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CORRECTIVE MEASURES STUDY FOR SOLID WASTE MANAGEMENT UNITS 18, 20, 21 AND 52 NS MAYPORT FL

6/1/2007

TETRA TECH NUS

Comprehensive Long-term Environmental Action Navy

CONTRACT NUMBER N62467-04-D-0055

Rev. 1
06/05/07

Corrective Measures Study
for
Solid Waste Management Units 18, 20, 21, and 52

Naval Station Mayport
Mayport, Florida

Contract Task Order 0033

June 2007

NAVFAC Naval Facilities Engineering Command
Southeast
2155 Eagle Drive
North Charleston, South Carolina 29406

TETRA TECH NUS, Inc.

Rev. 1
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CORRECTIVE MEASURES STUDY
FOR
SOLID WASTE MANAGEMENT UNITS
18, 20, 21, AND 52

NAVAL STATION MAYPORT
MAYPORT, FLORIDA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION NAVY (CLEAN) CONTRACT

Submitted to:
Naval Facilities Engineering Command
Southeast
2155 Eagle Drive
North Charleston, South Carolina 29406

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CONTRACT NUMBER N62467-04-D-0055
CONTRACT TASK ORDER 0033

JUNE 2007

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This document, *Corrective Measures Study for Solid Waste Management Units 18, 20, 21, and 52, Naval Station Mayport, Mayport, Florida*, has been prepared under the direction of a Florida Registered Professional Engineer. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice. This document was prepared for Naval Station Mayport, Mayport, Florida, and should not be construed to apply to any other site.

May 29, 2007
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Tetra Tech NUS, Inc. Engineering No. 7988

5/29/07

This document, *Corrective Measures Study for Solid Waste Management Units 18, 20, 21, and 52, Naval Station Mayport, Mayport, Florida*, has been prepared under the direction of a Florida Registered Professional Engineer. The work and professional opinions rendered in this report were conducted or developed in accordance with commonly accepted procedures consistent with applicable standards of practice. This document was prepared for Naval Station Mayport, Mayport, Florida, and should not be construed to apply to any other site.

June 5, 2007
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FOREWORD

To meet its mission objectives, the United States Navy (Navy) performs a variety of operations, some requiring the use, handling, storage, or disposal of hazardous materials. Through accidental spills and leaks and conventional methods of past disposal, hazardous materials may have entered the environment in ways unacceptable by today's standards. With growing knowledge of the long-term effects of hazardous materials on the environment, the Department of Defense initiated various programs to investigate and remediate conditions related to suspect past releases of hazardous materials at their facilities.

One of these programs is the Installation Restoration (IR) program. This program complies with the Comprehensive Environmental Response, Compensation, and Liability Act, as amended by the Superfund Amendments and Reauthorization Act. The acts, passed by Congress in 1980 and 1986, respectively, established the means to assess and clean up hazardous waste sites for both private-sector and federal facilities. These acts are the basis for what is commonly known as the Superfund program.

Originally, the Navy's part of this program was called the Navy Assessment and Control of Installation Pollutants (NACIP) program. Early reports reflect the NACIP process and terminology. The Navy eventually adapted the program structure and terminology of the standard IR program.

A second program to address present hazardous material management is the Resource Conservation and Recovery Act (RCRA) Corrective Action Program. This program is designed to identify and clean up releases of hazardous substances at RCRA-permitted facilities. RCRA ensures that solid and hazardous wastes are managed in an environmentally sound manner. The law applies primarily to facilities that generate or handle hazardous waste.

The RCRA program is conducted in the following three stages:

- The RCRA facility assessment (RFA) identifies solid waste management units (SWMUs), evaluates the potential for releases of contaminants, and determines the need for future investigations.

- The RCRA facility investigation (RFI) then determines the nature, extent, and fate of contaminant releases.

- The corrective measures study (CMS) identifies and recommends measures to correct the release.

The hazardous waste investigations at Naval Station (NAVSTA) Mayport are presently being conducted under the RCRA Corrective Action Program. Earlier preliminary investigations had been conducted at NAVSTA Mayport under the Navy's NACIP program and IR program following Superfund guidelines. In 1988, in coordination with the United States Environmental Protection Agency (USEPA) and the Florida Department of Environmental Regulation, now known as the Florida Department of Environmental Protection (FDEP), the hazardous waste investigations were formalized under the RCRA program.

Mayport is conducting the cleanup at their facility by working through the Naval Facilities Engineering Command, Southeast (NAVFAC SE). The USEPA and the FDEP oversee the Navy environmental program. All aspects of the program are conducted in compliance with state and federal regulations, as ensured by the participation of these regulatory agencies.

Questions regarding the RCRA program at NAVSTA Mayport should be addressed to Ms. Cheryl Mitchell (Code N4E) (904) 270-6730.

