sample contamination.

Acetone was detected in the laboratory method blank samples and field blank samples up to 4.7 ug/kg. Soil sample detections for acetone less than the blank action level of 47 ug/kg are qualified as "U" due to possible sample contamination.

Chloroform was detected in the laboratory method blank samples and field blank samples up to 0.8 ug/L. Soil sample detections for chloroform less than the corrected blank action level are qualified as "U" due to possible sample contamination.

Bromodichloromethane was detected in the laboratory method blank samples and field blank samples up to 0.7 ug/L. Soil sample detections for bromodichloromethane less than the corrected blank action level are qualified as "U" due to possible sample contamination.

The RRF for the initial calibration of 2-chloroethyl-vinyl ether on 6/19/02 for instrument MSVOA03 was low at 0.0261. Results for 2-chloroethyl-vinyl ether in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of vinyl acetate on 7/1/02 for instrument MSVOA05 was high at 173%. Results for vinyl acetate in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

## SDG 159382

This SDG was combined with SDGs 159404 and 159419 for validation.

Methylene chloride was detected in the laboratory method blank samples and field blank samples up to 3.1 ug/L. Soil sample detections for methylene chloride less than the corrected blank action level are qualified as "U" due to possible sample contamination.

Bromomethane was detected in the laboratory method blank samples and field blank samples up to 0.7 ug/L. Soil sample detections for bromomethane less than the corrected blank action level are qualified as "U" due to possible sample contamination.

The RRF for the initial calibration of 2-chloroethyl-vinyl ether on 6/25/02 for instrument MSVOA05 was low at 0.0493. Results for 2-chloroethyl-vinyl ether in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of vinyl acetate on 7/1/02 for instrument MSVOA05 was high at 173%. Results for vinyl acetate in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

# Semivolatile Organic Analysis by GC\MS

## SDG 159267

This SDG was combined with SDG 159265 for validation.

The %RSD for the initial calibration of benzoic acid on 6/25/02 for instrument MSBNA01 was high at 70.6%. Results for benzoic acid in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of naphthalene on 6/25/02 for instrument MSBNA01 was high at 31.9%. Results for naphthalene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of 2,4-dinitrophenol on 6/25/02 for instrument MSBNA01 was high at 67%. Results for 2,4-dinitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of 4-nitrophenol on 6/25/02 for instrument MSBNA01 was high at 37.7%. Results for 4-nitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of indeno (1,2,3-cd) pyrene on 6/25/02 for instrument MSBNA01 was high at 34.9%. Results for indeno (1,2,3-cd) pyrene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of dibenz (a,h) anthracene on 6/25/02 for instrument MSBNA01 was high at 34.9%. Results for dibenz (a,h) anthracene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of benzo (g,h,i) perylene on 6/25/02 for instrument MSBNA01 was high at 34.8%. Results for benzo (g,h,i) perylene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of benzoic acid on 6/26/02 for instrument MSBNA01 was high at 31%. Results for benzoic acid in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

## SDG 159304

This SDG was combined with SDGs 159309 and 159313 for validation.

The %RSD for the initial calibration of benzoic acid on 6/19/02 for instrument MSBNA03 was high at 56%. Results for benzoic acid in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of hexachlorocyclopentadiene on 6/19/02 for instrument MSBNA03 was high at 31%. Results for 2-methylnaphthalene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of 2,4-dinitrophenol on 6/19/02 for instrument MSBNA03 was high at 65%. Results for 2,4-dinitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of benzidine on 6/19/02 for instrument MSBNA03 was high at 43%. Results for benzidine in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of benzoic acid on 6/25/02 for instrument MSBNA01 was high at 70%. Results for benzoic acid in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of 2,4-dinitrophenol on 6/25/02 for instrument MSBNA01 was high at 66%. Results for 2,4-dinitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of 4-nitrophenol on 6/25/02 for instrument MSBNA01 was high at 37%. Results for 4-nitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of indeno (1,2,3-cd) pyrene on 6/25/02 for instrument MSBNA01 was high at 34%. Results for indeno (1,2,3-cd) pyrene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of dibenz (a,h) anthracene on 6/25/02 for instrument MSBNA01 was high at 34%. Results for dibenz (a,h) anthracene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of benzo (g,h,i) perylene on 6/25/02 for instrument MSBNA01 was high at 34%. Results for benzo (g,h,i) perylene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of benzoic acid on 6/20/02 for instrument MSBNA04 was high at 54%. Results for benzoic acid in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of 2,4-dinitrophenol on 6/20/02 for instrument MSBNA04 was high at 45%. Results for 2,4-dinitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of benzidine on 6/20/02 for instrument MSBNA04 was high at 100%. Results for benzidine in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

## SDG 159329

This SDG was combined with SDGs 159330 and 159344 for validation.

The %RSD for the initial calibration of benzoic acid on 6/25/02 for instrument MSBNA01 was high at 70.6%. Results for benzoic acid in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of naphthalene on 6/25/02 for instrument MSBNA01 was high at 31.9%. Results for naphthalene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of 2,4-dinitrophenol on 6/25/02 for instrument MSBNA01 was high at 67%. Results for 2,4-dinitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of 4-nitrophenol on 6/25/02 for instrument MSBNA01 was high at 37.7%. Results for 4-nitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of indeno (1,2,3-cd) pyrene on 6/25/02 for instrument MSBNA01 was high at 34.9%. Results for indeno (1,2,3-cd) pyrene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of dibenz (a,h) anthracene on 6/25/02 for instrument MSBNA01 was high at 34.9%. Results for dibenz (a,h) anthracene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of benzo (g,h,i) perylene on 6/25/02 for instrument MSBNA01 was high at 34.8%. Results for benzo (g,h,i) perylene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of benzidine on 6/27/02 for instrument MSBNA01 was high at 49%. Results for benzidine in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of hexachlorocyclopentadiene on 6/19/02 for instrument MSBNA03 was high at 31%. Results for hexachlorocyclopentadiene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of 2,4-dinitrophenol on 6/19/02 for instrument MSBNA03 was high at 63%. Results for 2,4-dinitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of benzoic acid on 6/19/02 for instrument MSBNA03 was high at 56%. Results for benzoic acid in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of aniline on 6/28/02 for instrument MSBNA03 was high at 82%. Results for aniline in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

### SDG 159363

The %RSD for the initial calibration of benzoic acid on 6/19/02 for instrument MSBNA03 was high at 56%. Results for benzoic acid in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of hexachlorocyclopentadiene on 6/19/02 for instrument MSBNA03 was high at 31%. Results for 2-methylnaphthalene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of 2,4-dinitrophenol on 6/19/02 for instrument MSBNA03 was high at 65%. Results for 2,4-dinitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of benzidine on 6/19/02 for instrument MSBNA03 was high at 43%. Results for benzidine in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of 4,6-dinitro-2-methyl phenol on 6/27/02 for instrument MSBNA03 was high at 40%. Results for 4,6-dinitro-2-methyl phenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of benzoic acid on 6/27/02 for instrument MSBNA03 was high at 55%. Results for benzoic acid in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of hexachlorocyclopentadiene on 6/27/02 for instrument MSBNA03 was high at 55%. Results for 2-methylnaphthalene in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %RSD for the initial calibration of 2,4-dinitrophenol on 6/27/02 for instrument MSBNA03 was high at 61%. Results for 2,4-dinitrophenol in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

The %D for the continuing calibration of aniline on 6/28/02 for instrument MSBNA03 was high at 82%. Results for aniline in samples run on this instrument are considered estimated and flagged "J" for detects and "UJ" for non-detects.

## Pesticide and PCB Analysis by GC\ECD

### SDG 159267

This SDG was combined with SDGs 159264 and 159265 for validation.

No deficiencies were noted.

## SDG 159304

The surrogate recovery for decachlorobiphenyl in sample AC1011 was high at 159% on column 2. No qualification was applied, as surrogate recoveries were acceptable on column 1.

The surrogate recoveries for TCMX and decachlorobiphenyl in sample AC1014W were low at 0% and 4% on column 2. The sample was re-extracted and re-analyzed with similar results. No qualification was applied, as surrogate recoveries were acceptable on column 1.

## SDG 159329

This SDG was combined with SDGs 159313, 159330, 159340, 159341, and 159344 for validation.

The surrogate recovery for decachlorobiphenyl in sample MP1005 was high at 161% on column 2. No qualification was applied, as surrogate recoveries were acceptable on column 1.

The surrogate recovery for decachlorobiphenyl in sample MP1006 was high at 161% on column 2. No qualification was applied, as surrogate recoveries were acceptable on column 1.

The surrogate recovery for decachlorobiphenyl in sample MP1007 was high at 178% on column 2. No qualification was applied, as surrogate recoveries were acceptable on column 1.

The surrogate recovery for decachlorobiphenyl in sample FTP1002NW was high at 159% on column 2. No qualification was applied, as surrogate recoveries were acceptable on column 1.

The surrogate recovery for decachlorobiphenyl in sample FTP1003SE was high at 163% on column 2. No qualification was applied, as surrogate recoveries were acceptable on column 1.

The surrogate recovery for decachlorobiphenyl in sample MP1069 was high at 162% on column 2. No qualification was applied, as surrogate recoveries were acceptable on column 1.

Aroclor-1260 was detected in the laboratory method blank sample QC182355 at 12 ug/Kg. Soil sample detections for acetone less than the blank action level of 60 ug/Kg are qualified as "U" due to possible sample contamination.

The continuing calibration %D for 4,4'-DDD in standard mixture INDA was high at 37%. No action was taken as all results were non-detects.

## SDG 159361

This SDG was combined with SDG 159362 for validation.

The surrogate recovery for decachlorobiphenyl in sample MP1010 was high at 231% on column 2. No qualification was applied, as surrogate recoveries were acceptable on column 1.

Aroclor-1260 was detected in the laboratory method blank sample QC182355 at 12 ug/Kg. Soil sample detections for acetone less than the blank action level of 60 ug/Kg are qualified as "U" due to possible sample contamination.

## Volatile Total Petroleum Hydrocarbon Analysis by GC

### SDG 159267

This SDG was combined with SDG 159264 for validation.

Gasoline range organics (C7 - C12) were noted in laboratory method blank sample QC181845 at 40 ug/L. Soil sample detections for gasoline range organics less than the corrected blank action level are qualified as "U" due to possible sample contamination.

### SDG 159313

This SDG was combined with SDGs 159304 and 159309 for validation.

The surrogate recoveries for trifluorotoluene and bromofluorobenzene in sample AC1009 were low at 31% and 31%. No detects were noted. No qualification was applied.

The MSD recovery for gasoline range organics in sample AC1009 was low at 37%. No action was taken based on MSD recovery alone.

The MS/MSD recoveries for gasoline range organics in sample MP1071 were low at 25% and 19%. No action was taken based on MS/MSD recoveries alone.

Gasoline range organics (C7 - C12) were detected in laboratory method blank sample QC182003 at 0.11 mg/Kg. Soil sample detections for gasoline range organics less than the blank action level of 0.55 mg/Kg are qualified as "U" due to possible sample contamination.

### SDG 159329

This SDG was combined with SDG 159344 for validation.

Gasoline range organics (C7 - C12) were detected in laboratory method blank sample QC182218 at 0.088 mg/Kg. Soil sample detections for gasoline range organics less than the blank action level of 0.44 mg/Kg are qualified as "U" due to possible sample contamination.

## Extractable Total Petroleum Hydrocarbon Analysis by GC

### SDG 159234

This SDG was combined with SDGs 159267, 159264, and 159265 for validation.

No deficiencies were noted.

### SDG 159313

This SDG was combined with SDGs 159304 and 159309 for validation.

No deficiencies were noted.

### SDG 159328

This SDG was combined with SDGs 159329, 159340, 159341, and 159344 for validation.

Diesel range organics were detected in field blank sample EQ001 at 320 ug/L. Soil sample detections for diesel range organics less than the corrected blank action level are qualified as "U" due to possible sample contamination.

Motor oil was detected in field blank sample EQ001 at 1200 ug/L. Soil sample detections for motor oil less than the corrected blank action level are qualified as "U" due to possible sample contamination.

### SDG 159382

This SDG was combined with SDGs 159404 and 159419 for validation.

Motor oil was detected in laboratory method blank sample QC182809 at 53 ug/L. Soil sample detections for motor oil less than the corrected blank action level are qualified as "U" due to possible sample contamination.

## Metal Analysis by ICP and CVAA

### SDG 159267

This SDG was combined with SDGs 159264 and 159265 for validation.

Antimony, molybdenum, zinc, and mercury were detected in laboratory method blank samples. Soil sample detects less than five times the corrected blank action level are qualified "U" due to possible sample contamination.

The MS recovery for antimony in sample MP1072 was low at 16%. The antimony result for sample MP1072 is considered estimated and flagged "J".

### SDG 159304

This SDG was combined with SDGs 159309 and 159313 for validation.

Silver, zinc, antimony, molybdenum, and thallium were detected in laboratory method blank and field blank samples. Soil sample detects less than five times the corrected blank action level are qualified "U" due to possible sample contamination.

### SDG 159329

This SDG was combined with SDGs 159330 and 159344 for validation.

Antimony, arsenic, chromium, zinc, lead, silver, beryllium, thallium, and mercury were detected in laboratory method blank and field blank samples. Soil sample detects less than five times the corrected blank action level are qualified "U" due to possible sample contamination.

The MS recovery for antimony in sample MP1052 was low at 21%. The antimony result for sample MP1052 is considered estimated and flagged "J".

### SDG 159363

The percent recovery of tin in one CCV sample was low at 11%. This CCV was at the end of the analytical sequence and did not bracket sample from this SDG. No action was taken.

Lead, zinc, tin, selenium, and mercury were detected in laboratory method blank samples. Soil sample detects less than five times the corrected blank action level are qualified "U" due to possible sample contamination.

The MS recoveries for antimony, chromium, and lead were low in at least one of three MS samples associated with this SDG. Samples with low MS recovery results were considered estimated for the native sample and qualified as "J".

## General Chemistry Parameters

## Cyanide

## SDG 159341

No discrepancies were noted.

Attachment 1
Sample Cross-Reference Summary

**TABLE H-1**
Sample Cross-Reference Summary
*(Fort McDowell Site Investigation)*

| Lab Sample ID | Sample ID | Matrix | Date Collected |
|---|---|---|---|
| 159234-001 | B-332#2@15' | SOLID | 06/17/02 |
| 159234-002 | B-332#1@15' | SOLID | 06/17/02 |
| 159234-003 | B-332#1@15' | SOLID | 06/17/02 |
| 159234-004 | TRIP BLANK1 | WATER | 06/17/02 |
| 159264-001 | MP1074 | WATER | 06/18/02 |
| 159265-001 | WG1004 | SOLID | 06/18/02 |
| 159265-002 | WG1005 | SOLID | 06/18/02 |
| 159265-003 | WG1006 | SOLID | 06/18/02 |
| 159267-001 | NG1136 | SOLID | 06/18/02 |
| 159267-002 | NG1137 | SOLID | 06/18/02 |
| 159267-003 | NG1139 | SOLID | 06/18/02 |
| 159267-004 | NG1138 | SOLID | 06/18/02 |
| 159267-005 | MP1054 | SOLID | 06/18/02 |
| 159267-006 | MP1055 | SOLID | 06/18/02 |
| 159304-001 | MP1052 | SOLID | 06/19/02 |
| 159304-002 | MP1056 | SOLID | 06/19/02 |
| 159304-003 | MP1071 | SOLID | 06/19/02 |
| 159304-004 | ALTB02 | WATER | 06/19/02 |
| 159304-005 | MP1058 | SOLID | 06/19/02 |
| 159309-001 | MP1057 | SOLID | 06/19/02 |
| 159309-002 | MP1067 | SOLID | 06/19/02 |
| 159309-003 | MP1066 | SOLID | 06/19/02 |
| 159309-004 | MP1072 | SOLID | 06/19/02 |
| 159309-005 | MP1073 | WATER | 06/19/02 |
| 159309-006 | ALTB01 | WATER | 06/19/02 |
| 159313-001 | AC1014W | WATER | 06/19/02 |
| 159313-002 | TRIP BLANK2 | WATER | 06/19/02 |
| 159313-003 | AC1013 | SOLID | 06/19/02 |
| 159313-004 | TRIP BLANK3 | WATER | 06/19/02 |
| 159313-005 | AC1012 | SOLID | 06/19/02 |
| 159313-006 | AC1011 | SOLID | 06/19/02 |
| 159313-007 | AC1010 | SOLID | 06/19/02 |
| 159313-008 | AC1009 | SOLID | 06/19/02 |
| 159313-009 | AC1008 | SOLID | 06/19/02 |