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ACRONYMS AND ABBREVIATIONS

ABB-ES	ABB Environmental Services, Inc.
AOC	area of concern
ARAR	applicable or relevant and appropriate requirement
bgs	below ground surface
BSV	Background Screening Value
CAMP	Corrective Action Management Plan
CAO	Corrective Action Objective
CLEAN	Comprehensive Long-term Environmental Action Navy
CMS	Corrective Measures Study
COC	contaminant of concern
COI	contaminant of interest
COPC	contaminant of potential concern
CTL	cleanup target level
DDE	dichlorodiphenyldichloroethylene
DDT	dichlorodiphenyltrichloroethane
DRMO	Defense Reutilization and Marketing Office
ELCR	excess lifetime cancer risk
ERA	ecological risk assessment
ESI	Environmental Site Inspection
F.A.C.	*Florida Administrative Code*
FDEP	Florida Department of Environmental Protection
FFTA	firefighting training area
FTC	Fleet Training Center
GC	gas chromatograph
GCTL	groundwater cleanup target level
GIR	General Information Report
HI	Hazard Index
HQ	Hazard Quotient
HSWA	Hazardous and Solid Waste Amendments
IM	interim measure
IR	Installation Restoration
JSI	Jacksonville Shipyard, Inc.
LUC	land use control
MCO	Media Cleanup Objectives
µg/kg	micrograms per kilogram
µg/L	micrograms per liter

ACRONYMS AND ABBREVIATIONS (CONTINUED)

Meq	milliequivalents
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MOA	Memorandum of Agreement
msl	mean sea level
NACIP	Navy Assessment and Control Installation Pollutants Program
NAVFAC SE	Naval Facilities Engineering Command, Southeast
NAVSTA	Naval Station
Navy	United States Navy
PCB	polychlorinated biphenyl
PWD	Public Works Department
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RFA	RCRA Facility Assessment
RFI	RCRA Facility Investigation
SCTL	soil cleanup target level
SVOC	semivolatile organic compound
SWCTL	Surface Water Cleanup Target Level
SWMU	Solid Waste Management Unit
TDS	total dissolved solids
TKN	total Kjeldahl nitrogen
TOC	Total Organic Carbon
TPH	total petroleum hydrocarbons
TtNUS	Tetra Tech NUS, Inc.
UCL	upper confidence limit
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
VOC	volatile organic compound
VSI	visual site inspection

EXECUTIVE SUMMARY

A Corrective Measures Study (CMS) has been conducted for Solid Waste Management Units (SWMUs) 18, 20, 21, and 52 at Naval Station (NAVSTA) Mayport in Mayport, Florida, by the Naval Facilities Engineering Command, Southeast (NAVFAC SE), pursuant to the Resource Conservation and Recovery Act (RCRA). This CMS was conducted in accordance with the Hazardous and Solid Waste Amendments (HSWA) permit FL9 170 024 260, issued by the Florida Department of Environmental Protection (FDEP) on March 25, 1988, and revised and reissued on August 30, 2005. The HSWA/RCRA program is designed to identify and clean up releases of hazardous substances at RCRA-permitted facilities. RCRA ensures that solid and hazardous wastes are managed in an environmentally sound manner. The law applies primarily to facilities that generate or handle hazardous waste.

The RCRA program is conducted in the following three stages:

1. The RCRA Facility Assessment (RFA) identifies SWMUs, evaluates the potential for releases of contaminants, and determines the need for future investigations.
2. The RCRA Facility Investigation (RFI) then determines the nature, extent, and fate of contaminant releases.
3. The CMS identifies and recommends measures to correct the releases.

The RFA Report for SWMUs 20, 21, and 52 was issued in August 1997. The RFI Report for SWMU 18 was issued in December 1996. This report presents the results of the CMS, including the following:

- Determination of the Media Cleanup Objective (MCOs) using the recently approved regulation Chapter 62-777, *Florida Administrative Code* (F.A.C.).
- Selection of contaminants of concern (COCs).
- Determination of areas and volumes of impacted media exceeding the MCOs.
- Development, screening, and evaluation of corrective measure alternatives.
- Recommendation of corrective action to address contaminated media.

This CMS Report contains the results of the identification, screening, and evaluation of corrective measure alternatives for all media at the following sites:

- SWMU 18, Fleet Training Center Diesel Generator Sump
- SWMUs 20 and 21, Hobby Shop Drain and Hobby Shop Scrap Storage Area
- SWMU 52, Public Works Department (PWD) Service Station Storage Area

SWMU 18 - Fleet Training Center Diesel Generator Sump

SWMU 18, the Fleet Training Center Diesel Generator Sump Area, is located at the firefighting training area (FFTA) which is part of the current Fleet Training Center (FTC) due south of the St. Johns River, approximately 1,000 feet west of Atlantic Ocean in the northeastern part of NAVSTA Mayport

SWMU 18 is the FTC Diesel Generator Sump and consists of a concrete containment structure in which a diesel generator is located. The generator has been at this location since approximately 1982. The sump is approximately 5 feet wide and 10 feet long with 6-inch high sides. A drainpipe exists in one side of the sump to drain stormwater that accumulates in the sump.

As a result of a post draft CMS re-evaluation of SWMU 18, the boundaries of that SWMU were significantly revised and the data set considered for the CMS was limited to one soil sampling location (MPT-18-SD02) and one downgradient groundwater location (MPT-14-MW10S). No contaminants detected in the soil sampled at this location exceeded the FDEP Residential Direct Exposure Soil Cleanup Target Levels (SCTLs) for a hypothetical future resident. No contaminants detected in the abovementioned groundwater location exceeded the FDEP Groundwater Cleanup Target Levels (GCTLs).

Surface Soil

No surface soil COCs were identified for SWMU 18 under either an industrial or residential exposure scenario. Therefore, No Action is recommended for surface soil at SWMU 18.

Groundwater

No groundwater COCs were identified for SWMU 18. Therefore, No Action is recommended for the groundwater at SWMU 18.

SWMUs 20 and 21 - Hobby Shop Drain and the Hobby Shop Scrap Storage Area

SWMUs 20 and 21, the Hobby Shop Drain and the Hobby Shop Scrap Storage Area, respectively are located adjacent to Building 414 in the southeastern part of NAVSTA Mayport near the Mayport Turning Basin. The facility contained scrap metal, engine parts, open gas cylinders and a Freon 22™ container, an automotive battery, old appliances, and other scrap metal items that were ultimately collected by the Defense Reutilization and Marketing Office (DRMO) for resale. The drain was located on the soil

adjacent to a sloped concrete apron leading to the raised concrete floor of Building 1965. The Hobby Shop Scrap Storage Area, approximately 20 square feet, was located adjacent to the south side of the east wing of Building 414, and surrounded by fencing with an entrance gate on the south side.

In 1991, the Hobby Shop area underwent renovations, which included construction of a new Building 1965, installation of a new drain system (connected to an oil-water separator) to intercept discharge from the garage bays and surrounding parking lot, and new concrete pavement across the entire site. According to NAVSTA Mayport PWD personnel, soil was excavated and removed from the site during the construction work; however, the documentation for the soil excavation and removal was not available. On May 5, 1994, ABB Environmental Services, Inc. (ABB-ES) conducted a site visit at SWMUs 20 and 21 and reported that the conditions described during the 1989 RFA-Visual Site Inspection (VSI) were no longer applicable. However, a small waste oil storage area was observed along the south edge of the parking lot area (near the west end of Building 1517). This facility consisted of a curbed containment area on concrete pavement with waste oil containers of unknown capacity sitting on stands. A valved drainpipe extended through the southern curb and drained to an adjacent grassy area. The drain was used to remove accumulated rainwater from within the curbed area. A small area (less than 1 square yard) of stained soil was observed at this location. During this time, the RFA-VSI field investigations were conducted as described below. A new scrap storage area was also observed during May 1994, located east of Building 414 near the eastern edge of the Hobby Shop site. Oily scrap materials and signs of a release were not observed.

Limited confirmatory sampling was conducted by ABB-ES in May of 1995 at SWMUs 20 and 21 as part of the RFA-VSI. Field activities included the collection of eight surface and six subsurface soil samples and the installation and sampling of six shallow groundwater monitoring wells.

Surface Soil

No surface soil COCs were identified for SWMUs 20 and 21 under either an industrial or residential exposure scenario. Therefore, No Action is recommended for surface soil at SWMUs 20 and 21.

Subsurface Soil

No subsurface soil COCs were identified for SWMUs 20 and 21 under either an industrial or residential exposure scenario. Therefore, No Action is recommended for subsurface soil at SWMUs 20 and 21.

Groundwater

No groundwater COCs were identified for SWMUs 20 and 21. Therefore, No Action is recommended for the groundwater at SWMUs 20 and 21.

SWMU 52 - PWD Service Station Storage Area

SWMU 52, the PWD Service Station Storage Area is located at Building 25 near the central part of NAVSTA Mayport near the Mayport Turning Basin. The PWD Service Station Storage Area is located on and adjacent to a concrete slab that is 30 feet long and 20 feet wide and is situated along the northeastern wall of Building 25. There is a drain in the concrete slab that discharges to a nearby oil-water separator.

During the site visit by ABB-ES personnel on May 5, 1994, the site generally appeared as described in the 1989 RFA. However, no drums were present on the pad and in place of the bowser there was a small tank (approximately 250 gallons) within a metal containment tub. No staining of the pavement in the area of the tank was observed. A small pipe extended from the building wall above the concrete pad. The pipe discharged condensate from an air compressor in the building. The condensate would ultimately get discharged into the drain and would get processed through the oil-water separator. The oil in the separator was periodically collected for recycling, and water from the effluent discharged into the sanitary sewer system.

Limited confirmatory sampling was conducted by ABB-ES in May of 1995 at SWMU 52 as part of the RFA-VSI. Field activities included the collection of one surface and one subsurface soil samples and the installation and sampling of one shallow groundwater monitoring wells. The total area of SWMU 52 is only 0.016 acres. No additional sampling was conducted due to the relatively small size of the SWMU.

Surface Soil

No surface soil COCs were identified for SWMU 52 under either an industrial or residential exposure scenario. Therefore, No Action is recommended for surface soil at SWMU 52.

Subsurface Soil

No subsurface soil COCs were identified for SWMU 52 under either an industrial or residential exposure scenario. Therefore, No Action is recommended for subsurface soil at SWMU 52.

Groundwater

No groundwater COCs were identified for SWMU 52. Therefore, No Action is recommended for the groundwater at SWMU 52.