**TABLE H-1**
Sample Cross-Reference Summary
*(Fort McDowell Site Investigation)*

| Lab Sample ID | Sample ID | Matrix | Date Collected |
|---|---|---|---|
| 159313-010 | AC1014W RE | WATER | 06/19/02 |
| 159313-011 | AC1009 | SOLID | 06/19/02 |
| 159328-001 | NG1011 | SOLID | 06/20/02 |
| 159328-002 | NG1012 | SOLID | 06/20/02 |
| 159328-003 | NG1013 | SOLID | 06/20/02 |
| 159328-004 | NG1014 | SOLID | 06/20/02 |
| 159328-005 | NG1015 | SOLID | 06/20/02 |
| 159328-006 | NG1016 | SOLID | 06/20/02 |
| 159328-007 | NG1017 | SOLID | 06/20/02 |
| 159328-008 | NG1018 | SOLID | 06/20/02 |
| 159328-009 | EQ005 | WATER | 06/20/02 |
| 159329-001 | EG1001 | SOLID | 06/20/02 |
| 159329-002 | EG1003 | SOLID | 06/20/02 |
| 159329-003 | EG1007W | WATER | 06/20/02 |
| 159329-004 | EG1008W | WATER | 06/20/02 |
| 159329-005 | EG1006W | SOLID | 06/20/02 |
| 159329-006 | EQ007 | WATER | 06/20/02 |
| 159329-007 | ALTB04 | WATER | 06/20/02 |
| 159330-001 | ALTB03 | WATER | 06/20/02 |
| 159330-002 | MP1002 | SOLID | 06/20/02 |
| 159330-003 | MP1003 | SOLID | 06/20/02 |
| 159330-004 | MP1004 | SOLID | 06/20/02 |
| 159330-005 | MP1005 | SOLID | 06/20/02 |
| 159330-006 | MP1006 | SOLID | 06/20/02 |
| 159330-007 | MP1007 | SOLID | 06/20/02 |
| 159330-008 | EQ006 | WATER | 06/20/02 |
| 159340-001 | AC1017 | SOLID | 06/21/02 |
| 159340-002 | AC1016 | SOLID | 06/21/02 |
| 159340-003 | MP2001 | SOLID | 06/21/02 |
| 159340-004 | AC1003 | SOLID | 06/21/02 |
| 159341-001 | AC1001 | SOLID | 06/21/02 |
| 159341-002 | AC1003 | SOLID | 06/21/02 |
| 159341-003 | AC1015 | SOLID | 06/21/02 |
| 159341-004 | AC1001D | SOLID | 06/21/02 |
| 159341-005 | AC1025 | SOLID | 06/21/02 |
| 159341-006 | ALTB05 | WATER | 06/21/02 |

**TABLE H-1**
Sample Cross-Reference Summary
*(Fort McDowell Site Investigation)*

| Lab Sample ID | Sample ID | Matrix | Date Collected |
|---|---|---|---|
| 159344-001 | EQ001 | WATER | 06/21/02 |
| 159344-002 | NG1001 | SOLID | 06/21/02 |
| 159344-003 | NG1003 | SOLID | 06/21/02 |
| 159344-004 | NG1005 | SOLID | 06/21/02 |
| 159344-006 | FTP1001NE | SOLID | 06/21/02 |
| 159344-007 | FTP1002NW | SOLID | 06/21/02 |
| 159344-008 | FTP1003SE | SOLID | 06/21/02 |
| 159344-009 | FTP1004SW | SOLID | 06/21/02 |
| 159344-010 | MP1059 | SOLID | 06/20/02 |
| 159344-011 | MP1069 | SOLID | 06/20/02 |
| 159361-001 | EG1006 | SOLID | 06/24/02 |
| 159361-002 | EG1007 | SOLID | 06/24/02 |
| 159361-003 | EG1008 | SOLID | 06/24/02 |
| 159361-004 | EG1009 | SOLID | 06/24/02 |
| 159362-001 | MP1008 | SOLID | 06/24/02 |
| 159362-002 | MP1009 | SOLID | 06/24/02 |
| 159362-003 | MP1010 | SOLID | 06/24/02 |
| 159362-004 | MP1011 | SOLID | 06/24/02 |
| 159362-005 | MP1012 | SOLID | 06/24/02 |
| 159362-006 | MP1013 | SOLID | 06/24/02 |
| 159363-001 | WG1016 | SOLID | 06/24/02 |
| 159363-002 | WG1017 | SOLID | 06/24/02 |
| 159363-003 | WG1018 | SOLID | 06/24/02 |
| 159363-004 | WG1019 | SOLID | 06/24/02 |
| 159363-005 | WG1020 | SOLID | 06/24/02 |
| 159363-006 | EG1010 | SOLID | 06/24/02 |
| 159363-007 | EG1011 | SOLID | 06/24/02 |
| 159363-008 | EG1012 | SOLID | 06/24/02 |
| 159363-009 | EG1013 | SOLID | 06/24/02 |
| 159363-010 | EG1014 | SOLID | 06/24/02 |
| 159363-011 | EQ003 | WATER | 06/24/02 |
| 159363-012 | EG1015 | SOLID | 06/24/02 |
| 159363-013 | EG1016 | SOLID | 06/24/02 |
| 159363-014 | EG1028 | SOLID | 06/24/02 |
| 159363-015 | EG1024 | SOLID | 06/20/02 |
| 159363-016 | WG1001 | SOLID | 06/20/02 |

**TABLE H-1**
Sample Cross-Reference Summary
*(Fort McDowell Site Investigation)*

| Lab Sample ID | Sample ID | Matrix | Date Collected |
|---|---|---|---|
| 159363-017 | WG1002 | SOLID | 06/20/02 |
| 159363-018 | NG3005 | SOLID | 06/17/02 |
| 159363-019 | NG3011 | SOLID | 06/17/02 |
| 159363-020 | NG3018 | SOLID | 06/17/02 |
| 159363-021 | NG3026 | SOLID | 06/17/02 |
| 159363-022 | NG3040 | SOLID | 06/17/02 |
| 159363-023 | NG3055 | SOLID | 06/19/02 |
| 159363-024 | INCNE-3 | SOLID | 06/18/02 |
| 159363-025 | INCNW-6 | SOLID | 06/20/02 |
| 159363-026 | NG4004 | SOLID | 06/18/02 |
| 159363-027 | NG4009 | SOLID | 06/18/02 |
| 159363-028 | NG4015 | SOLID | 06/18/02 |
| 159363-029 | NG4028 | SOLID | 06/20/02 |
| 159363-030 | EG1022 | SOLID | 06/20/02 |
| 159363-031 | EG1023 | SOLID | 06/20/02 |
| 159382-001 | NG1148 | SOLID | 06/25/02 |
| 159382-002 | NG1149 | SOLID | 06/25/02 |
| 159382-005 | B066 | WATER | 06/25/02 |
| 159404-001 | AC1026 | SOLID | 06/26/02 |
| 159404-002 | NG1142 | SOLID | 06/26/02 |
| 159404-003 | NG1143 | SOLID | 06/26/02 |
| 159404-004 | NG1144 | SOLID | 06/26/02 |
| 159404-005 | AC1030 | SOLID | 06/26/02 |
| 159404-006 | AC1031 | SOLID | 06/26/02 |
| 159404-007 | AC1032 | SOLID | 06/26/02 |
| 159404-008 | AC1033 | SOLID | 06/26/02 |
| 159419-001 | NG1154 | SOLID | 06/27/02 |
| 159419-002 | NG1155 | SOLID | 06/27/02 |
| 159419-003 | NG1156 | SOLID | 06/27/02 |
| 159419-004 | NG1157 | SOLID | 06/27/02 |
| 159419-005 | EQ002 | WATER | 06/27/02 |

# Attachment 2
Validated Sample Results

# Attachment 3
Field Duplicate Results

**TABLE H-2**
Field Duplicate Precision Summary
*(Fort McDowell Site Investigation)*

| Analyses | Units | Native Sample Result | Field Duplicate Result | Precision %RPD | Precision Objective |
|---|---|---|---|---|---|
| | SITE NAME: | Former Ship Fueling | | | |
| | FIELD SAMPLE ID: | NG1016 | NG1017 | | |
| | LOCATION ID: | T-NG-FSF-16 | T-NG-FSF-16 | | |
| | SAMPLE PURPOSE: | Normal | FD-NG1016 | | |
| **Wet Chemistry** | | | | | |
| Cyanide (E335.2) | MG/KG | -- | -- | -- | 30 |
| **TPH (SW8015)** | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 7800 | 10000 | 25 | 50 |
| Motor Oil C24-C36(SGCU) | MG/KG | 7100 | 8700 | 20 | 50 |
| **VOCs (SW8260B)** | | | | | |
| None Detected | UG/KG | -- | -- | -- | 30 |
| | SITE NAME: | Building 242 ASTs | | | |
| | FIELD SAMPLE ID: | NG1148 | NG1149 | | |
| | LOCATION ID: | B-NG-BB242-3 | B-NG-BB242-3 | | |
| | SAMPLE PURPOSE: | Normal | FD-NG1148 | | |
| **TPH (SW8015)** | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 4700 | 6500 | 32 | 50 |
| Motor Oil C24-C36(SGCU) | MG/KG | 240 | 250 | 4 | 50 |
| **VOCs (SW8260B)** | | | | | |
| 1,2,4-Trimethylbenzene | UG/KG | 99 | 88 | 12 | 30 |
| 1,3,5-Trimethylbenzene | UG/KG | 47 | 45 | 4 | 30 |
| Ethylbenzene | UG/KG | 4.6 J | 4 | 14 | 30 |
| Isopropylbenzene | UG/KG | 7.1 | 6.8 | 4 | 30 |
| m,p-Xylenes | UG/KG | 15 | 13 | 14 | 30 |
| Naphthalene | UG/KG | 86 | 75 | 14 | 30 |
| n-Butylbenzene | UG/KG | 20 | 18 | 11 | 30 |
| o-Xylene | UG/KG | 23 | 22 | 4 | 30 |
| para-Isopropyl Toluene | UG/KG | 20 | 19 | 5 | 30 |
| Propylbenzene | UG/KG | 13 | 12 | 8 | 30 |
| sec-Butylbenzene | UG/KG | 11 | 11 | 0 | 30 |
| tert-Butylbenzene | UG/KG | 0.64 J | 0.76 J | 17 | 30 |

**TABLE H-2**
Field Duplicate Precision Summary
*(Fort McDowell Site Investigation)*

| Analyses | Units | Native Sample Result | Field Duplicate Result | Precision %RPD | Precision Objective |
|---|---|---|---|---|---|
| | SITE NAME: | Vehicle Lift Rack | | | |
| | FIELD SAMPLE ID: | MP1069 | MP1059 | | |
| | LOCATION ID: | B-MP-VLR-4 | B-MP-VLR-4 | | |
| | SAMPLE PURPOSE: | Normal | FD-MP1069 | | |
| **VOCs (SW8260B)** | | | | | |
| None Detected | UG/KG | -- | -- | -- | 30 |
| | SITE NAME: | Oil Change Rack | | | |
| | FIELD SAMPLE ID: | MP1056 | MP1058 | | |
| | LOCATION ID: | B-MP-OCR-3 | B-MP-OCR-3 | | |
| | SAMPLE PURPOSE: | Normal | FD-MP1056 | | |
| **TPH (SW8015)** | | | | | |
| Gasoline C7-C12 | MG/KG | 0.19 U | 0.2 U | -- | 50 |
| **VOCs (SW8260B)** | | | | | |
| None Detected | UG/KG | -- | -- | -- | 30 |
| | SITE NAME: | Former Boiler Stack | | | |
| | FIELD SAMPLE ID: | EG1013 | EG1014 | | |
| | LOCATION ID: | H-EG-FBS-W | H-EG-FBS-W | | |
| | SAMPLE PURPOSE: | Normal | FD-EG1013 | | |
| **Metals (SW6010/7471)** | | | | | |
| Antimony | MG/KG | 2.9 U | 2.9 UJ | -- | 25 |
| Arsenic | MG/KG | 1.5 J | 2.2 J | 38 | 25 |
| Barium | MG/KG | 100 J | 210 J | 71 | 25 |
| Beryllium | MG/KG | 0.14 | 0.18 | 25 | 25 |
| Cadmium | MG/KG | 1.1 | 1.3 | 17 | 25 |
| Chromium | MG/KG | 150 J | 190 J | 24 | 25 |
| Cobalt | MG/KG | 14 | 17 | 19 | 25 |
| Copper | MG/KG | 36 | 36 | 0 | 25 |
| Lead | MG/KG | 720 J | 640 J | 12 | 25 |
| Mercury | MG/KG | 0.14 | 0.099 | 34 | 25 |
| Molybdenum | MG/KG | 0.47 J | 0.75 J | 46 | 25 |
| Nickel | MG/KG | 320 | 390 | 20 | 25 |
| Selenium | MG/KG | 0.69 UJ | 1.1 J | -- | 25 |
| Silver | MG/KG | 0.24 U | 0.24 U | -- | 25 |
| Thallium | MG/KG | 0.36 | 0.24 U | -- | 25 |
| Vanadium | MG/KG | 42 | 55 | 27 | 25 |
| Zinc | MG/KG | 190 | 260 | 31 | 25 |

**TABLE H-2**
Field Duplicate Precision Summary
*(Fort McDowell Site Investigation)*

| Analyses | Units | Native Sample Result | Field Duplicate Result | Precision | |
|---|---|---|---|---|---|
| | | | | %RPD | Objective |
| | SITE NAME: | Former Photoshop | | | |
| | FIELD SAMPLE ID: | EG1016 | EG1028 | | |
| | LOCATION ID: | H-EG-FPS-2 | H-EG-FPS-2 | | |
| | SAMPLE PURPOSE: | Normal | FD-EG1016 | | |
| **Metals (SW6010/7471)** | | | | | |
| Antimony | MG/KG | 3.1 UJ | 2.8 UJ | -- | 25 |
| Arsenic | MG/KG | 3.8 | 2.9 | 27 | 25 |
| Barium | MG/KG | 140 | 130 | 7 | 25 |
| Beryllium | MG/KG | 0.41 | 0.37 | 10 | 25 |
| Cadmium | MG/KG | 1.7 | 1.4 | 19 | 25 |
| Chromium | MG/KG | 79 J | 62 J | 24 | 25 |
| Cobalt | MG/KG | 16 | 13 | 21 | 25 |
| Copper | MG/KG | 25 | 18 | 33 | 25 |
| Lead | MG/KG | 40 J | 31 J | 25 | 25 |
| Mercury | MG/KG | 0.12 | 0.13 | 8 | 25 |
| Molybdenum | MG/KG | 0.43 J | 0.94 U | -- | 25 |
| Nickel | MG/KG | 120 | 89 | 30 | 25 |
| Selenium | MG/KG | 1.4 | 1 | 33 | 25 |
| Silver | MG/KG | 0.26 U | 0.23 U | -- | 25 |
| Thallium | MG/KG | 0.84 | 0.7 | 18 | 25 |
| Vanadium | MG/KG | 42 | 35 | 18 | 25 |
| Zinc | MG/KG | 76 | 65 | 16 | 25 |
| **SVOCs (SW8270C)** | | | | | |
| None Detected | UG/KG | -- | -- | -- | 30 |
| | SITE NAME: | Visitor Center | | | |
| | FIELD SAMPLE ID: | AC1030 | AC1031 | | |
| | LOCATION ID: | B-AC-VC80-1 | B-AC-VC80-1 | | |
| | SAMPLE PURPOSE: | Normal | FD-AC1030 | | |
| **TPH (SW8015)** | | | | | |
| Diesel C12-C24(SGCU) | MG/KG | 1.2 U | 1.2 U | -- | 50 |
| Motor Oil C24-C36(SGCU) | MG/KG | 5.8 U | 6 U | -- | 50 |
| **VOCs (SW8260B)** | | | | | |
| None Detected | UG/KG | -- | -- | -- | 30 |