1.0 INTRODUCTION

A CMS has been conducted for SWMUs 18, 20, 21, and 52 at NAVSTA Mayport, in Mayport, Florida, by the Navy, NAVFAC SE, pursuant to the RCRA. Tetra Tech NUS, Inc. (TtNUS) has been contracted by NAVFAC SE to complete a CMS under the Comprehensive Long-term Environmental Action Navy (CLEAN) IV Contract Number N62467-04-D-0055. This report presents the results of the CMS, including the:

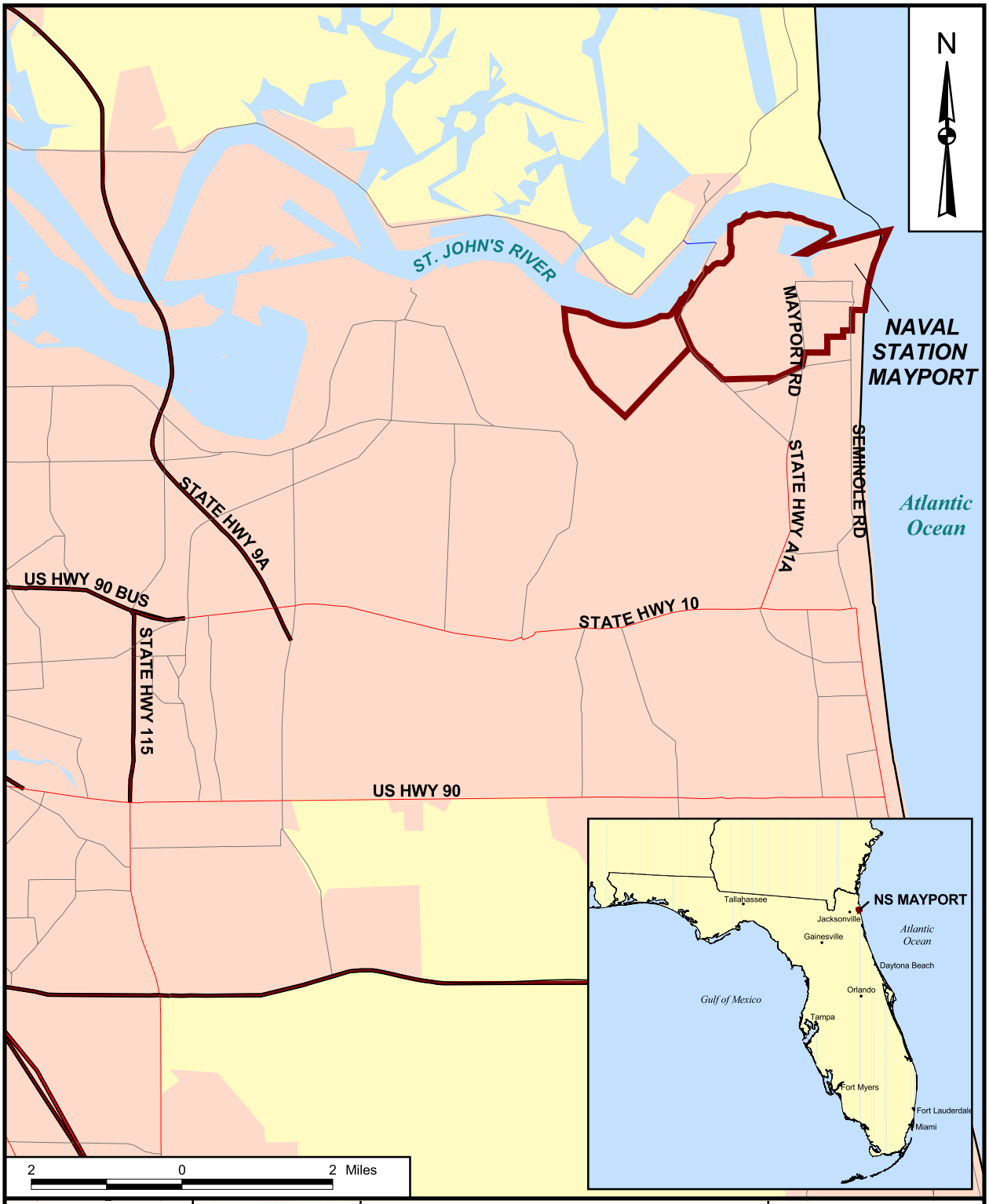
- Determination of the MCOs using the recently approved regulation Chapter 62-777, F.A.C..
- Selection of COCs.
- Determination of areas of impacted media exceeding the MCOs.
- Development, screening, and evaluation of corrective measure alternatives.
- Recommendation of corrective action as necessary to address contaminated media at SWMUs 18, 20, 21, and 52.

1.1 FACILITY DESCRIPTION

NAVSTA Mayport is located near the town of Mayport within the city limits of Jacksonville, Florida, in northeastern Duval County on the south shore of the confluence of the St. Johns River and the Atlantic Ocean (Figure 1-1). A SWMU location map is provided as Figure 1-2.

A RFA-VSI for NAVSTA Mayport was conducted for the United States Environmental Protection Agency (USEPA) Region IV in 1989 (Kearny, 1989). The RFA-VSI identified 56 SWMUs and 2 Areas of Concern (AOCs) at NAVSTA Mayport. These SWMUs and AOCs were included in the HSWA permit. Fifteen of these SWMUs were determined to require no further action. Twenty-three of the remaining SWMUs and the two AOCs were determined to require further investigation by conducting RFA sampling visits, referred to in the current HSWA permit as confirmatory sampling. The remaining 18 SWMUs, including SWMUs 18, 20, 21, and 52, were determined to require an RFI.

Because of the number of SWMUs, the diversity of their past and present operations, and the magnitude of the permit requirements, the USEPA recommended that a phased approach be used to implement the



DRAWN BY S. PAXTON	DATE 2/28/07	FACILITY LOCATION MAP SWMUs 18, 20, 21, AND 52 CORRECTIVE MEASURE STUDY NAVAL STATION MAYPORT MAYPORT, FLORIDA	CONTRACT NUMBER CTO 0033
CHECKED BY K. WIMBLE	DATE 3/29/07		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 1 - 1 / REV 0

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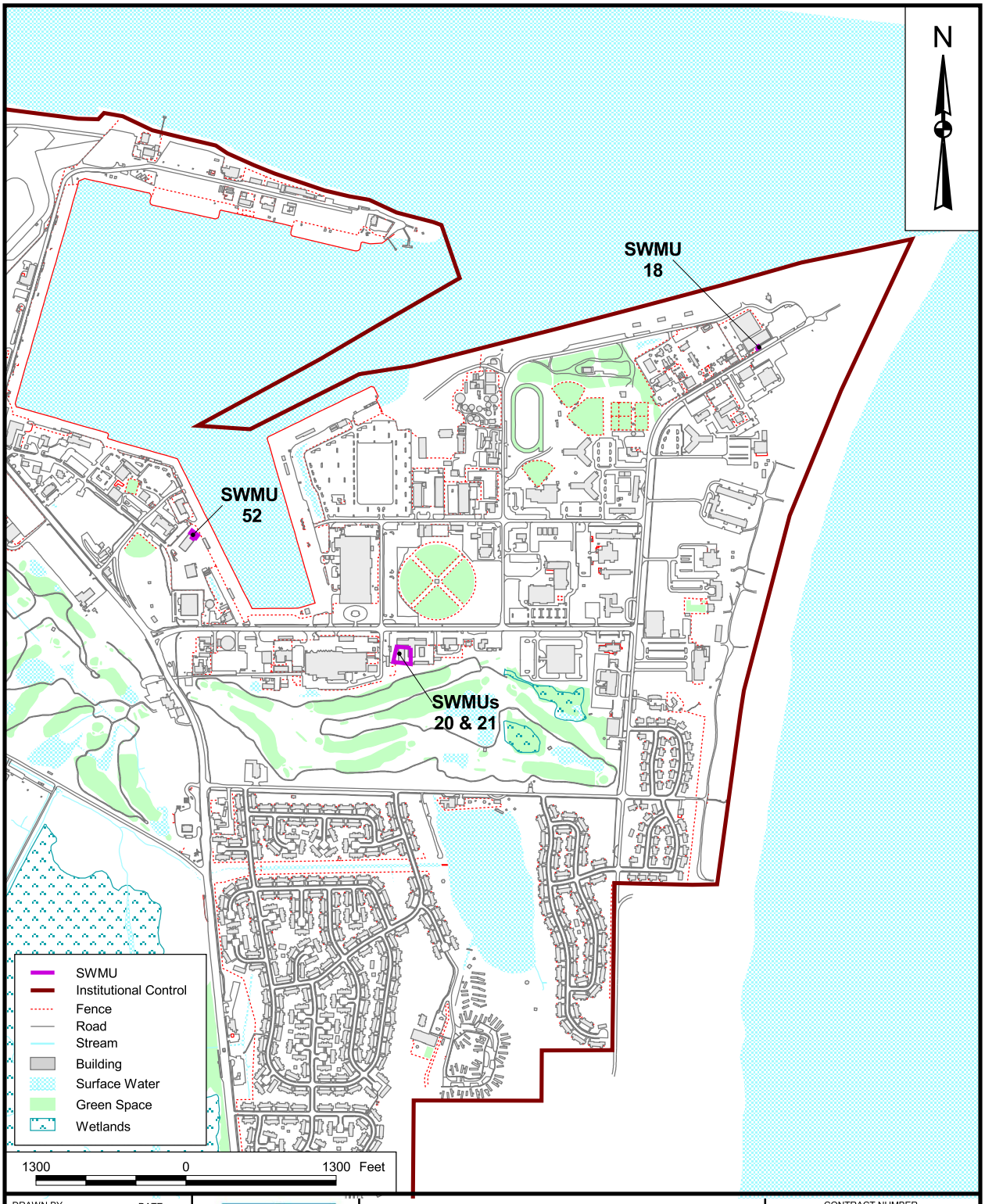


DRAWN BY S. STROZ	DATE 9/20/06	SITE VICINITY MAP SWMUs 18, 20, 21, AND 52 NAVAL STATION MAYPORT MAYPORT, FLORIDA	CONTRACT NUMBER CTO 0033
CHECKED BY S. BALLARD	DATE 12/08/06		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 1-2 / REV 0

P:\GIS\MAYPORT_NS\APR\2868.APR REVISED SITE VINCINITY LAYOUT 12/08/06 SS

RFI and other corrective action activities at NAVSTA Mayport. A Corrective Action Management Plan (CAMP) was prepared in response to the USEPA recommendation and describes the strategy used to implement the RCRA corrective action program at NAVSTA Mayport (ABB-ES, 1995a).