**TABLE H-2**
Field Duplicate Precision Summary
*(Fort McDowell Site Investigation)*

| Analyses | Units | Native Sample Result | Field Duplicate Result | Precision | |
|---|---|---|---|---|---|
| | | | | %RPD | Objective |
| | SITE NAME: | Avala Cove Boat Ramp Dump Site | | | |
| | FIELD SAMPLE ID: | AC1012 | AC1013 | | |
| | LOCATION ID: | T-AC-BR-2 | T-AC-BR-2 | | |
| | SAMPLE PURPOSE: | Normal | FD-AC1012 | | |
| **TPH (SW8015)** | | | | | |
| Diesel C12-C24 (SGCU) | MG/KG | 2700 | 2700 | 0 | 50 |
| Motor Oil C24-C36 (SGCU) | MG/KG | 81 | 76 | 6 | 50 |
| Gasoline C7-C12 | MG/KG | 24 | 94 | 119 | 50 |
| **Metals (SW6010/7471)** | | | | | |
| Antimony | MG/KG | 3.2 UJ | 3.2 UJ | | |
| Arsenic | MG/KG | 6.2 | 7.6 | 20 | 25 |
| Barium | MG/KG | 93 | 130 | 33 | 25 |
| Beryllium | MG/KG | 0.48 | 0.36 | 29 | 25 |
| Cadmium | MG/KG | 2 | 1.9 | 5 | 25 |
| Chromium | MG/KG | 73 | 51 | 35 | 25 |
| Cobalt | MG/KG | 18 | 15 | 18 | 25 |
| Copper | MG/KG | 19 | 19 | 0 | 25 |
| Lead | MG/KG | 24 | 18 | 29 | 25 |
| Mercury | MG/KG | 0.15 | 0.11 | 31 | 25 |
| Molybdenum | MG/KG | 1.1 U | 1.4 U | -- | 25 |
| Nickel | MG/KG | 110 | 100 | 10 | 25 |
| Selenium | MG/KG | 0.81 | 0.88 | 8 | 25 |
| Silver | MG/KG | 0.27 U | 0.26 U | -- | 25 |
| Thallium | MG/KG | 1.1 U | 1.1 U | -- | 25 |
| Vanadium | MG/KG | 39 | 27 | 36 | 25 |
| Zinc | MG/KG | 67 | 59 | 13 | 25 |
| **PCBs (SW8082)** | | | | | |
| None Detected | UG/KG | -- | -- | -- | 50 |
| **VOCs (SW8260B)** | | | | | |
| Propylbenzene | UG/KG | 1.3 J | 34 | 185 | 30 |
| **SVOCs (SW8270C)** | | | | | |
| None Detected | UG/KG | -- | -- | -- | 30 |

**TABLE H-2**
Field Duplicate Precision Summary
*(Fort McDowell Site Investigation)*

| Analyses | Units | Native Sample Result | Field Duplicate Result | Precision %RPD | Precision Objective |
|---|---|---|---|---|---|
| | SITE NAME: | Former Disinfection Bldg | | | |
| | FIELD SAMPLE ID: | AC1016 | AC1017 | | |
| | LOCATION ID: | B-AC-FDB-2 | B-AC-FDB-2 | | |
| | SAMPLE PURPOSE: | Normal | FD-AC1016 | | |
| **Pesticides (SW8081)** | | | | | |
| None detected | | -- | -- | -- | 50 |
| | SITE NAME: | Paint Shop | | | |
| | FIELD SAMPLE ID: | WG1017 | WG1020 | | |
| | LOCATION ID: | H-WG-PS-N | H-WG-PS-N | | |
| | SAMPLE PURPOSE: | N | FD-WG1017 | | |
| **Metals (SW6010/7471)** | | | | | |
| Antimony | MG/KG | 3.0 UJ | 3.0 UJ | -- | 25 |
| Arsenic | MG/KG | 1.3 | 1.7 | 27 | 25 |
| Barium | MG/KG | 100 | 130 | 26 | 25 |
| Beryllium | MG/KG | 0.22 | 0.31 J | 34 | 25 |
| Cadmium | MG/KG | 1.3 | 1.9 | 38 | 25 |
| Chromium | MG/KG | 89 J | 100 J | 12 | 25 |
| Cobalt | MG/KG | 21 | 24 | 13 | 25 |
| Copper | MG/KG | 19 | 25 | 27 | 25 |
| Lead | MG/KG | 46 J | 70 J | 41 | 25 |
| Mercury | MG/KG | 0.1 | 0.099 J | 1 | 25 |
| Molybdenum | MG/KG | 1 U | 1 U | -- | 25 |
| Nickel | MG/KG | 180 | 190 | 5 | 25 |
| Selenium | MG/KG | 1.1 | 1.3 | 17 | 25 |
| Silver | MG/KG | 0.25 U | 0.25 U | -- | 25 |
| Thallium | MG/KG | 0.72 | 0.57 | 23 | 25 |
| Vanadium | MG/KG | 40 | 61 J | 42 | 25 |
| Zinc | MG/KG | 56 | 76 J | 30 | 25 |
| | SITE NAME: | Power Plant AST | | | |
| | FIELD SAMPLE ID: | EG1007W | EG1008W | | |
| | LOCATION ID: | B-EG-AST-2 | B-EG-AST-2 | | |
| | SAMPLE PURPOSE: | Normal | FD-EG1007W | | |
| ***TPH (SW8015)*** | | | | | |
| Diesel C12-C24 (SGCU) | UG/L | 86 | 86 | 0 | 50 |
| Motor Oil C24-C36 (SGCU) | UG/L | 300 | 200 | 40 | 50 |

**TABLE H-2**
Field Duplicate Precision Summary
*(Fort McDowell Site Investigation)*

| Analyses | Units | Native Sample Result | Field Duplicate Result | Precision | |
|---|---|---|---|---|---|
| | | | | %RPD | Objective |
| **VOCs (SW8260B)** | | | | | |
| 2-Butanone | UG/L | 3.1 J | 1.4 J | 76 | 20 |
| Carbon Disulfide | UG/L | 1 J | 0.4 J | 86 | 20 |

# Attachment 4

Field and Trip Blank Summary of Detections

**TABLE H-3**
Field and Trip Blank Summary of Detections
*(Fort McDowell Site Investigation)*

| Parameter | Units | RL | Sample Results | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Field Sample ID: | | EQ005 | EQ007 | EQ006 | EQ001 | EQ003 | EQ002 |
| | Lab Sample ID: | | 159328-009 | 159329-006 | 159330-008 | 159344-001 | 159363-011 | 159419-005 |
| | Sample Type: | | EB | EB | EB | EB | EB | EB |
| **SW8015 Modified** | | | | | | | | |
| Motor Oil C24-C36 (SGCU) | UG/L | 300 | 300 U | 300 U | NS | 1200 = | NS | 300 U |
| Gasoline C7-C12 | UG/L | 50 | NS | 50 U | NS | NS | NS | NS |
| **SW6010B** | | | | | | | | |
| Antimony | UG/L | 60 | NS | 15 = | 60 U | NS | 60 U | NS |
| Arsenic | UG/L | 5 | NS | 4.6 = | 5 U | NS | 5 U | NS |
| Chromium | UG/L | 10 | NS | 2.7 = | 1.4 = | NS | 10 U | NS |
| Lead | UG/L | 3 | NS | 3 U | 2.2 = | NS | 2.1 = | NS |
| Zinc | UG/L | 20 | NS | 5.5 = | 4.2 = | NS | 11 = | NS |
| **SW8082** | | | | | | | | |
| No PCB was detected | UG/L | 0.5 - 1 | NS | ND | ND | NS | NS | NS |
| **SW8260B** | | | | | | | | |
| Acetone | UG/L | 20 | NS | 5.8 = | 4.7 = | NS | NS | NS |
| Bromodichloromethane | UG/L | 5 | NS | 0.7 = | 0.7 = | NS | NS | NS |
| Chloroform | UG/L | 5 | NS | 0.8 = | 0.8 = | NS | NS | NS |
| Methylene Chloride | UG/L | 5 | NS | 0.6 = | 0.6 = | NS | NS | NS |
| **SW8270** | | | | | | | | |
| No SVOCs were detected | UG/L | 10 - 50 | NS | 11 U | 9.4 U | NS | NS | NS |
| | Field Sample ID: | | TRIP BLANK | ALTB02 | ALTB01 | TRIP BLANK | TRIP BLANK | ALTB04 |
| | Lab Sample ID: | | 159234-004 | 159304-004 | 159309-006 | 159313-002 | 159313-004 | 159329-007 |
| | Sample Type: | | TB | TB | TB | TB | TB | TB |
| **SW8015 Modified** | UG/L | -- | NS | NS | NS | NS | NS | NS |
| **SW6010B** | UG/L | -- | NS | NS | NS | NS | NS | NS |
| **SW8082** | UG/L | -- | NS | NS | NS | NS | NS | NS |
| **SW8260B** | | | | | | | | |
| 1,2,4-Trichlorobenzene | UG/L | 5 | 0.1 = | 5 U | 5 U | 5 U | 5 U | 5 U |
| 1,3,5-Trimethylbenzene | UG/L | 5 | 5 U | 0.4 = | 0.4 = | 5 U | 5 U | 5 U |
| 2-Chlorotoluene | UG/L | 5 | 5 U | 0.3 = | 0.2 = | 5 U | 5 U | 5 U |
| Acetone | UG/L | 20 | 20 U | 1.5 = | 20 U | 20 U | 20 U | 20 U |
| Bromomethane | UG/L | 10 | 10 U | 0.7 = | 10 U | 10 U | 10 U | 10 U |
| Ethylbenzene | UG/L | 5 | 5 U | 0.2 = | 5 U | 5 U | 5 U | 5 U |
| Methylene Chloride | UG/L | 5 | 0.4 = | 0.4 = | 0.5 = | 0.8 = | 0.8 = | 0.9 = |
| MTBE | UG/L | 5 | 5 U | 0.2 = | 0.1 = | 5 U | 5 U | 5 U |
| para-Isopropyl Toluene | UG/L | 5 | 0.1 = | 5 U | 5 U | 5 U | 5 U | 5 U |
| Trichloroethene | UG/L | 5 | 5 U | 0.5 = | 0.5 = | 5 U | 5 U | 5 U |

**TABLE H-3**
Field and Trip Blank Summary of Detections
*(Fort McDowell Site Investigation)*

| Parameter | Units | RL | Sample Results | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Field Sample ID: | | TRIP BLANK | ALTB02 | ALTB01 | TRIP BLANK | TRIP BLANK | ALTB04 |
| | Lab Sample ID: | | 159234-004 | 159304-004 | 159309-006 | 159313-002 | 159313-004 | 159329-007 |
| | Sample Type: | | TB | TB | TB | TB | TB | TB |
| **SW8270** | UG/L | -- | NS | NS | NS | NS | NS | NS |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Field Sample ID: | | ALTB03 | ALTB05 | B066 | | | |
| | Lab Sample ID: | | 159330-001 | 159341-006 | 159382-005 | | | |
| | Sample Type: | | TB | TB | TB | | | |
| **Parameter** | **Units** | **RL** | | | | | | |
| **SW8015 Modified** | UG/L | -- | NS | NS | NS | | | |
| **SW6010B** | UG/L | -- | NS | NS | NS | | | |
| **SW8082** | UG/L | -- | NS | NS | NS | | | |
| **SW8260B** | | | | | | | | |
| Methylene Chloride | UG/L | 5 | 1.2 = | 0.8 = | 1.3 = | | | |
| **SW8270** | UG/L | -- | NS | NS | NS | | | |

**Footnotes:**

NS = No sample was collected for this analysis.

ND = None of the parameters were detected for this analysis

# APPENDIX H

# FIELD SAMPLING AND LABORATORY AUDIT REPORT

T N & Associates, Inc.
Engineering and Science

# Memorandum

**Date:** August 12, 2002

**To:** Margaret Berry\TN&A

**From:** Richard Baldino\TN&A

**Subject:** **Field and Laboratory Audits – Angel Island**

## *Introduction*

Quality assurance\quality control (QA\QC) oversight audits were conducted by T.N. & Associates Inc. (TN&A) during the field sampling and analysis activities performed in support of the Environmental Site Investigation\Preliminary Assessment (PA\SI) at Fort McDowell/Angel Island, Marin County, California. The objective of these audits was to ensure compliance of field sampling, onsite laboratory procedures, and the fixed-base laboratory procedures with the project Quality Assurance Project Plan (QAPP). Mr. Richard Baldino of TN&A conducted the QA\QC oversight audits on June 18 and 19, 2002, which were documented on field and laboratory assessment checklists presented in Attachment A and B of the memorandum.

## *Field Sampling Audit*

Field sampling activities were audited to ensure that sample collection techniques and procedures were compliant with the QAPP. TN&A field personnel included:

Margaret Berry – Field Team Leader
Brian McReynolds – Field Team Member
Jacques Marcillac – Field Team Member
Tom Rowell – Field Team Member

Field sampling techniques observed included surface soil sampling, test pit sampling, decontamination procedures, and sample handling procedures. Some recommendations were made regarding the handling of EnCore™ samplers. Soil samples for non-volatile parameters were to have been colleted in stainless steel tubes. Stainless steel tubes were not available at the time of sample collection so glass jars with Teflon lined caps were used. Recommendations were made regarding homogenizing samples and collection techniques, as sampling with glass sample containers was not covered in the QAPP.

1033 N. Mayfair Road
Suite 200
Milwaukee, WI 53226

## *Fixed Laboratory Audit*

Fixed laboratory analysis was to be conducted by Curtis & Tompkins, Ltd. of Berkeley, California. Analytical parameters to be tested are shown in Table 1.

**Table 1**
*Analytical Methods and Parameters for Fixed Laboratory Analysis*
*(Fort McDowell PA\SI)*

| Method | Parameter |
|---|---|
| SW-846 6010B | Metals |
| SW-846 8015M | TPH-D, TPH-G, TPH-Motor Oil |
| SW-846 8082 | PCBs |
| SW-846 8260B | VOCs |
| SW-846 8270C | SVOCs |
| SW-846 9012A | Cyanide |

Laboratory audits for the fixed laboratory included analytical procedures for the methods and parameters listed in Table 1, sample receiving and sample handling, QA procedures, corrective action procedures, and the Laboratory Information Management System (LIMS). The Laboratory Quality and Operations Audit Checklist is included in Attachment B. Laboratory personnel interviewed during the laboratory audit are listed in Table 2. No deficiencies were noted during the fixed laboratory audit process.

**Table 2**
*Curtis & Tompkins, Ltd. Laboratory Personnel Included in the Audit Process*
*(Fort McDowell PA\SI)*

| Personnel | Function |
|---|---|
| Teresa K. Morrison | Quality Assurance Director |
| Chris Katayanagi | Systems Administrator |
| Patricia Flynn | Project Manager |
| Terri Walsh | GC/MS Department Manager |
| H. Dennis Dougherty | Inorganic Group Leader |
| Robert Hopeman | GC, HPLC, IC Department Manager |
| Steven E. Stanley | Project Manager |
| John Goyette | Operations Manager |

## *Mobile Laboratory Audit*

Mobile laboratory analysis was to be conducted by Transwest Geochem of Phoenix, Arizona. The analytical parameter to be tested is lead by Energy Diffusive X-Ray Fluorescence (EDXRF). Laboratory audits for the mobile laboratory included analytical procedures for lead by EDXRF, sample receiving and sample handling, QA procedures, corrective action procedures, and the Laboratory Information Management System (LIMS). The Laboratory Quality and Operations Audit Checklist is included in Attachment B. Mike Barber of Transwest Geochem was interviewed during the mobile laboratory audit. No deficiencies were noted during the mobile laboratory audit process.

**Attachment A**
Field Assessment Checklist

# Field Assessment General Information

| | |
|---|---|
| Project Name: | Angel Island / Fort McDowell |
| Address: | |
| Facility Contact and Phone Number: | |
| Sampling Team: | Margaret Berry |
| Affiliation: | Brian McReynolds |
| Address & Phone Number: | Jaques Marcillak |
| Sampling Personnel: | Tom Powell |
| Field Assessment Personnel | Erich Sabins |
| Affiliation: | |
| Date(s) of Assessment: | |

Checklist enclosure(s) completed for this overview:

1. ☒ 2. ☐ 3. ☒ 4. ☐ 5. ☐ 6. ☐ 7. ☐ 8. ☐

Key:

1. General Procedures
2. Groundwater Sampling
3. Soil and Sediment Sampling
4. Surface Water Sampling
5. Waste Sampling
6. Storm Water Sampling
7. Air Sampling
8. Potable Water Sampling

# General Procedures

| | |
|---|---|
| 1. Type of samples collected:<br>**List:** Surface Soil, Subsurface Borelok, Test pit soils. | |
| 2. Were sampling locations properly selected?<br>**Comments:** | Yes ☒ No ☐ |
| 3. Were sampling locations adequately documented in a bound field logbook using indelible ink?<br>**Comments:** | Yes ☒ No ☐ |
| 4. Were photos taken and a photolog maintained?<br>**Comments:** | Yes ☐ No ☒ |
| 5. What field instruments were used during this study?<br>**List:** None used during audit. | |
| 6. Were field instruments properly calibrated and calibrations recorded in a bound field logbook?<br>**Comments:** N/A | Yes ☐ No ☐ |
| 7. Was sampling equipment properly wrapped and protected from possible contamination prior to sample collection?<br>**Comments:** | Yes ☒ No ☐ |

| | |
|---|---|
| 8. Was sampling equipment constructed of Teflon®, polyethylene, glass, or stainless steel? | Yes ☒ No ☐ |
| **Comments:** | |
| 9. Were samples collected in appropriate order (e.g. least suspected contamination to most contaminated)? | Yes ☒ No ☐ |
| **Comments:** | |
| 10. Were clean disposable latex or vinyl gloves worn during sampling? | Yes ☒ No ☐ |
| **Comments:** | |
| 11. Were gloves changed before each sample? | Yes ☒ No ☐ |
| **Comments:** | |
| 12. Was any equipment field cleaned? | Yes ☒ No ☐ |
| 13. Type of equipment cleaned: | |
| **List:** Shovels, bowls, spoons. | |
| **Comments:** | |
| 14. Were proper cleaning procedures used? | Yes ☒ No ☐ |
| **Comments:** | |

| | |
|---|---|
| 15. Were equipment rinse blanks collected after field cleaning? | Yes ☒ No ☐ |
| **Comments:** | |
| 16. Were proper sample containers used for samples? | Yes ☒ No ☐ |
| **Comments:** | |
| 17. Were split samples offered to the regulatory agency representative? | Yes ☐ No ☒ |
| **Comments:** | |
| 18. Was a receipt for samples form given to regulatory agency representative? | Yes ☐ No ☐ |
| **Comments:** N/A | |
| 19. Were any duplicate samples collected? | Yes ☒ No ☐ |
| **Comments:** | |
| 20. Were samples properly field preserved? | Yes ☒ No ☐ |
| **Comments:** | |
| 21. Were preservative blanks utilized? | Yes ☐ No ☒ |
| **Comments:** | |

| | |
|---|---|
| 22. Were field and/or trip blanks utilized? | Yes ☒ No ☐ |
| **Comments:** | |
| 23. Were samples adequately identified with labels or tags? | Yes ☒ No ☐ |
| **Comments:** | |
| 24. Were coolers sealed with custody seals after collection? | Yes ☒ No ☐ |
| **Comments:** | |
| 25. Were security measures used to insure custody of the samples after collection? | Yes ☐ No ☐ |
| **Comments:** | |
| 26. Were chain-of-custody and receipt for samples forms properly completed? | Yes ☒ No ☐ |
| **Comments:** | |
| 27. Were any samples shipped to a laboratory? | Yes ☒ No ☐ |
| **Comments:** | |
| 28. If yes to # 27, were samples properly packed? | Yes ☐ No ☐ |
| **Comments:** | |

| | |
|---|---|
| 29. What safety monitoring equipment, protection and procedures were used prior to and during sampling? | Yes ☒ No ☐ |
| **List:** Proper level D clothing, gloves, and shoes | |
| 30. Was safety monitoring equipment properly calibrated and were calibrations recorded in a bound field log book? | Yes ☐ No ☐ |
| **Comments:** N/A | |
| 31. Other comments or observations: | Yes ☐ No ☐ |
| **Comments:** N/A | |

# Groundwater Sampling

| | |
|---|---|
| 1. Type of wells sampled? (monitoring, potable, industrial, *etc.*) | Yes ☐ No ☐ |
| **List:** | |
| 2. Were wells locked and protected? | Yes ☐ No ☐ |
| **Comments:** | |
| 3. Were identification marks and measurement points affixed to the wells? | Yes ☐ No ☐ |
| **Comments:** | |
| 4. What were the sizes and construction materials of the well casings? | |
| **List:** | |
| **Comments:** | |
| 5. Were the boreholes sealed with a concrete pad to prevent surface infiltration? | Yes ☐ No ☐ |
| ***Comments:*** | |
| 6. Was there a dedicated pump in the well? | Yes ☐ No ☐ |
| **Comments:** | |

| | |
|---|---|
| 7. Was clean plastic sheeting placed around the wells to prevent contamination of sampling? | Yes ☐ No ☐ |
| **Comments:** | |
| 8. Were total depth and depth to water determined before purging? | Yes ☐ No ☐ |
| **Comments:** | |
| 9. What device was used to determine depth? | Yes ☐ No ☐ |
| **Comments:** | |
| 10. Were measurements made to the nearest 0.01 ft.? | Yes ☐ No ☐ |
| **Comments:** | |
| 11. Was the measuring device properly cleaned between wells? | Yes ☐ No ☐ |
| **Comments:** | |
| 12. Was the standing water volume in each well determined? | Yes ☐ No ☐ |
| **Comments:** | |

| | |
|---|---|
| 13. How was the volume determined? | |
| **Comments:** | |
| | |
| | |
| | |
| | |
| 14. Was a sufficient volume purged prior to sampling? | Yes ☐ No ☐ |
| **Comments:** | |
| | |
| | |
| | |
| | |
| 15. What was done with the purged water? Was it collected for proper disposal, containerized until characterized or sent to an approved treatment facility? | Yes ☐ No ☐ |
| **Comments:** | |
| | |
| | |
| | |
| | |
| 16. How many volumes? | |
| **List:** | |
| | |
| | |
| | |
| | |
| 17. How was the purged volume measured? | |
| **Comments:** | |
| | |
| | |
| | |
| | |
| 18. What was the method of purging? | |
| **Comments:** | |
| | |
| | |
| | |
| | |

| | |
|---|---|
| 19. Were pH, conductivity, temperature, turbidity, and dissolved oxygen measurements taken and recorded during well-purging activities? | Yes ☐ No ☐ |
| **Comments:** | |
| 20. Were pH, conductivity, temperature, turbidity, and dissolved oxygen readings stable prior to sampling? | Yes ☐ No ☐ |
| **Comments:** | |
| 21. How many wells were sampled? | ☐ Up gradient<br>☐ Down gradient |
| **Comments:** | |
| 22. How were the samples collected? | ☐ Bailer<br>☐ Pump<br>☐ Other: |
| **Comments:** | |
| 23. If pump was used, what type? | |
| **List:** | |
| **Comments:** | |

| | |
|---|---|
| 24. If a pump was used, was it properly cleaned before and/or between wells? | Yes ☐ No ☐ |
| **Comments:** | |
| 25. What were the cleaning procedures? | |
| **List:** | |
| 26. Did bailers have polytetrafluoroethylene (PTFE)-coated wire leaders to prevent rope from coming into contact with water? | Yes ☐ No ☐ |
| **Comments:** | |
| 27. Were bailers open or closed top? | Yes ☐ No ☐ |
| **Comments:** | |
| 28. Was a clean bailer and new leaders used at each well? | Yes ☐ No ☐ |
| **Comments:** | |
| 29. Were samples properly transferred from the sampling device to the sample containers? (*i.e.*, | Yes ☐ No ☐ |
| **Comments:** | |

| | |
|---|---|
| 30. Was pH of preserved samples checked to insure proper preservation? | Yes ☐ No ☐ |
| **Comments:** | |
| 31. Were samples iced immediately after collection? | Yes ☐ No ☐ |
| **Comments:** | |
| 32. For what analyses were the samples collected? | |
| **List:** | |
| **Comments:** | |
| 33. If samples were split, what were the sample/station numbers? | |
| **List:** | |
| **Comments:** | |
| 34. If samples were split, were they blind to the laboratory on the chain-of-custody form? | |
| **Comments:** | |

| 35. Other comments or observations: | |
|---|---|
| **Comments:** | |
| | |
| | |
| | |
| | |

# Soil and Sediment Sampling

1. Type of samples collected:
   **List:** Surface Soil, borehole, Test Pits

   **Comments:**

2. General sample description: Surface soils were sandy and dry Test Pits were extremely rocky and wet.

   **Comments:**

3. How many samples were collected? | Number:
   **Comments:** N/A

4. Were background and/or control samples collected? | Yes ☒ No ☐
   **Comments:**

5. Were representative samples collected? | Yes ☒ No ☐
   **Comments:**

| | |
|---|---|
| 6. Were grab or composite samples collected? Both. | Yes ☐ No ☐ |
| **Comments:** | |
| 7. Were composite samples areal or vertical? | ☒ areal ☐ vertical |
| **Comments:** | |
| 8. How many aliquots were taken for the composite sample? | Number: UNK. |
| **Comments:** | |
| 9. What procedures and equipment were used to collect samples? | |
| **Comments:** Grab samples collected with Bowls / Ekman samplers. | |
| 10. Were samples thoroughly mixed prior to putting them into the sample containers? | Yes ☒ No ☐ |
| **Comments:** Not for VOCs. | |
| 11. Were samples properly placed into sample containers? | Yes ☒ No ☐ |
| **Comments:** | |

| | |
|---|---|
| 12. Were samples chilled with ice water immediately after collection? | Yes ☒ No ☐ |
| **Comments:** | |

13. For what analyses were the samples collected?

**Comments:** TCL / TAL + TPH

| | |
|---|---|
| 14. If samples were split, what were the sample/station numbers? | |

**List:** N/A

**Comments:**

| | |
|---|---|
| 15. If samples were split, were they blind to the laboratory on the chain-of-custody form? | Yes ☐ No ☐ |

**Comments:** N/A

| | |
|---|---|
| 16. Was a drilling rig, backhoe, *etc.*, used to collect soil samples? | Yes ☒ No ☐ |

**Comments:** Drill Rig = Bore holes
Backhoe = Test Pits

17. What was done with the soil cuttings from the drill rig or backhoe?

**Comments:** Backhoe = Replaced.
Drill Rig = Containerized.

| | |
|---|---|
| 18. Were the cuttings collected for proper disposal, or containerized until characterized? | Yes ☒ No ☐ |
| **Comments:** | |
| 19. Were the drilling rig, backhoe, *etc.*, properly cleaned prior to arriving on site? | Yes ☒ No ☐ |
| **Comments:** | |
| 20. What was the condition of the drilling and sampling equipment when it arrived on site? (cleanliness, leaking jacks, peeling paint)? | |
| **Comments:** No problems Noted. | |
| 21. Was a decontamination area located where the cleaning activities would not cross-contaminate clean and/or drying equipment? | Yes ☒ No ☐ |
| **Comments:** | |
| 22. Was clean equipment properly wrapped and stored in a clean area? | Yes ☒ No ☐ |
| **Comments:** | |
| 23. Was the drilling rig(s) properly cleaned between well borings? | Yes ☒ No ☐ |
| **Comments:** | |

| | |
|---|---|
| 24. Were the cleaning and decontamination procedures conducted in accordance with the project plans? | Yes ☒ No ☐ |
| **Comments:** | |
| | |
| | |
| | |
| | |
| 25. Other comments or observations | |
| **Comments:** | |
| | |
| | |
| | |
| | |

**Attachemnt B**

Laboratory Quality and Operation Systems Audit Checklist

# TN & ASSOCIATES, INCORPORATED

# LABORATORY QUALITY AND OPERATION SYSTEMS AUDIT CHECKLIST

**On-Site Audit Date:** 6/19/02

iRequest Location **LABORATORY**

## I. AUDIT INTERVIEWEES

| Name | Position/Title/Method Qualifications | Experience | Initial Proficiency | Continuing Proficiency |
|---|---|---|---|---|
| 1. Mike Barber | Owner | | | |
| 2. | | | | |
| 3. | | | | |
| 4. | | | | |
| 5. | | | | |
| 6. | | | | |
| 7. | | | | |
| 8. | | | | |
| 9. | | | | |
| 10. | | | | |
| 11. | | | | |
| 12. | | | | |
| 13. | | | | |
| 14. | | | | |
| 15. | | | | |
| 16. | | | | |
| 17. | | | | |
| 18. | | | | |
| 19. | | | | |
| 20. | | | | |

## II. QUALITY/OPERATIONS FILES

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| **1.0 Laboratory Certifications** | | | | |
| 1. Are laboratory certifications and approvals by state and federal programs available for review, in place and current? | | | ✓ | Mobile lab |
| **2.0 Sample Management** | | | | |
| 1. Are there SOPs for all elements of the sample management process? | ✓ | | | |
| **2.0.1 Sample Receipt and Tracking** | | | | |
| 1. Are sample receipt procedures documented? | ✓ | | | |
| 2. Is there a SOP for laboratory sample acceptance? | ✓ | | | |
| a. Does the SOP define acceptable conditions by type of analytical request or method? | ✓ | | | |
| 3. Are sample conditions and discrepancies noted on the COC? | ✓ | | | |
| 4. Are sample pHs measured and documented in COC upon receipt, other than volatile samples? | | | ✓ | Metals |
| a. Is volatile sample pH measured and documented at time of analysis? | | | ✓ | |
| 5. Is all relevant sample and project information documented and tracked? | ✓ | | | |
| a. Are unique identifiers assigned to each sample, which allow for clear identification and tracking? | ✓ | | | |
| b. Is a unique sample identifier assigned to each sample container for different analytical tests? | ✓ | | | |
| 6. Are there internal COC procedures and documentation? | ✓ | | | |
| 7. Are holding times tracked and documented with sufficient information to demonstrate compliance with method-specified holding times? | | | ✓ | Same day |
| 8. Is there a system for communication of project-specific requirements (e.g., quick turnaround times) to appropriate lab staff, including changes during the course of the project? | ✓ | | | |

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| **3.0 Subcontracting** | | | | |
| 1. Is client's approval documented prior to shipment of samples to subcontract laboratory? | | | X | |
| **4.0 Sample Storage and Disposal** | | | | |
| 1. Are there adequate access and environmental controls to maintain sample custody and integrity including procedures for monitoring volatile organic samples for cross-contamination? | X | | | |
| a. Are storage blanks used to monitor volatile organic samples for cross-contamination? | | | X | |
| i) Is there one storage blank for each volatile storage area? | | | X | |
| ii) Does the laboratory analyze storage blanks from each volatile storage area weekly? | | | X | |
| b. Are storage blank data maintained in QA program files? | | | X | |
| 2. Do sample storage conditions meet method requirements? | X | | | |
| 3. Do sample management procedures allow for archival of samples, digestates and extracts, when necessary? | X | | | |
| 4. Are procedures for the disposal of completed samples, digestates, etc., in conformance with all applicable local, state, and federal regulations, and documentation maintained? | X | | | |
| 5. Are sample storage conditions monitored daily and results documented? | | | X | Soil Matrix |
| 6. Is there a maximum temperature threshold for freezers? | | | X | |
| 7. Does the laboratory have emergency procedures to identify and respond to conditions that would result in loss of temperature control for large numbers of samples? | | | X | |
| 8. Are temperature measurement devices in sample storage area calibrated annually against a NIST traceable thermometer? | | | X | |
| 9. Do monitoring records clearly indicate use of corrected temperatures or reference to correction factors? | | | X | |

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| temperatures or reference to correction factors? | | | | |
| **5.0 Supplies and Glassware** | | | | |
| 1. Does the laboratory have acceptance criteria for critical reagents, equipment and supplies? | | | X | |
| 2. Are incoming supplies and materials inspected for conformance to acceptance criteria? | | | X | |
| 3. Is an inventory maintained for all chemicals, reagents, purchased standard solutions, and solvents? | | | X | |
| 4. Are materials stored and maintained to ensure integrity and allow for safe use? | | | X | |
| 5. Are bottles and/or containers used for sample storage either purchased precleaned from a commercial supplier or properly cleaned by the laboratory? | | | X | |
| 6. Documentation of manufacturer's certificates of guarantee for all precleaned bottles available? | | | X | |
| 7. Is there a SOP for sample bottle cleaning procedures, if not received precleaned from manufacturer? | | | X | New container for each sample |
| 8. Labware used for the storage, preparation, or analysis of samples washed, dried, and stored in accordance with documented procedures? | | | X | |
| **6.0 Laboratory Waste Disposal** | | | | |
| 1. Procedures for storage and disposal of all laboratory waste are in conformance with all applicable local, state, and federal regulations? | X | | | |
| 2. Documentation is kept for disposal of hazardous wastes? | X | | | |