The corrective action program at NAVSTA Mayport described in the CAMP invoked a phased approach to assure collection of adequate site characterization data to support the selection of effective corrective measures. The structure of the corrective action program at NAVSTA Mayport is based on the establishment of four SWMU groups: Groups I, II, III, and IV, based on the past use of the SWMU. The corrective action activities at each SWMU group are being implemented in phases.

This CMS Report is for SWMUs 18, 20, 21, and 52 at NAVSTA Mayport, which belong to Group III. The RFA Report for SWMUs 20, 21, and 52 and the RFI Report for Group III SWMUs (ABB-ES, 1997 and 1996b, respectively) contain pertinent information about the site background, environmental setting, nature and extent of contamination, the identification of RFI contaminants of potential concern (COPCs), seasonal or updated concentrations of contaminants in environmental media, and the results of remedial measures that have reduced or eliminated risks or exposure pathways between certain media and potential receptors for SWMUs 18, 20, 21, and 52.

Land use controls (LUCs) have been approved as an additional interim measure (IM) and implemented at all of the SWMUs which restrict current and future land use to other than residential. By a separate Memorandum of Agreement (MOA), effective August 31, 1998, with the USEPA and FDEP, the Navy agreed to implement facility-wide periodic site inspections, designed to ensure the maintenance by Navy personnel of any site-specific LUCs deemed necessary for future protection of human health and the environment.

Information has been gathered from all of the aforementioned reports to describe the current conditions of each SWMU presented in Sections 2.0 through 4.0 of this CMS.

1.2 ORGANIZATION OF THIS REPORT

This CMS Report consists of four sections that describe SWMUs 18, 20, 21, and 52; summarizes the RFI findings pertinent to conducting the CMS; identifies the contaminants and media that present unacceptable risk to human and ecological receptors; and evaluates and recommends potential corrective measures for addressing those risks. Section 1.0 includes a general facility description, identifies the primary sources of information, describes the physical and environmental setting of the SWMUs of interest, and presents the general methodology used in the CMS to identify contaminants and

media of concern. Sections 2.0 through 4.0 describe the current conditions for each SWMU, present the evaluation and selection of COPCs and COCs, identify and evaluate potential corrective measure alternatives, and select the recommended alternative for soil and groundwater at each SWMU. Appendix A contains the CMS Data Set for SWMUs 18, 20, 21, and 52. Appendix B contains the representative concentration calculations used in selecting COCs.

1.3 PHYSICAL CHARACTERISTICS OF SWMUs 18, 20, 21, AND 52

A detailed description of the physical characteristics of NAVSTA Mayport, including topography, demography, climate, soil types, and regional hydrogeology has been presented in Sections 1.0 and 3.0 of the NAVSTA Mayport General Information Report (GIR) (ABB-ES, 1995b). The following sections also provide summaries of the geologic and hydrologic data collected at the Group III SWMUs (ABB-ES, 1996b), specifically for SWMUs 18, 20, 21, and 52 that were presented in the RFA Report (ABB-ES, 1997).

1.3.1 Soils and Geology

In the areas where SWMUs 18, 20, 21, and 52 are located, dredge material overlies undifferentiated post-Hawthorn deposits to depths of approximately 8 to 16 feet below ground surface (bgs). The thickness of the dredge material is a result of variations in the original topographic contour of the near-shore environments in which the dredge material was placed. The dredge material consists predominantly of fine-grained, well-sorted sands that may include marine shell fragments. Underlying the dredge materials are sediments that comprise the undifferentiated post-Hawthorn deposits. These sediments primarily consist of fairly uniform, well-sorted, fine-grained sand with a Unified Soil Classification System (USCS) designation of SP. However, the undifferentiated deposits (CH or MH visual classification) frequently include a very soft gray to dark gray silt clay layer that is 3 to 7 feet thick and likely represents recent estuarine deposition. This layer appears to be restricted to more landward, lower-energy depositional zones and is not found in former high-energy beach or river channel deposits. The undifferentiated post-Hawthorn deposits are likely the product of Miocene to Holocene fluvial and marine deposition and the erosion and redeposition of Hawthorn Group sediments. The top of the Upper Hawthorn deposits was estimated to be at a depth of approximately 70 to 72 feet bgs in the Group III area. Lithologically, the Hawthorn Group is quite variable and consists of calcareous, phosphatic sandy clays and clayey sands interbedded with thin discontinuous lenses of phosphatic sand, sandy limestone, limestone, and dolostone. The contact between the Hawthorn and the overlying undifferentiated Miocene and Pliocene deposits is marked by an unconformity expressed by coarse phosphatic sand and a gravel bed.

Shallow soil in the SWMU 18 area typically consists of various shades ranging from light-tan to brown, dark-gray, or black, fine-grained sand or silty sand. Minor amounts of shell material were present in some of the borings. Borings drilled for wells located along the northern perimeter of SWMU 18, nearest to the St. Johns River, revealed an increased layering of fine sands, a 6-inch clay layer, and a generally higher silt content in the soil that were not observed at locations further inland (e.g., beneath the SWMU proper). These variations were attributed to subaqueous deposition by marine process along the former shoreline of the St. Johns River.