| 7.0 Analytical Methods | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 1. Are there SOPs available for the analytical methods used? Do they: | | | | X | | | | | | | | | | | |
| a. Contain sufficient information to perform the method properly? | | | | | | | | | | | | | | | |
| b. Reflect what is actually being done in the laboratory? | | | | | | | | | | | | | | | |
| c. Include evidence of review and approval by management? | | | | | | | | | | | | | | | |
| d. Address health and safety issues? | | | | | | | | | | | | | | | |
| e. Describe sample management procedures? | | | | | | | | | | | | | | | |
| f. Describe batching for preparation and analysis? | | | | | | | | | | | | | | | |
| g. Describe or reference SOPs for sample preparation and dilution procedures? | | | | | | | | | | | | | | | |
| h. Describe instrument conditions and maintenance? | | | | | | | | | | | | | | | |
| i. Describes QC checks and materials? | | | | | | | | | | | | | | | |
| j. Describe QC acceptance criteria (i.e., precision and accuracy at specified concentrations)? | | | | | | | | | | | | | | | |
| k. Describe corrective actions? | | | | | | | | | | | | | | | |
| l. Describe data review procedures? | | | | | | | | | | | | | | | |
| m. Do the SOPs contain variation(s) from EPA or other standard method protocols? | | | | | | | | | | | | | | | |
| i) Are the variations noted in the SOP? | | | | | | | | | | | | | | | |
| ii) Is documentation of the comparability of the modified method to the original method included or available? | | | | | | | | | | | | | | | |
| 2. Are there experimentally derived MDLs (annually confirmed and revalidated) for each analyte? | | | | X | | | | | | | | | | | |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 3. Is method capability demonstrated at least annually? | | | | f | | | | | | | | | | | |
| 4. Is there a documented policy regarding selection, documentation, and use of different versions of reference methods? | | | | | | | | | | | | | | | |
| 5. Do reference method citations include revision or version number, as applicable? | | | | | | | | | | | | | | | |
| 6. Is the laboratory's policy for incorporation of new versions of reference methods clearly defined? | | | | | | | | | | | | | | | |
| 7. Is there a system for notifying clients of proposed modifications to reference methods, obtaining approval for modifications as required in QA Guide, documenting and reporting deviations in data report? | | | | | | | | | | | | | | | |
| **7.1 Batch** | | | | | | | | | | | | | | | |
| 1. Do batches not exceed 20 samples, including field QC samples? Are SDGs closed after ten days from first sample receipt? | | | | f | | | | | | | | | | | |
| 2. Are batches processed as a unit, with the same method sequence, lots of reagents, and standards? | | | | | | | | | | | | | | | |
| 3. All manipulations performed simultaneously or in a continuous sequence without interruption? | | | | | | | | | | | | | | | |
| 4. Contains all QC samples required by method, including MS, MSD, duplicate, method blank, LCS, or others as specified? | | | | | | | | | | | | | | | |
| 5. Are all QC samples assigned and prepared in the initial analytical sequence step? | | | | | | | | | | | | | | | |
| **7.2 Standards and QC Materials** | | | | | | | | | | | | | | | |
| 1. Are incoming standard materials assessed for conformance or traceable to a NIST or EPA standard? | | | | f | | | | | | | | | | | |
| 2. Are incoming standard materials labeled with date of receipt, opening and expiration? | | | | f | | | | | | | | | | | |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 3. Are records and labels containing contents, initials of preparer, date of preparation, and date of expiration maintained and affixed to laboratory prepared standards/materials? | | | | | | | | | | | | | | | |
| 4. Do standard material storage conditions comply with manufacturer's recommendations and/or GLP? | | | | | | | | | | | | | | | |
| 5. Are class A volumetric glassware used for standard materials preparation, or automatic pipettes/gas tight syringes used calibrated or checked for conformance to calibration specifications prior to use? | | | | | | | | | | | | | | | |
| **7.3 Traceability** | | | | | | | | | | | | | | | |
| 1. Are there laboratory standard and QC material preparation logbooks? | | | | | | | | | | | | | | | |
| a. Do logbooks allow an external reviewer to identify the QC materials used? | | | | | | | | | | | | | | | |
| b. Do logbooks identify the source and dates of expiration of the QC materials and solvents used? | | | | | | | | | | | | | | | |
| c. Is a unique identifier assigned to each original stock material and subsequent dilution? | | | | | | | | | | | | | | | |
| d. Are prepared concentrations, unique identifiers, dates of preparation and expiration, amounts and lot numbers or unique identifiers of all materials used in preparation and identity of preparer included in all logbook entries? | | | | | | | | | | | | | | | |
| **7.4 Expiration Dates** | | | | | | | | | | | | | | | |
| 1. Are expiration dates assigned and documented for all standard and QC materials? | | | | | | | | | | | | | | | |
| 2. Are standard and QC materials labeled with expiration dates? | | | | | | | | | | | | | | | |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| a. Are manufacturer's recommended expiration dates used, or | | | | X | | | | | | | | | | | |
| b. Laboratory-assigned dates based on professional judgment, method specification, or consideration of the shelf life or similar materials at similar concentrations? | | | | | | | | | | | | | | | |
| c. Is the technical basis for any laboratory-assigned expiration date documented by the responsible analyst, and approved by laboratory management? | | | | | | | | | | | | | | | |
| d. Do assigned expiration dates not exceed manufacturer's? | | | | | | | | | | | | | | | |
| 3. Do laboratory-prepared stock and diluted standard expiration dates not exceed the most limiting component stock standard or any method-specified shelf life? | | | | X | | | | | | | | | | | |
| 4. Is there a SOP which provides detailed guidelines for assignment of expiration dates? | | | | | | | | | | | | | | | |
| 5. Are there records of assigned expiration dates for all standard and QC materials? | | | | | | | | | | | | | | | |
| 6. Are expired standard materials either discarded or revalidated prior to use against a traceable standard material within its original shelf life? | | | | | | | | | | | | | | | |
| 7. Are revalidated standard materials assigned a new expiration date with shelf life no longer than the original material? | | | | | | | | | | | | | | | |
| 8. Is there a SOP for revalidation of standard materials, including acceptance criteria? | | | | | | | | | | | | | | | |
| **7.5 Calibration** | | | | | | | | | | | | | | | |
| 1. Are calibrations performed as specified in the analytical method and instrument requirements prior to sample analysis? | | | | X | | | | | | | | | | | |
| 2. Are the number of initial and continuing calibration standards and target analytes as specified in the analytical method? | | | | | | | | | | | | | | | |
| 3. Are frequency and acceptance criteria as specified in the analytical method? | | | | | | | | | | | | | | | |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 4. Do SOPs for analytical methods without frequency and acceptance criteria document technically reasonable frequency and acceptance criteria? | | | | f | | | | | | | | | | | |
| 5. Do all method analytes meet calibration acceptance criteria prior to analysis of samples? | | | | f | | | | | | | | | | | |
| a. Do GC/MS calibrations check solutions include **all** targeted analytes? | | | | | | f | | | | | | | | | |
| b. For methods with continuing calibration verification (except GC/MS methods), are all reported samples bracketed with acceptable calibration verifications? | | | | | | f | | | | | | | | | |
| 6. A calibration verification is performed prior to sample analysis? | | | | f | | | | | | | | | | | |
| a. Is second-source calibration verification performed after every initial calibration? | | | | f | | | | | | | | | | | |
| b. Are calibration verification acceptance criteria as stringent as continuing calibration acceptance criteria? | | | | f | | | | | | | | | | | |
| 7. Do records allow an external reviewer to completely identify the source of standard materials used for QC samples and calibration standards, and to recreate each calibration event and allow identification of all sample results associated with each calibration event? | | | | f | | | | | | | | | | | |
| **7.6 Quality Control Samples** | | | | | | | | | | | | | | | |
| 1. Are the frequency and type of QC samples used in accordance with the referenced analytical method? | | | | f | | | | | | | | | | | |
| **7.6.1 Laboratory Control Samples** | | | | | | | | | | | | | | | |
| 1. Is a matrix-specific LCS included in each preparation batch? | | | | | | f | | | | | | | | | |
| 2. For classical and metals methods, do LCSs contain all targeted analytes of interest? | | | X | | | f | | | X | | | X | | | X |
| 3. Do organic LCSs contain all surrogates required by the referenced method? | | | X | | | X | | | | | | | | | |
| 4. Do multiple-analyte organic method LCSs contain at least two targeted analytes from each major class of compounds requested for analysis? | | | X | | | X | | | | | | | | | |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 5. Are criteria for LCS recovery specified in analytical method, or determined using in-house statistical limits SOP from a minimum of 20 data points and updated at least annually? | | | | | | f | | | | | | | | | |
| 6. Are corrective actions and/or qualification of data due to failed LCSs in accordance with QA guide? | | | | | | f | | | | | | | | | |
| **7.6.2 Matrix Spike/Matrix Spike Duplicates (MS/MSD) or Duplicates** | | | | | | | | | | | | | | | |
| 1. Are matrix-specific MS/MSDs or MSs and duplicates prepared from project site samples and analyzed at the rate specified in the referenced analytical method or in the project workplan? | | | | | | f | | | | | | | | | |
| 2. Are MS/MSD samples spiked with all targeted analytes of interest at a concentration not less than 10 times the highest method analyte MDL? | | | | | | f | | | | | | | | | |
| 3. Are criteria for MS/MSD recovery either as specified in analytical method, or determined using in-house statistical limits SOP? M = method | | | | | | f | | | | | | | | | |
| **7.6.3 Blanks** | | | | | | | | | | | | | | | |
| 1. Is a method blank included with each analytical batch? | | | | f | | | | | | | | | | | |
| 2. Are corrective actions and/or qualification of data due to contaminated method blanks in accordance with QA guide? | | | | f | | | | | | | | | | | |
| **7.6.4 Surrogates** | | | | | | | | | | | | | | | |
| 1. Are all method required or recommended surrogates used in conjunction with analytical samples? | | | | | | X | | | | | | | | | |
| 2. Are corrective actions and/or qualification of data always performed due to failed surrogates? | | | | | | X | | | | | | | | | |
| **7.6.5 Field QC Samples** | | | | | | | | | | | | | | | |
| 1. Does the laboratory **not** use samples identified as field blanks, equipment blanks, or trip blanks for matrix QC? | | | | f | | | | | | | | | | | |
| **7.6.6 Quantitation Procedures** | | | | | | | | | | | | | | | |
| 1. Does the laboratory use method-specified quantitation procedures, if required? | | | | f | | | | | | | | | | | |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 3. Are detection and reporting limit data subjected to technical review and approved prior to acceptance and use for reporting purposes? | | | | C | | | | | | | | | | | |
| 4. Are MDL studies performed in accordance with CFR Part 136, Appendix B, using at least seven aliquots spiked at 1-10 times the estimated DL? | | | | C | | | | | | | | | | | |
| 5. Does the laboratory annually confirm and revalidate MDLs? | | | | X | | | | | | | | | | | |
| 6. Are confirmation column MDLs equal or less than corresponding primary column MDLs? | | | X | C | | | | | | | | | | | |
| 7. Are IDL studies performed at least annually for each analyte under inorganic methods using ICP, AA, and ICP-MS instruments? | | | X | X | | | | | X | | | X | | | X |

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| **8.0 Equipment Maintenance** | | | | |
| 1. Are maintenance logs for all major instruments in the laboratory complete? | X | | | |
| 2. Do logs include in-house as well as manufacturer or contractor service? | | | | |
| 3. Is completion of preventive maintenance documented? | | | | |
| 4. Does each log entry includes a unique identifier for the affected instrument, or a separate logbook kept for each instrument? | | | | |
| 5. Is proof that serviced instruments are operating properly prior to the analysis of environmental samples evident? | | | | |
| 6. Is return to analytical control prior to analysis of samples documented in the maintenance records by referencing the specific calibration or instrument tune performed immediately after major repairs were completed? | | | | |
| 7. Do calibration records of analytical balances show annual calibration by a professional service? | | | | |
| 8. Are records of daily balance calibration and periodic weighing checks using Class "S" weights maintained and available for review? | | | | |

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| 9. Does the SOP for balance operation include appropriate corrective actions in the event that daily balance checks are out of specification? | ✓ | | | |
| 10. Do records of calibration and temperature checks of drying ovens document at least annual calibration, and daily temperature checks prior to use? | ↓ | | | |
| 11. Do records of calibration of pipettes show accuracy and precision determined at least every six months? | ↓ | | | |
| 12. Are variable volume pipettes calibrated at low, mid and high volume levels? | ↓ | | | |
| 13. Are procedures and algorithms used to determine accuracy and precision of pipettes documented in the SOP for pipette use? | ↓ | | | |
| 14. Are acceptance criteria for pipette calibration documented in the SOP? | ↓ | | | |
| 15. Are pipettes checked for compliance with calibration acceptance criteria each working day prior to use, using aliquot volume consistent with actual use? | ↓ | | | |
| 16. Are procedures for cleaning and maintenance of each type of pipette unit in the SOP for pipette use? | ↓ | | | |
| **9.0 Deliverables** | | | | |
| 1. Is the internal review process and approval of data documented? | ✓ | | | |
| 2. Are supervisory and peer reviews documented by the reviewer's signature and date? | ↓ | | | |
| 3. Are final reports in the required format and issued with management's or a designated alternate's signature? | ↓ | | | |

| | | | | |
|---|---|---|---|---|
| **10.0 Quality Assurance Program** | | | | |
| 1. Are the qualifications of QA staff maintained on file? | ✓ | | | |
| 2. Do all members of the technical and support staff have direct access to controlled copies of the laboratory QAP? | ✓ | | | |
| 3. All members of the laboratory staff receive QA training at a level commensurate with their responsibilities? | ✓ | | | |

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| **10.1 Responsibilities** | | | | |
| 1. Are QA program responsibilities for each member of the laboratory staff clearly defined in the laboratory QAP? | ✓ | | | |
| 2. Are QA staff completely independent of any production responsibilities? | ↓ | | | |
| 3. Does the QA Officer have authority to independently halt production operations, including data reporting? | ↓ | | | |
| **10.2 Corrective Action** | | | | |
| 1. Can out-of-control events be recognized by analysts and addressed with documented corrective action and follow-up? | ✓ | | | |
| a. Are acceptance criteria for all procedures readily available to the analysts? | ↓ | | | |
| b. Can analysts initiate appropriate response (i.e., including work stoppage) and follow-up until a return to control has been demonstrated? | ↓ | | | |
| c. Are all sample analyses conducted during out-of-control conditions evaluated and repeated as necessary? | ↓ | | | |
| 2. Is there a corrective action report available for each out-of-control event? | ↓ | | | |
| a. Are the reports complete? | ↓ | | | |
| b. Is there evidence of management and QA review and approval of the corrective actions and reports? | ↓ | | | |
| c. Documented return of the system to analytical control? | ↓ | | | |
| 3. Are corrective action reports used by QA to detect and eliminate systematic or recurring problems? | ↓ | | | |
| **10.3 Statistical Control** | | | | |
| 1. Are systems used to control accuracy and precision, including calculation of control limits from statistical analysis of internal data? | ✓ | | | |
| a. Used by analysts, supervisory staff, and QA personnel? | ✓ | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| 2. Are procedures used to: (1) analyze trends or biases, as identified in control charts? | C | | | |
| a. (2) identify root causes of out-of-control events? | | | | |
| b. (3) monitor proficiency of analysts and equipment? | | | | |
| 3. Are corrective actions taken prior to analysis of samples? | | | | |
| 4. Are possible effects of trends on data discussed in the report narrative for the affected samples? | | | | |
| 6. Are there documented procedures for pooling data sets, treatment of outliers, assignment of data flags, calculation of control limits and generation of control charts? | | | | |
| **10.4 Document Control** | | | | |
| 1. Does the laboratory have a document control system (DCS) for the generation, approval, distribution and maintenance of QA program documents? | C | | | |
| 2. Does the DCS address the laboratory QAP, SOPs, logbooks, and other official records? | | | | |
| 3. Does the DCS include procedures for controlled and uncontrolled distribution of controlled documents, maintaining all obsolete versions of controlled documents, and removing outdated versions as revisions are distributed? | | | | |
| 4. Does the laboratory maintain controlled document files which include document title, unique ID number or code, dates of issue and replacement or removal, revision dates and numbers and a distribution list for each revision? | | | | |
| **10.5 Standard Operating Procedures** | | | | |
| 1. Are there SOPs available for each analytical method or procedure that would impact data quality? | C | | | |
| a. SOPs available for: | | | | |
| i) Administrative procedures? | | | | |
| ii) QC procedures? | | | | |
| iii) Data review? | | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| iv) Data management? | ✓ | | | |
| v) Laboratory support procedures? | | | | |
| b. Do they reflect what is actually being done in the lab? | | | | |
| c. Are they readily available to members of the laboratory staff? | | | | |
| d. Do they contain all information necessary for a technically qualified individual to perform the procedures properly? | | | | |
| e. Is there evidence of review and approval by management and the laboratory QA officer prior to release? | | | | |
| 3. Are SOPs reviewed annually? | | | | |
| 4. Are SOP reviews documented by the signature of the reviewer and the date? | | | | |
| 5. Are all SOPs signed by the originator, management, and the QA officer? | | | | |
| 6. Is a master list of all SOPs and their revision dates available? | ✓ | | | |
| **10.6 Training** | | | | |
| 1. Are training records available? | ✓ | | | |
| 2. Are criteria used to monitor the analyst's performance and establish acceptable proficiency available and acceptable? | ✓ | | | |
| 3. Are procedures used to train staff documented in a separate SOP including the scope and content of training, trainer qualifications, steps involved in the training and demonstration of proficiency, and required documentation? | ✓ | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| **10.7 Documentation and Recordkeeping Procedures** | | | | |
| 1. Do laboratory records include all the information necessary to recreate each step of the analytical process and maintained in a manner that allows retrieval and review? | ✓ | | | |
| a. Are laboratory records kept for a minimum of three years, unless otherwise stated in the contract ? | | | | |
| b. Is all documentation stored in a secure, controlled access archives area? | | | | |
| c. Do records unambiguously identify the samples, standards, QC materials used to generate the data? | | | | |
| d. Are copies of superseded SOPs maintained as archival copies? | | | | |
| 2. Are there SOPs on proper documentation and recordkeeping procedures, including error correction, archiving data and notebooks, supervisory review requirements, and other administrative tasks? | | | | |
| 3. Are records kept in indelible ink and signed and dated by the initiator and reviewer(s)? | | | | |
| 4. Are corrections made with a single line through the erroneous information, initialed and dated? | | | | |
| 5. Are instrument printouts that have undergone technical evaluation initialed and dated by the analyst? | | | | |
| 6. Is there a QA process to ensure authenticity and recreation of computer generated and stored records? | | | | |
| **10.8 Security** | | | | |
| 1. Are there physical and administrative controls that protect data, samples digestates, and extracts from unauthorized access or intentional modification? | ✓ | | | |
| 2. Is access to sample and data handling areas controlled, with written procedures for personnel access control? | ✓ | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| 3. Are computer systems physically and electronically secured, with write and change access to results files and raw data limited to authorized personnel? | | P | | |
| 4. Are there staff access and authority lists for electronic data file modifications, with specific privileges documented? | | P | | |
| **10.9 Comparability of Data** | | | | |
| 1. Are PE sample results acceptable? | C | | | |
| a. Responses documented? | | | | |
| b. Adequate corrective action documented? | | | | |
| 2. Are calibration standards and QC standard materials traceable to NIST or EPA standards and with original manufacturer's shelf life? | | | | |
| 3. Are frequency of QC checks and acceptance criteria in accordance with well-established and documented reference method requirements? | | | | |
| **10.10 Internal and External Audits** | | | | |
| 1. Does the laboratory QA program utilize internal and external audits on a routine basis? | C | | | |
| a. Does the laboratory perform an internal technical systems audit on each laboratory section at least annually? | | | | |
| b. Do the audits evaluate compliance against laboratory QAP, method and contract requirements? | | | | |
| 2. Does the laboratory have an internal PE program? | | | | |
| 3. Are external PE samples analyzed by the same methods and in exactly the same manner as routine samples? | | | | |
| 4. Are findings identified during all audits tracked to closure, and resolved through documented corrective actions? | | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| **10.11 Software Quality Assurance** | | | | |
| 1. Does the laboratory have a software QAP (SQAP) that addresses QA activities related to the LIMS, local software, instrumentation software, and any other systems used to generate, compile, or report data or other supporting information? | P | | | |
| 2. Does the SQAP describe policies and practices for the development, procurement, modification, maintenance and use of computer software? | P | | | |
| 3. Has the laboratory established a configuration control system that defines controlled software items, controls the release and change of these items throughout the software life cycle, and documents the status of all controlled items? | | P | | |
| 4. Are all software changes documented? Does the documentation include: | | X | | |
| a. Description of the change and date implemented? | | | | |
| b. Rationale for the change? | | | | |
| c. Identification of affected baselines? | | | | |
| 5. Is software used for compilation, reduction or reporting of data validated and verified prior to use? | P | | | |
| 6. Is baseline software maintained and periodically checked for corruption on a schedule determined by the LIMS system manager? | | X | | |
| 7. Are all software modifications approved, documented, verified, validated, and controlled in accordance with the SQAP? | | X | | |
| 8. Are controls established to permit authorized and prevent unauthorized access to software systems and data files? | | P | | |
| 9. Is there a system that maintains a complete audit trail for all changes to data file structures, including the date and time of changes, the individual responsible for the change, the reason for the change, and the original data record? | | X | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| **10.12 Data Review** | | | | |
| 1. Are all data reported by the laboratory subjected to documented reviews, including peer review, technical supervisor review, and approval for release by management? | X | | | |
| 2. Does the data review process prevent the release of invalid data? Does it: | | | | |
| a. Trace generation of analytical results from data obtained at the bench through peer or supervisory review, and QA and final review prior to report issuance? | | | | |
| b. Ensure the completeness and accuracy of data reports? | | | | |
| c. Include a peer review of 100% of all data sets by an independent analyst, in accordance with the QA guide? | | | | |
| d. Include a technical review of 100% of all reported data by the responsible supervisor or designated alternate in accordance with the QA guide? | | | | |
| e. Include approval of 100% of all data for release by management? | | | | |
| 3. Do routine data reports identify: | | | | |
| a. Specific instruments used? | X | | | |
| b. Analytical method? | X | | | |
| c. Reporting limits and detection limits? | X | | | |
| d. Dates of calibration and analyses? | X | | | |
| e. Standards and other QC materials used? | | X | | |
| f. Results of associated QC samples? | | X | | |
| g. Dates of reviews? | X | | | |
| h. Identity of samples by field and laboratory designators? | X | | | |
| i. Results of the analysis? | X | | | |
| j. Units associated with the results? | X | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| l. Explanations of any corrections or qualifications? | | X | | |
| 4. Are there procedures used for reviewing and verifying electronic data? | | X | | |
| 5. Are reports in the required format? | X | | | |
| **10.13 Quality Assurance Reports to Management** | | | | |
| 1. At least annual formal reports to management are performed? | | | X | |
| Do they include: | | | | |
| a. Findings of internal and external evaluations? | | | | |
| b. Results of performance evaluation studies? | | | | |
| c. Problems identified through data review? | | | | |
| d. The statistical evaluation of QC data? | | | | |
| e. Problems identified through the corrective action system and customer complaints? | | | | |
| f. Status of certifications and approvals? | | | | |
| g. Status of training and continuing education of personnel? | | | | |
| h. A discussion of new QA program initiatives | | | | |
| **10.14 Client Coordination** | | | | |
| 1. Are there documented procedures for addressing, resolving, and documenting client concerns and complaints? | X | | | |

## III. Additional Interviewee/Audit Checklist Comments

# TN & ASSOCIATES, INCORPORATED

# LABORATORY QUALITY AND OPERATION SYSTEMS AUDIT CHECKLIST

**On-Site Audit Date:** 6/18/02

Curtis and Tompkins **LABORATORY**

## I. AUDIT INTERVIEWEES

| Name | Position/Title/Method Qualifications | Experience | Initial Proficiency | Continuing Proficiency |
|---|---|---|---|---|
| 1. Teresa Morrison | DA/QC Manager | | | |
| 2. Chris Katapodis | Systems admin. | | | |
| 3. Patricia Flynn | P.M. | | | |
| 4. Terri Walsh | GC/MS | | | |
| 5. Dennis Dougherty | Inorganics | | | |
| 6. Robert Hoffman | GC, HPLC, IC | | | |
| 7. Steven Stanley | P.M. | | | |
| 8. John Goyette | Operations Manager | | | |
| 9. | | | | |
| 10. | | | | |
| 11. | | | | |
| 12. | | | | |
| 13. | | | | |
| 14. | | | | |
| 15. | | | | |
| 16. | | | | |
| 17. | | | | |
| 18. | | | | |
| 19. | | | | |
| 20. | | | | |

## II. QUALITY/C ᴚATIONS FILES

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| **1.0 Laboratory Certifications** | | | | |
| 1. Are laboratory certifications and approvals by state and federal programs available for review, in place and current? | ✓ | | | |
| **2.0 Sample Management** | | | | |
| 1. Are there SOPs for all elements of the sample management process? | ✓ | | | |
| **2.0.1 Sample Receipt and Tracking** | | | | |
| 1. Are sample receipt procedures documented? | ✓ | | | |
| 2. Is there a SOP for laboratory sample acceptance? | ✓ | | | |
| a. Does the SOP define acceptable conditions by type of analytical request or method? | ✓ | | | |
| 3. Are sample conditions and discrepancies noted on the COC? | ✓ | | | |
| 4. Are sample pHs measured and documented in COC upon receipt, other than volatile samples? | ✓ | | | |
| a. Is volatile sample pH measured and documented at time of analysis? | | | ✓ | No VOC Samples for waters. |
| 5. Is all relevant sample and project information documented and tracked? | ✓ | | | |
| a. Are unique identifiers assigned to each sample, which allow for clear identification and tracking? | ✓ | | | |
| b. Is a unique sample identifier assigned to each sample container for different analytical tests? | ✓ | | | |
| 6. Are there internal COC procedures and documentation? | ✓ | | | |
| 7. Are holding times tracked and documented with sufficient information to demonstrate compliance with method-specified holding times? | ✓ | | | |
| 8. Is there a system for communication of project-specific requirements (e.g., quick turnaround times) to appropriate lab staff, including changes during the course of the project? | ✓ | | | |

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| **3.0 Subcontracting** | | | | |
| 1. Is client's approval documented prior to shipment of samples to subcontract laboratory? | | | X | |
| **4.0 Sample Storage and Disposal** | | | | |
| 1. Are there adequate access and environmental controls to maintain sample custody and integrity including procedures for monitoring volatile organic samples for cross-contamination? | X | | | |
| a. Are storage blanks used to monitor volatile organic samples for cross-contamination? | X | | | |
| i) Is there one storage blank for each volatile storage area? | X | | | |
| ii) Does the laboratory analyze storage blanks from each volatile storage area weekly? | X | | | |
| b. Are storage blank data maintained in QA program files? | X | | | |
| 2. Do sample storage conditions meet method requirements? | X | | | |
| 3. Do sample management procedures allow for archival of samples, digestates and extracts, when necessary? | X | | | |
| 4. Are procedures for the disposal of completed samples, digestates, etc., in conformance with all applicable local, state, and federal regulations, and documentation maintained? | X | | | |
| 5. Are sample storage conditions monitored daily and results documented? | X | | | |
| 6. Is there a maximum temperature threshold for freezers? | X | | | |
| 7. Does the laboratory have emergency procedures to identify and respond to conditions that would result in loss of temperature control for large numbers of samples? | Y | | | |
| 8. Are temperature measurement devices in sample storage area calibrated annually against a NIST traceable thermometer? | Y | | | |
| 9. Do monitoring records clearly indicate use of corrected temperatures or reference to correction factors? | Y | | | |

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| temperatures or reference to correction factors? | | | | |
| **5.0 Supplies and Glassware** | | | | |
| 1. Does the laboratory have acceptance criteria for critical reagents, equipment and supplies? | Y | | | |
| 2. Are incoming supplies and materials inspected for conformance to acceptance criteria? | Y | | | |
| 3. Is an inventory maintained for all chemicals, reagents, purchased standard solutions, and solvents? | Y | | | |
| 4. Are materials stored and maintained to ensure integrity and allow for safe use? | Y | | | |
| 5. Are bottles and/or containers used for sample storage either purchased precleaned from a commercial supplier or properly cleaned by the laboratory? | Y | | | |
| 6. Documentation of manufacturer's certificates of guarantee for all precleaned bottles available? | Y | | | |
| 7. Is there a SOP for sample bottle cleaning procedures, if not received precleaned from manufacturer? | Y | | | |
| 8. Labware used for the storage, preparation, or analysis of samples washed, dried, and stored in accordance with documented procedures? | Y | | | |
| **6.0 Laboratory Waste Disposal** | | | | |
| 1. Procedures for storage and disposal of all laboratory waste are in conformance with all applicable local, state, and federal regulations? | Y | | | |
| 2. Documentation is kept for disposal of hazardous wastes? | Y | | | |

| 7.0 Analytical Methods | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 1. Are there SOPs available for the analytical methods used? Do they: | X | | | X | | | X | | | X | | | | | X |
| a. Contain sufficient information to perform the method properly? | | | | | | | | | | | | | | | |
| b. Reflect what is actually being done in the laboratory? | | | | | | | | | | | | | | | |
| c. Include evidence of review and approval by management? | | | | | | | | | | | | | | | |
| d. Address health and safety issues? | | | | | | | | | | | | | | | |
| e. Describe sample management procedures? | | | | | | | | | | | | | | | |
| f. Describe batching for preparation and analysis? | | | | | | | | | | | | | | | |
| g. Describe or reference SOPs for sample preparation and dilution procedures? | | | | | | | | | | | | | | | |
| h. Describe instrument conditions and maintenance? | | | | | | | | | | | | | | | |
| i. Describes QC checks and materials? | | | | | | | | | | | | | | | |
| j. Describe QC acceptance criteria (i.e., precision and accuracy at specified concentrations)? | | | | | | | | | | | | | | | |
| k. Describe corrective actions? | | | | | | | | | | | | | | | |
| l. Describe data review procedures? | | | | | | | | | | | | | | | |
| m. Do the SOPs contain variation(s) from EPA or other standard method protocols? | | | | | | | | | | | | | | | |
| i) Are the variations noted in the SOP? | | | | | | | | | | N | | | | | |
| ii) Is documentation of the comparability of the modified method to the original method included or available? | | | | | | | | | | | | | | | |
| 2. Are there experimentally derived MDLs (annually confirmed and revalidated) for each analyte? | | | X | X | | | X | | | X | | | | | X |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 3. Is method capability demonstrated at least annually? | | | | | | | | | | | | | | | |
| 4. Is there a documented policy regarding selection, documentation, and use of different versions of reference methods? | | | | | | | | | | | | | | | |
| 5. Do reference method citations include revision or version number, as applicable? | | | | | | | | | | | | | | | |
| 6. Is the laboratory's policy for incorporation of new versions of reference methods clearly defined? | | | | | | | | | | | | | | | |
| 7. Is there a system for notifying clients of proposed modifications to reference methods, obtaining approval for modifications as required in QA Guide, documenting and reporting deviations in data report? | | | | | | | | | | | | | | | |
| **7.1 Batch** | | | | | | | | | | | | | | | |
| 1. Do batches not exceed 20 samples, including field QC samples? Are SDGs closed after ten days from first sample receipt? | | | | | | | | | | | | | | | |
| 2. Are batches processed as a unit, with the same method sequence, lots of reagents, and standards? | | | | | | | | | | | | | | | |
| 3. All manipulations performed simultaneously or in a continuous sequence without interruption? | | | | | | | | | | | | | | | |
| 4. Contains all QC samples required by method, including MS, MSD, duplicate, method blank, LCS, or others as specified? | | | | | | | | | | | | | | | |
| 5. Are all QC samples assigned and prepared in the initial analytical sequence step? | | | | | | | | | | | | | | | |
| **7.2 Standards and QC Materials** | | | | | | | | | | | | | | | |
| 1. Are incoming standard materials assessed for conformance or traceable to a NIST or EPA standard? | | | | | | | | | | | | | | | |
| 2. Are incoming standard materials labeled with date of receipt, opening and expiration? | | | | | | | | | | | | | | | |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 3. Are records and labels containing contents, initials of preparer, date of preparation, and date of expiration maintained and affixed to laboratory prepared standards/materials? | ✓ | | | ✓ | | | ✓ | | | ✓ | | | | | ✓ |
| 4. Do standard material storage conditions comply with manufacturer's recommendations and/or GLP? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| 5. Are class A volumetric glassware used for standard materials preparation, or automatic pipettes/gas tight syringes used calibrated or checked for conformance to calibration specifications prior to use? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| **7.3 Traceability** | | | | | | | | | | | | | | | |
| 1. Are there laboratory standard and QC material preparation logbooks? | | | | | | | | | | | | | | | |
| a. Do logbooks allow an external reviewer to identify the QC materials used? | ✓ | | | ✓ | | | ✓ | | | ✓ | | | | | ✓ |
| b. Do logbooks identify the source and dates of expiration of the QC materials and solvents used? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| c. Is a unique identifier assigned to each original stock material and subsequent dilution? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| d. Are prepared concentrations, unique identifiers, dates of preparation and expiration, amounts and lot numbers or unique identifiers of all materials used in preparation and identity of preparer included in all logbook entries? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| **7.4 Expiration Dates** | | | | | | | | | | | | | | | |
| 1. Are expiration dates assigned and documented for all standard and QC materials? | ✓ | | | ✓ | | | ✓ | | | ✓ | | | | | ✓ |
| 2. Are standard and QC materials labeled with expiration dates? | ✓ | | | ✓ | | | ✓ | | | ✓ | | | | | ✓ |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| a. Are manufacturer's recommended expiration dates used, or | X | | | X | | | X | | | X | | | | | X |
| b. Laboratory-assigned dates based on professional judgment, method specification, or consideration of the shelf life or similar materials at similar concentrations? | | | | | | | | | | | | | | | |
| c. Is the technical basis for any laboratory-assigned expiration date documented by the responsible analyst, and approved by laboratory management? | | | | | | | | | | | | | | | |
| d. Do assigned expiration dates not exceed manufacturer's? | | | | | | | | | | | | | | | |
| 3. Do laboratory-prepared stock and diluted standard expiration dates not exceed the most limiting component stock standard or any method-specified shelf life? | X | | | X | | | X | | | X | | | | | X |
| 4. Is there a SOP which provides detailed guidelines for assignment of expiration dates? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| 5. Are there records of assigned expiration dates for all standard and QC materials? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| 6. Are expired standard materials either discarded or revalidated prior to use against a traceable standard material within its original shelf life? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| 7. Are revalidated standard materials assigned a new expiration date with shelf life no longer than the original material? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| 8. Is there a SOP for revalidation of standard materials, including acceptance criteria? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| **7.5 Calibration** | | | | | | | | | | | | | | | |
| 1. Are calibrations performed as specified in the analytical method and instrument requirements prior to sample analysis? | X | | | X | | | X | | | X | | | | | X |
| 2. Are the number of initial and continuing calibration standards and target analytes as specified in the analytical method? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |
| 3. Are frequency and acceptance criteria as specified in the analytical method? | ↓ | | | ↓ | | | ↓ | | | ↓ | | | | | ↓ |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 4. Do SOPs for analytical methods without frequency and acceptance criteria document technically reasonable frequency and acceptance criteria? | | | | | | | | | | | | | | | |
| 5. Do all method analytes meet calibration acceptance criteria prior to analysis of samples? | | | | | | | | | | | | | | | |
| a. Do GC/MS calibrations check solutions include **all** targeted analytes? | | | | | | | | | | | | | | | |
| b. For methods with continuing calibration verification (except GC/MS methods), are all reported samples bracketed with acceptable calibration verifications? | | | | | | | | | | | | | | | |
| 6. A calibration verification is performed prior to sample analysis? | | | | | | | | | | | | | | | |
| a. Is second-source calibration verification performed after every initial calibration? | | | | | | | | | | | | | | | |
| b. Are calibration verification acceptance criteria as stringent as continuing calibration acceptance criteria? | | | | | | | | | | | | | | | |
| 7. Do records allow an external reviewer to completely identify the source of standard materials used for QC samples and calibration standards, and to recreate each calibration event and allow identification of all sample results associated with each calibration event? | | | | | | | | | | | | | | | |
| **7.6 Quality Control Samples** | | | | | | | | | | | | | | | |
| 1. Are the frequency and type of QC samples used in accordance with the referenced analytical method? | | | | | | | | | | | | | | | |
| **7.6.1 Laboratory Control Samples** | | | | | | | | | | | | | | | |
| 1. Is a matrix-specific LCS included in each preparation batch? | | | | | | | | | | | | | | | |
| 2. For classical and metals methods, do LCSs contain all targeted analytes of interest? | | | | | | | | | | | | | | | |
| 3. Do organic LCSs contain all surrogates required by the referenced method? | | | | | | | | | | | | | | | |
| 4. Do multiple-analyte organic method LCSs contain at least two targeted analytes from each major class of compounds requested for analysis? | | | | | | | | | | | | | | | |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 5. Are criteria for LCS recovery specified in analytical method, or determined using in-house statistical limits SOP from a minimum of 20 data points and updated at least annually? | | | | | | | | | | | | | | | |
| 6. Are corrective actions and/or qualification of data due to failed LCSs in accordance with QA guide? | | | | | | | | | | | | | | | |
| **7.6.2 Matrix Spike/Matrix Spike Duplicates (MS/MSD) or Duplicates** | | | | | | | | | | | | | | | |
| 1. Are matrix-specific MS/MSDs or MSs and duplicates prepared from project site samples and analyzed at the rate specified in the referenced analytical method or in the project workplan? | | | | | | | | | | | | | | | |
| 2. Are MS/MSD samples spiked with all targeted analytes of interest at a concentration not less than 10 times the highest method analyte MDL? | | | | | | | | | | | | | | | |
| 3. Are criteria for MS/MSD recovery either as specified in analytical method, or determined using in-house statistical limits SOP? M = method | | | | | | | | | | | | | | | |
| **7.6.3 Blanks** | | | | | | | | | | | | | | | |
| 1. Is a method blank included with each analytical batch? | | | | | | | | | | | | | | | |
| 2. Are corrective actions and/or qualification of data due to contaminated method blanks in accordance with QA guide? | | | | | | | | | | | | | | | |
| **7.6.4 Surrogates** | | | | | | | | | | | | | | | |
| 1. Are all method required or recommended surrogates used in conjunction with analytical samples? | | | | | | X | | | | | | | | | |
| 2. Are corrective actions and/or qualification of data always performed due to failed surrogates? | | | | | | X | | | | | | | | | |
| **7.6.5 Field QC Samples** | | | | | | | | | | | | | | | |
| 1. Does the laboratory **not** use samples identified as field blanks, equipment blanks, or trip blanks for matrix QC? | | | | | | | | | | | | | | | |
| **7.6.6 Quantitation Procedures** | | | | | | | | | | | | | | | |
| 1. Does the laboratory use method-specified quantitation procedures, if required? | | | | | | | | | | | | | | | |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 2. Do SOPs for analytical methods without quantitation procedures document technically reasonable procedures with acceptable method performance, as supported by QC data? | | | | | | | | | | | | | | | |
| 3. Is there documentation which demonstrates proper functioning of the computer system, including the LIMS, data reduction software, instrumental data systems, commercial software and locally prepared spreadsheets? | | | | | | | | | | | | | | | |
| 4. Are all quantitation algorithms in method SOPs? | | | | | | | | | | | | | | | |
| 5. Is manual integration of chromatograms used only to correct incomplete or incorrect integration by the analytical system, justified in the final data report, and all manually integrated data flagged? | | | | | | | | | | | | | | | |
| **7.6.7 Holding Times** | | | | | | | | | | | | | | | |
| 1. Does the laboratory notify the prime contractor immediately if holding time is exceeded and documents the potential data quality impact in the associated narrative of the report of the missed holding time? | | | | | | | | | | | | | | | |
| **7.6.8 Detection Limits** | | | | | | | | | | | | | | | |
| 1. Do laboratory SOPs clearly define procedures for determination and use of all detection, quantitation and reporting limits? Do they: | | | | | | | | | | | | | | | |
| a. Include experimental method, frequency of determination, the algorithm used for data reduction and responsibility for determination, documentation and maintenance of data files for limits? | | | | | | | | | | | | | | | |
| b. Include references for all procedures used for determination of detection limits (DLs)? | | | | | | | | | | | | | | | |
| c. Comply with method-specific guidelines for the determination of detection or quantitation limits (QLs)? | | | | | | | | | | | | | | | |
| 2. Are data maintained in QA program files and available for review? | | | | | | | | | | | | | | | |