Shallow soil in the SWMUs 20, 21, and 52 area consists of relatively uniform, light-tan to tan, brown to dark-brown, or gray, very fine to fine-grained sand and silty sand with shell fragments that may make up to approximately 20 percent of the soil sample. These sands are primarily dredge material with a minor amount of engineered fill material deposited over the last 55 years.

1.3.2 Hydrogeology

Three primary aquifer systems are recognized beneath NAVSTA Mayport (in descending order): the surficial aquifer, the Intermediate Hawthorn Aquifer, and the Floridan Aquifer System. The surficial aquifer, which extends from near the surface to a depth of nearly 100 feet bgs at NAVSTA Mayport, is the first aquifer beneath SWMUs 18, 20, 21, and 52 and is the groundwater zone considered in this CMS. It includes all of the undifferentiated post-Hawthorn deposits (see Section 1.3.1) and consists of unconsolidated sand, shell, and clay, which vary horizontally and vertically in lithology, thickness, and permeability. It is recharged primarily by precipitation at a county-wide estimated rate of 10 to 16 inches per year. Discharge in the vicinity of NAVSTA Mayport is primarily by seepage into surface water bodies and evapotranspiration. At SWMUs 18, 20, 21, and 52, the direction of groundwater flow in the surficial aquifer is toward the St. Johns River and the Mayport Turning Basin, respectively. It has also been reported that groundwater becomes brackish below a depth of 40 feet at NAVSTA Mayport.

The surficial aquifer is underlain by the Hawthorn Aquifer. The Hawthorn Aquifer consists of sand and limestone layers interbedded with clayey sand and sandy clay. It was noted in the RFI that the most productive limestone layer in the upper part of the Hawthorn Aquifer is absent in the Mayport area. Thus, the Intermediate Hawthorn Aquifer may be in hydraulic contact with the surficial aquifer at NAVSTA Mayport. Overall, the Hawthorn Group is a complex aquiclude that acts as a confining bed to the underlying Floridan Aquifer. The primary recharge mechanism for the Intermediate Hawthorn Aquifer is precipitation in areas approximately 30 miles to the west of NAVSTA Mayport where the Hawthorn Group sediments occur at shallow depths. The Floridan Aquifer consists of Eocene sediment, primarily limestone, which lies approximately 400 feet below the surface at NAVSTA Mayport. This aquifer is

under artesian conditions due to the presence of the overlying Hawthorn formation and is the principal source for fresh water in the area. Because the surficial aquifer is the preferred pathway for groundwater flow and contaminant migration at NAVSTA Mayport, groundwater in the Intermediate Hawthorn Aquifer and the Floridan Aquifer were not considered in the CMS.

The hydrogeology of SWMUs 18, 20, 21, and 52 was investigated during the RFI. A station-wide tidal study was performed, water levels were measured, the potentiometric surface was mapped at different points in time, aquifer conductivity testing was conducted, and aquifer material physical properties were tested. This information was presented in the RFI Reports for the Groups III SWMUs and is summarized below for SWMUs 18, 20, 21, and 52.

SWMU 18

- Wells MW01S, -05S, -06S, -10S, and -11S, located in the vicinity of SWMU 18, were included in the tidal effects study. Groundwater level amplitudes of 0.3, 0.25, and 0.6 foot were observed at wells MW01S, MW05S, and MW06S, respectively. A time lag of approximately 10 to 12 hours relative to the tidal fluctuation was observed for all three wells. It is likely that the tidal effect on the water table zone of the surficial aquifer is limited to areas located less than about 400 feet from the St. Johns River near SWMU 18.

- The direction of groundwater flow was generally north toward the St. Johns River. Tidal influence on the direction of groundwater flow was not observed.

- Groundwater horizontal gradients in the vicinity of the SWMU ranged from 0.0008 to 0.004 feet/foot; station-wide well pairs used to investigate vertical gradients showed a range of 0.01 to 0.05 feet/foot between the shallow and intermediate and intermediate to deep well-depth zones.

- The average values for radial hydraulic conductivity in the Group III area (i.e., includes SWMU 18) was approximately 1.2 to 72.2 feet/day. Wells tested near SWMU 18 ranged from approximately 7.2 to 22.1 feet/day with an average of 12.2 feet/day. (No wells near SWMU 18 have been screened in the intermediate or deep monitoring zones in the surficial aquifer.)

- The groundwater flow velocity was estimated to range from approximately 0.03 feet/day (10 feet/year) to 0.14 feet/day (51 feet/year).

- Testing of soil samples near SWMU 18 showed the following results: pH = 8.27 – 9.13; cation exchange capacity = <0.8 – 2.2 milliequivalents (Meq)/100 grams; moisture = 97 – 98 percent; and total organic carbon content = 152 – 226 milligrams per kilogram (mg/kg).

SWMUs 20 and 21

- The direction of groundwater flow was generally north toward the northwest. Tidal influence on the direction of groundwater flow was not observed.

- Groundwater horizontal gradients in the vicinity of the SWMUs appear to be relatively uniform at 0.011 feet/foot; station-wide well pairs used to investigate vertical gradients showed a range of 0.01 to 0.05 feet/foot between the shallow and intermediate and intermediate to deep well-depth zones. The values reflect a net downward gradient that suggests there is no significant artesian influence from the Floridan Aquifer system or the surficial aquifer.