| 7.0 Analytical Methods – cont. | Wet Chem | | | Metals | | | GC/MS Organics | | | GC Organics | | | HPLC Organics | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA | Y | N | NA |
| 3. Are detection and reporting limit data subjected to technical review and approved prior to acceptance and use for reporting purposes? | ✓ | | | ✓ | | | ✓ | | | ✓ | | | | | ✓ |
| 4. Are MDL studies performed in accordance with CFR Part 136, Appendix B, using at least seven aliquots spiked at 1-10 times the estimated DL? | | | | | | | | | | | | | | | |
| 5. Does the laboratory annually confirm and revalidate MDLs? | ✓ | | | | | | | | | | | | | | |
| 6. Are confirmation column MDLs equal or less than corresponding primary column MDLs? | | | X | | | | ✓ | | | ✓ | | | | | ✓ |
| 7. Are IDL studies performed at least annually for each analyte under inorganic methods using ICP, AA, and ICP-MS instruments? | | | X | ✓ | | | | | X | | | X | | | X |

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| **8.0 Equipment Maintenance** | | | | |
| 1. Are maintenance logs for all major instruments in the laboratory complete? | ✓ | | | |
| 2. Do logs include in-house as well as manufacturer or contractor service? | ✓ | | | |
| 3. Is completion of preventive maintenance documented? | ✓ | | | |
| 4. Does each log entry includes a unique identifier for the affected instrument, or a separate logbook kept for each instrument? | ✓ | | | |
| 5. Is proof that serviced instruments are operating properly prior to the analysis of environmental samples evident? | ✓ | | | |
| 6. Is return to analytical control prior to analysis of samples documented in the maintenance records by referencing the specific calibration or instrument tune performed immediately after major repairs were completed? | ✓ | | | |
| 7. Do calibration records of analytical balances show annual calibration by a professional service? | ✓ | | | |
| 8. Are records of daily balance calibration and periodic weighing checks using Class "S" weights maintained and available for review? | ✓ | | | |

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| 9. Does the SOP for balance operation include appropriate corrective actions in the event that daily balance checks are out of specification? | ✓ | | | |
| 10. Do records of calibration and temperature checks of drying ovens document at least annual calibration, and daily temperature checks prior to use? | | | | |
| 11. Do records of calibration of pipettes show accuracy and precision determined at least every six months? | | | | |
| 12. Are variable volume pipettes calibrated at low, mid and high volume levels? | | | | |
| 13. Are procedures and algorithms used to determine accuracy and precision of pipettes documented in the SOP for pipette use? | | | | |
| 14. Are acceptance criteria for pipette calibration documented in the SOP? | | | | |
| 15. Are pipettes checked for compliance with calibration acceptance criteria each working day prior to use, using aliquot volume consistent with actual use? | | | | |
| 16. Are procedures for cleaning and maintenance of each type of pipette unit in the SOP for pipette use? | ✓ | | | |
| **9.0 Deliverables** | | | | |
| 1. Is the internal review process and approval of data documented? | ✓ | | | |
| 2. Are supervisory and peer reviews documented by the reviewer's signature and date? | ✓ | | | |
| 3. Are final reports in the required format and issued with management's or a designated alternate's signature? | ✓ | | | |
| **10.0 Quality Assurance Program** | | | | |
| 1. Are the qualifications of QA staff maintained on file? | ✓ | | | |
| 2. Do all members of the technical and support staff have direct access to controlled copies of the laboratory QAP? | ✓ | | | |
| 3. All members of the laboratory staff receive QA training at a level commensurate with their responsibilities? | ✓ | | | |

| | Yes | No | N/A | Comments |
|---|---|---|---|---|
| **10.1 Responsibilities** | | | | |
| 1. Are QA program responsibilities for each member of the laboratory staff clearly defined in the laboratory QAP? | Y | | | |
| 2. Are QA staff completely independent of any production responsibilities? | Y | | | |
| 3. Does the QA Officer have authority to independently halt production operations, including data reporting? | Y | | | |
| **10.2 Corrective Action** | | | | |
| 1. Can out-of-control events be recognized by analysts and addressed with documented corrective action and follow-up? | Y | | | |
| a. Are acceptance criteria for all procedures readily available to the analysts? | Y | | | |
| b. Can analysts initiate appropriate response (i.e., including work stoppage) and follow-up until a return to control has been demonstrated? | Y | | | |
| c. Are all sample analyses conducted during out-of-control conditions evaluated and repeated as necessary? | Y | | | |
| 2. Is there a corrective action report available for each out-of-control event? | Y | | | |
| a. Are the reports complete? | Y | | | |
| b. Is there evidence of management and QA review and approval of the corrective actions and reports? | Y | | | |
| c. Documented return of the system to analytical control? | Y | | | |
| 3. Are corrective action reports used by QA to detect and eliminate systematic or recurring problems? | Y | | | |
| **10.3 Statistical Control** | | | | |
| 1. Are systems used to control accuracy and precision, including calculation of control limits from statistical analysis of internal data? | Y | | | |
| a. Used by analysts, supervisory staff, and QA personnel? | Y | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| 2. Are procedures used to: (1) analyze trends or biases, as identified in control charts? | X | | | |
| a. (2) identify root causes of out-of-control events? | X | | | |
| b. (3) monitor proficiency of analysts and equipment? | X | | | |
| 3. Are corrective actions taken prior to analysis of samples? | X | | | |
| 4. Are possible effects of trends on data discussed in the report narrative for the affected samples? | X | | | |
| 6. Are there documented procedures for pooling data sets, treatment of outliers, assignment of data flags, calculation of control limits and generation of control charts? | X | | | |
| **10.4 Document Control** | | | | |
| 1. Does the laboratory have a document control system (DCS) for the generation, approval, distribution and maintenance of QA program documents? | X | | | |
| 2. Does the DCS address the laboratory QAP, SOPs, logbooks, and other official records? | X | | | |
| 3. Does the DCS include procedures for controlled and uncontrolled distribution of controlled documents, maintaining all obsolete versions of controlled documents, and removing outdated versions as revisions are distributed? | X | | | |
| 4. Does the laboratory maintain controlled document files which include document title, unique ID number or code, dates of issue and replacement or removal, revision dates and numbers and a distribution list for each revision? | X | | | |
| **10.5 Standard Operating Procedures** | | | | |
| 1. Are there SOPs available for each analytical method or procedure that would impact data quality? | X | | | |
| a. SOPs available for: | X | | | |
| i) Administrative procedures? | X | | | |
| ii) QC procedures? | X | | | |
| iii) Data review? | X | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| iv) Data management? | X | | | |
| v) Laboratory support procedures? | X | | | |
| b. Do they reflect what is actually being done in the lab? | X | | | |
| c. Are they readily available to members of the laboratory staff? | X | | | |
| d. Do they contain all information necessary for a technically qualified individual to perform the procedures properly? | X | | | |
| e. Is there evidence of review and approval by management and the laboratory QA officer prior to release? | X | | | |
| 3. Are SOPs reviewed annually? | X | | | |
| 4. Are SOP reviews documented by the signature of the reviewer and the date? | X | | | |
| 5. Are all SOPs signed by the originator, management, and the QA officer? | X | | | |
| 6. Is a master list of all SOPs and their revision dates available? | X | | | |
| **10.6 Training** | | | | |
| 1. Are training records available? | X | | | |
| 2. Are criteria used to monitor the analyst's performance and establish acceptable proficiency available and acceptable? | X | | | |
| 3. Are procedures used to train staff documented in a separate SOP including the scope and content of training, trainer qualifications, steps involved in the training and demonstration of proficiency, and required documentation? | X | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| **10.7 Documentation and Recordkeeping Procedures** | | | | |
| 1. Do laboratory records include all the information necessary to recreate each step of the analytical process and maintained in a manner that allows retrieval and review? | X | | | |
| a. Are laboratory records kept for a minimum of three years, unless otherwise stated in the contract ? | X | | | |
| b. Is all documentation stored in a secure, controlled access archives area? | X | | | |
| c. Do records unambiguously identify the samples, standards, QC materials used to generate the data? | X | | | |
| d. Are copies of superseded SOPs maintained as archival copies? | X | | | |
| 2. Are there SOPs on proper documentation and recordkeeping procedures, including error correction, archiving data and notebooks, supervisory review requirements, and other administrative tasks? | X | | | |
| 3. Are records kept in indelible ink and signed and dated by the initiator and reviewer(s)? | X | | | |
| 4. Are corrections made with a single line through the erroneous information, initialed and dated? | X | | | |
| 5. Are instrument printouts that have undergone technical evaluation initialed and dated by the analyst? | X | | | |
| 6. Is there a QA process to ensure authenticity and recreation of computer generated and stored records? | X | | | |
| **10.8 Security** | | | | |
| 1. Are there physical and administrative controls that protect data, samples digestates, and extracts from unauthorized access or intentional modification? | X | | | |
| 2. Is access to sample and data handling areas controlled, with written procedures for personnel access control? | | X | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| 3. Are computer systems physically and electronically secured, with write and change access to results files and raw data limited to authorized personnel? | | X | | |
| 4. Are there staff access and authority lists for electronic data file modifications, with specific privileges documented? | | X | | |
| **10.9 Comparability of Data** | | | | |
| 1. Are PE sample results acceptable? | X | | | |
| a. Responses documented? | X | | | |
| b. Adequate corrective action documented? | X | | | |
| 2. Are calibration standards and QC standard materials traceable to NIST or EPA standards and with original manufacturer's shelf life? | X | | | |
| 3. Are frequency of QC checks and acceptance criteria in accordance with well-established and documented reference method requirements? | X | | | |
| **10.10 Internal and External Audits** | | | | |
| 1. Does the laboratory QA program utilize internal and external audits on a routine basis? | X | | | |
| a. Does the laboratory perform an internal technical systems audit on each laboratory section at least annually? | X | | | |
| b. Do the audits evaluate compliance against laboratory QAP, method and contract requirements? | X | | | |
| 2. Does the laboratory have an internal PE program? | X | | | |
| 3. Are external PE samples analyzed by the same methods and in exactly the same manner as routine samples? | X | | | |
| 4. Are findings identified during all audits tracked to closure, and resolved through documented corrective actions? | X | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| **10.11 Software Quality Assurance** | | | | |
| 1. Does the laboratory have a software QAP (SQAP) that addresses QA activities related to the LIMS, local software, instrumentation software, and any other systems used to generate, compile, or report data or other supporting information? | X | | | |
| 2. Does the SQAP describe policies and practices for the development, procurement, modification, maintenance and use of computer software? | X | | | |
| 3. Has the laboratory established a configuration control system that defines controlled software items, controls the release and change of these items throughout the software life cycle, and documents the status of all controlled items? | X | | | |
| 4. Are all software changes documented? Does the documentation include: | X | | | |
| a. Description of the change and date implemented? | X | | | |
| b. Rationale for the change? | X | | | |
| c. Identification of affected baselines? | X | | | |
| 5. Is software used for compilation, reduction or reporting of data validated and verified prior to use? | X | | | |
| 6. Is baseline software maintained and periodically checked for corruption on a schedule determined by the LIMS system manager? | X | | | |
| 7. Are all software modifications approved, documented, verified, validated, and controlled in accordance with the SQAP? | X | | | |
| 8. Are controls established to permit authorized and prevent unauthorized access to software systems and data files? | X | | | |
| 9. Is there a system that maintains a complete audit trail for all changes to data file structures, including the date and time of changes, the individual responsible for the change, the reason for the change, and the original data record? | X | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| **10.12 Data Review** | | | | |
| 1. Are all data reported by the laboratory subjected to documented reviews, including peer review, technical supervisor review, and approval for release by management? | Y | | | |
| 2. Does the data review process prevent the release of invalid data? Does it: | Y | | | |
| a. Trace generation of analytical results from data obtained at the bench through peer or supervisory review, and QA and final review prior to report issuance? | Y | | | |
| b. Ensure the completeness and accuracy of data reports? | Y | | | |
| c. Include a peer review of 100% of all data sets by an independent analyst, in accordance with the QA guide? | Y | | | |
| d. Include a technical review of 100% of all reported data by the responsible supervisor or designated alternate in accordance with the QA guide? | Y | | | |
| e. Include approval of 100% of all data for release by management? | Y | | | |
| 3. Do routine data reports identify: | | | | |
| a. Specific instruments used? | Y | | | |
| b. Analytical method? | Y | | | |
| c. Reporting limits and detection limits? | Y | | | |
| d. Dates of calibration and analyses? | Y | | | |
| e. Standards and other QC materials used? | Y | | | |
| f. Results of associated QC samples? | Y | | | |
| g. Dates of reviews? | Y | | | |
| h. Identity of samples by field and laboratory designators? | Y | | | |
| i. Results of the analysis? | Y | | | |
| j. Units associated with the results? | Y | | | |

| | Yes | No | NA | Comments |
|---|---|---|---|---|
| l. Explanations of any corrections or qualifications? | X | | | |
| 4. Are there procedures used for reviewing and verifying electronic data? | X | | | |
| 5. Are reports in the required format? | X | | | |
| **10.13 Quality Assurance Reports to Management** | | | | |
| 1. At least annual formal reports to management are performed? | X | | | |
| Do they include: | X | | | |
| a. Findings of internal and external evaluations? | X | | | |
| b. Results of performance evaluation studies? | X | | | |
| c. Problems identified through data review? | X | | | |
| d. The statistical evaluation of QC data? | X | | | |
| e. Problems identified through the corrective action system and customer complaints? | X | | | |
| f. Status of certifications and approvals? | X | | | |
| g. Status of training and continuing education of personnel? | X | | | |
| h. A discussion of new QA program initiatives | X | | | |
| **10.14 Client Coordination** | | | | |
| 1. Are there documented procedures for addressing, resolving, and documenting client concerns and complaints? | X | | | |

## III. Additional Interviewee/Audit Checklist Comments

# APPENDIX I

# PETROLEUM AND NON-PETROLEUM SITE PROGRESS TABLES

# Table I-1
## Petroleum Program, Including ASTs, USTs, Ship Fueling Operations

| Location | Site Name | Current Status | Site Assessment | Tank Removed | Site Investigation | Corrective Action Plan | Site Closure |
|---|---|---|---|---|---|---|---|
| **North Garrison** | | | | | | | |
| Beach Area | Former ship fueling operations | Not in use. State Park Department is planning to rebuild the dock facility as a historic restoration. | During a Screening Assessment conducted in 1997, samples were collected and analyzed for metals and SVOCs. Significant concentrations of lead and benzo(a)pyrene were detected. | No | The source of the fuel on beach is not certain. Proceed to Corrective Action Plan to address the beach contamination. | | |
| Barracks Building 241 | Former UST location | Removed in Fall 2000. | Significant concentrations of petroleum hydrocarbons as diesel were found approx. one foot below the bottom of the tank excavation. | Yes | Sampling conducted during the SI did not locate any petroleum contamination at or near the former tank location. Recommend tank closure. | | |
| Barracks Building 242 | Former UST Location | Removed in Fall 2000. | Significant concentrations of petroleum hydrocarbons as diesel were found approx. one foot below the bottom of the tank excavation. | Yes | Sampling conducted during the SI indicated potentially significant petroleum contamination. Proceed to Corrective Action Plan. | | |
| East of the water tank | Former UST Location | Removed in Fall 2000. | Significant concentrations of petroleum hydrocarbons as diesel were found approx. one foot below the bottom of the tank excavation. | Yes | Sampling conducted during the SI did not locate any petroleum contamination at or near the former tank location. Recommend site closure. | | |

# Table I-1
## Petroleum Program, Including ASTs, USTs, Ship Fueling Operations

| Location | Site Name | Current Status | Site Assessment | Tank Removed | Site Investigation | Corrective Action Plan | Site Closure |
|---|---|---|---|---|---|---|---|
| Building 205 | Former UST Location | Removed in Fall 2000. | Significant concentrations of petroleum hydrocarbons as diesel were found approx. one foot below the bottom of the tank excavation. | Yes | The site is a low-risk site, given the relatively low concentratation of diesel (150 mg/kg), and the fact that the tank is located 600 feet from the nearet water well. Recommend site closure. | | |
| Park Maintenance Warehouse, Building 228 | Former UST Location | Removed in Fall 2000. | Samples collected during the tank removal were non-detect for petroleum hydrocarbons as diesel. | Yes | | | |
| Hospital, Building 316 | Two possible USTs | No tanks located. | Two possible USTs were noted in the Inventory Project Report, 1990. | NA | A geophysical survey was conducted, no tanks were located. | | |
| Fire House, Building 231 | Possible UST | Tank in place, not in use. | A possible UST was noted in the Inventory Project Report, 1990. | No. | A tank was located during a geophysical survey. The location was confirmed by uncovering the top of the tank with a backhoe. Recommend tank removal and confirmation sampling. | | |
| Building 80, west of Park Residence | UST | No tank located. | A possible UST was noted in the Inventory Project Report, 1990. | NA | A geophysical survey was conducted, no tank was located. | | |
| Behind Central Heating Plant, Building 314 | Aboveground fuel tanks | Tanks in place, not in use, considered to be historic structures. | Above ground tanks visible at North Garrison. | Yes | Sampling conducted during the SI dindicated poetntially significant concentrations of TPH-D and TPH-MO. Proceed to Corrective Action Plan. | | |
| 1,000-inch Rifle Range | UST | Tank in place, not in use. | A possible UST was noted in the Inventory Project Report, 1990. | Yes | A tank was located during a geophysical survey. The location was confirmed by uncovering the top of the tank with a backhoe. Recommend tank removal and confirmation sampling. | | |

# Table I-1
## Petroleum Program, Including ASTs, USTs, Ship Fueling Operations

| Location | Site Name | Current Status | Site Assessment | Tank Removed | Site Investigation | Corrective Action Plan | Site Closure |
|---|---|---|---|---|---|---|---|
| **East Garrison** | | | | | | | |
| Motor Pool Area | Former UST Location | Removed in Fall 2000. | Samples collected during the tank removal were non-detect for petroleum hydrocarbons as diesel. | Yes | | | |
| Southeast of Post Exchange | UST | Tank in place, not in use. | The electrical substation was noted in the Inventory Project Report, 2000. A transformer oil spill was noted in the report. | Yes | A tank was located beneath a large tree during a geophysical survey. Recommend abandoning the tank in place and collecting confirmation samples. | | |
| Power Plant west of Gymnasium | Aboveground fuel tanks | Tanks in place, not in use, considered to be historic structures. | Above ground tanks visible at East Garrison. | Yes | Sampling conducted during the SI did not locate any petroleum contamination at or near the tank location. No further action recommended. | | |
| Deer Pen Tank | Possible UST | No tank located. | A possible UST was noted in the Inventory Project Report, 1990. | NA | No tank was located during a geophysical survey or subsequent backhoe investigation | | |

# Table I-1
## Petroleum Program, Including ASTs, USTs, Ship Fueling Operations

| Location | Site Name | Current Status | Site Assessment | Tank Removed | Site Investigation | Corrective Action Plan | Site Closure |
|---|---|---|---|---|---|---|---|
| **Ayala Cove** | | | | | | | |
| Visitor's Center, 10 SW of Building 328 | Former UST Location | Abandoned in place in Fall 2000. | Significant concentrations of petroleum hydrocarbons as diesel were found approx. one foot below the bottom of the tank excavation. | Abandoned in place. | Sampling conducted during the SI did not locate any petroleum contamination at or near the former tank location. Recommend site closure. | | |
| Residence, Building 329 | Former UST Location | Removed in Fall 2000. | Significant concentrations of petroleum hydrocarbons as diesel were found approx. one foot below the bottom of the tank excavation. | Yes | Sampling conducted during the SI did not locate any petroleum contamination at or near the former tank location. Recommend site closure. | | |
| Residence Area, 80' southwest of Visitor's Center | Former UST Location | Removed in 2001. | Removal permits were filed for the tank removal, but no record of removal was filed with the County. Site personnel confirmed the abandonment. | Yes | Sampling conducted during the SI did not locate any petroleum contamination at or near the former tank location. Recommend site closure. | | |
| Residence, between Buildings 331 and 332 | Former UST Location | Removed in 2001. | Removal permits were filed for the tank removal, but no record of removal was filed with the County. Site personnel confirmed the abandonment. | Yes | Sampling conducted during the SI did not locate any petroleum contamination at or near the former tank location. Recommend site closure. | | |
| Near State Boat Ramp | Three former ASTs | Tank were most likely removed pre-1960. | The tanks were noted on historic site maps. | Yes | Sampling conducted during the SI did not locate any petroleum contamination at or near the former tank location. Recommend site closure. | | |
| **Point Blunt** | | | | | | | |
| Nike Battery Generator Pad | Possible UST | No tank located. | A possible UST was noted in the Inventory Project Report, 1990. | NA | A geophysical survey was conducted, no tank was located. | | |

# Table I-2
## Non-Petroleum Program

| Location | Site Name | Current Status | Preliminary Assessment | Site Investigation | Remedial Invest. | Feasibility Study | Proposed Plan | Remedial Action Plan | Remedial Action WP | Ordnance Invest. | Site Closure | 5-year Review |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **North Garrison** | | | | | | | | | | | | |
| 1,000-inch Rifle Range | Rifle Range | Site currently used as a campsite. | Rifle range used during World War II. | Samples were collected and analyzed for metals. Potentially significant concentrations of lead were detected. Proceed to Remedial Investigation. | | | | | | | | |
| P-100 Pistol Range / Sunrise Campsite | P-100 Pistol Range | Site currently used as a campsite. | Pistol range used during World War II. | Samples were collected and analyzed for metals. No metals were detected at significant concentrations. | | | | | | | | |
| **East Garrison - Motor Pool Area** | | | | | | | | | | | | |
| Motor Pool Area | Hazardous Waste Drum Storage Area | All drums have been removed. | Drums removed from around the island including the Nike facility were stored in Building 130. Sampling conducted during a Limited Scope Site Investigation conducted in 2000 indicated potentially significant concentrations of TPH-D, arsenic, and benzo(a)pyrene. | Samples were collected and analyzed for metals, SVOCs, VOCs, and PCBs. Potentially significant concentrations of lead were detected. Proceed to Remedial Investigation. | | Remedial Investigation . | | | | | | |
| Motor Pool Area | Vehicle Lift Rack | Not in use. | Sampling conducted during a Limited Scope Site Investigation in 2000 indicated potentially significant concentrations of lead, benzo(k)fluoranthene, benzo(a)pyrene, and pyrene. Note: The contamination appears to be associated primarily with the drop inlets, which are potential culturally significant structures. | Samples were collected around the lift rack and analyzed for TPH-D, TPH-G, TPH-MO, metals, SVOCs, VOCs, and PCBs. No significant concentrations were detected. Proceed to Remedial Investigation for area around the drop inlets. | | | | | | | | |
| Motor Pool Area | Oil Change Rack | Not in use. | Sampling conducted during a Limited Scope Site Investigation in 2000 indicated potentially significant concentrations of lead, benzo(k)fluoranthene, and benzo(a)pyrene. | Samples were collected and analyzed for TPH-D, TPH-G, TPH-MO, metals, SVOCs, VOCs, and PCBs. Potentially significant concentrations of lead were detected. Proceed to Remedial Investigation. | | | | | | | | |

# Table I-2
## Non-Petroleum Program

| Location | Site Name | Current Status | Preliminary Assessment | Site Investigation | Remedial Invest. | Feasibility Study | Proposed Plan | Remedial Action Plan | Remedial Action WP | Ordnance Invest. | Site Closure | 5-year Review |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Motor Pool Area | Incinerator | Not in use. | Sampling conducted during a Limited Scope Site Investigation in 2000 indicated potentially significant concentrations of lead. | Samples were collected and analyzed for metals. Potentially significant concentrations of arsenic, cadmium, lead, copper, and zinc were detected. Proceed to Remedial Investigation. | | | | | | | | |
| Motor Pool Area | Wash Rack at Building 64 | Not in use. | The wash rack was noted on a historic map of the site. | Samples were collected and analyzed for TPH-D, TPH-G, TPH-MO, metals, SVOCs, VOCs, and PCBs. No significant concentrations were detected. | | | | | | | | |
| **East Garrison** | | | | | | | | | | | | |
| Warehouse, Engineer's Building, Gymnasium | Electrical Equipment Storage | Not in use. | Several transformers were noted in the Inventory Project Report, 1990. | Samples were collected from six pieces of oil-filled equipment and analyzed for PCBs. Significant concentration of PCBs was detected in one transformer stored in the gymnasium electrical room. Recommend removal and disposal of the transformer. | | | | | | | | |
| Northwest of Gymnasium | Former Boiler Stack Location | Boiler stack debris has been removed. | The boiler stack was noted in the Inventory Project Report, 1990. | Samples were collected and analyzed for metals. Potentially significant concentrations of lead were detected. Proceed to Remedial Investigation. | | | | | | | | |
| Northwest of Gymnasium | Photo Shop | Shop has been removed. | The photo shop was noted on a historic map of the site. | Samples were collected and analyzed for metals and SVOCS. No significant concentrations of metals were detected. | | | | | | | | |
| East of Hospital Building | Electrical Substation | Used by the Park as storage. | The electrical substation was noted in the Inventory Project Report, 2000. A transformer oil spill was noted in the report. | Samples were collected from surface soil and analyzed for PCBs. Significant concentrations were detected. Proceed to Remedial Investigation. | | | | | | | | |
| Transformer pad | Former transformer location | Not in use. | The transformer pad was noted in the Inventory Project Report, 2000. | Samples were collected from surface soil and analyzed for PCBs. No significant concentrations were detected. | | | | | | | | |

# Table I-2
## Non-Petroleum Program

| Location | Site Name | Current Status | Preliminary Assessment | Site Investigation | Remedial Invest. | Feasibility Study | Proposed Plan | Remedial Action Plan | Remedial Action WP | Ordnance Invest. | Site Closure | 5-year Review |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Ayala Cove** | | | | | | | | | | | | |
| Boat Landing Dock | Former disinfection building | The building has been removed and the site regraded. | The disinfection building was noted on historic maps of the site. | Soil samples were collected and analyzed for cyanide. No significant concentrations were detected. | | | | | | | | |
| North of Boat Dock | Possible Dump Site | Used as vehicle parking area and equipment storage. | The potential dump site was noted in the Inventory Project Report, 2000. | Samples were collected and analyzed for TPH-D, TPH-G, TPH-MO, metals, SVOCs, VOCs, and PCBs. Potentially significant concentrations of TPH-D, beryllium, lead and mercury were detected in soil samples, and TPH-D, TPH-G, TPH-MO, and lead were detected in bay water samples. Proceed to Remedial Investigation. | | | | | | | | |
| **West Garrison** | | | | | | | | | | | | |
| Parade grounds near flagpole | Possible Dump Site | Lawn area of historic area. | Park personnel pointed out the potential dump site location during the Inventory Project Report assessment. The site dates back to the Civil War. | Samples were collected and analyzed for TPH-D, TPH-G, TPH-MO, metals, SVOCs, VOCs, and PCBs. No significant concentrations were detected. | | | | | | | | |
| Electrical Substation | Electrical Substation | Unknown. | Samples collected during the limited Scope Site Investigation in 2000 were analyzed for PCBs. No signification concentrations were detected. | | | | | | | | | |
| North of Mule Barn | Paint Shop | Building has been removed. | The Paint Shop was noted on historic site maps. Use of the buildings dated to the Civil War era. | Shallow soil samples were collected and analyzed for metals. Potentially significant concentrations of lead were detected. Proceed to Remedial Investigation. | | | | | | | | |
| **Point Blunt** | | | | | | | | | | | | |
| Sand Springs Beach, "Grand Canyon" | Possible cannonball disposal area | Remote beach area. | The site was noted in an ordnance Archive Search Report dated 1994. | A geophysical survey was conducted at the beach. Several cannonballs were located. Proceed to ordnance investigation. | | | | | | | | |