- The average values for radial hydraulic conductivity in the Group III area (i.e., includes SWMUs 20 and 21) was approximately 1.2 to 72.2 feet/day. Wells tested near SWMUs 20 and 21 ranged from approximately 2.3 to 7.8 feet/day.

- The groundwater flow velocity was estimated to range from approximately 0.07 feet/day to 0.25 feet/day.

SWMU 52

Because only one monitoring well was installed at SWMU 52, a limited amount of data was collected.

- The average values for radial hydraulic conductivity in the Group III area (i.e., includes SWMU 52) was approximately 1.2 to 72.2 feet/day. The well tested at SWMU 52 was approximately 6.8 feet/day.
- The groundwater elevation at SWMU 52 was 3.8 feet mean sea level (msl).

1.3.3 Background Conditions

Background screening values (BSVs) were originally calculated and presented in the RCRA GIR for NAVSTA Mayport, Florida (ABB-ES, 1995b). The calculation was based on analytical results for samples from each medium of concern including groundwater, surface soil, subsurface soil, sediment, and surface water. During review of the background data, it was determined that certain procedures used during the original background calculations were not consistent with current regulatory guidelines, and apparent spurious or problematic results were present in the data used to perform the calculations. A recalculation of the BSVs was therefore performed primarily to conform to newer regulatory guidance that recommends

how concentrations less than analytical detection limit are used in the mathematical treatment of the data (TtNUS, 2000).

It was noted during review of the background data sets that many of the results for each medium sampled were less than the detection limits of the laboratory methods used. Consequently, the use of one-half the detection limit for results less than the analytical detection limit in the recalculation methodology may result in an unnatural lowering of the mean concentration. Therefore, the background screening concentration was compared with the maximum background concentration in each medium's data set. If the screening concentration (i.e., 2 times the mean of the background data set) for a contaminant was less than the maximum concentration for that contaminant, then the background screening concentration for that contaminant was bolded and footnoted in Tables 1-1 through 1-5. For these contaminants, if a detection occurred in site media within the range of concentration between the screening concentration and the maximum concentration, then these contaminants received additional evaluation on a case by case basis to determine if the site detection represents the upper range of background or a site release. Tables 1-1 through 1-5 present the re-calculated BSVs for each medium at NAVSTA Mayport.

1.4 CORRECTIVE MEASURES STUDY METHODOLOGY

This CMS for SWMUs 18, 20, 21, and 52 uses the CMS process described in the CMS Work Plan (ABB-ES, 1995c) for NAVSTA Mayport with the incorporation of the newer USEPA guidance for conducting a CMS (USEPA, 1994). The purpose of the CMS is to identify, evaluate, and recommend corrective action for SWMUs that warrant such action based on the results of the RFI. The following key components were considered in identifying appropriate corrective action.

Investigation data documented in the station-wide GIR, the RFI Reports, and subsequent IM programs conducted at the SWMUs of concern were reviewed to gain an understanding of the SWMUs physical setting, past history, current conditions, and future land uses. All available, validated analytical data for all environmental media were assembled into a single CMS database.

- Corrective Action Objectives (CAOs). CAOs are developed to specify the contaminants, media of interest, exposure pathways, and corrective action goals for a SWMU.

TABLE 1-1

STATISTICS AND BACKGROUND SCREENING CONCENTRATIONS – SURFACE SOIL
NAVSTA MAYPORT, FLORIDA

Chemical	Frequency of Detection [1]	Range of Reporting Limits [2]	Range of Detected Concentrations [2]	Arithmetic Mean [3]	BG Screen [4]
Inorganics (mg/kg)					
Antimony	0 / 6	5.2 -- 6	--[5]	ND[5]	ND[5]
Arsenic	0 / 6	0.76 -- 2.6	--[5]	ND[5]	ND[5]
Barium	6 / 6	--[6]	0.76 -- 5	2.75	5.50
Beryllium	1 / 6	0.06 -- 0.07	0.09	0.05	0.09
Cadmium	1 / 6	0.83 -- 0.96	1 -- 1	0.5	1.1
Chromium	6 / 6	--[6]	0.68 -- 2.5	1.3	2.6
Cobalt	0 / 6	0.47 -- 0.55	--[5]	ND[5]	ND[5]
Copper	1 / 6	0.35 -- 0.41	2.1	0.35	**0.69**[7]
Cyanide	0 / 6	0.16 -- 0.18	--[5]	ND[5]	ND[5]
Lead	0 / 6	0.25 -- 1.7	--[5]	ND[5]	ND[5]
Mercury	0 / 6	0.03 -- 0.07	--[5]	ND[5]	ND[5]
Nickel	0 / 6	2.6 -- 3	--[5]	ND[5]	ND[5]
Selenium	5 / 6	0.45 -- 0.45	0.47 -- 0.86	0.6	1.2
Silver	0 / 6	0.51 -- 0.59	--[5]	ND[5]	ND[5]
Thallium	4 / 6	0.53 -- 0.62	0.77 -- 1.1	0.7	1.4
Tin	0 / 6	7.3 -- 8.5	--[5]	ND[5]	ND[5]
Vanadium	5 / 6	0.46 -- 0.46	1.2 -- 2.5	1.7	3.4
Zinc	6 / 6	--[6]	0.35 -- 1.9	1.3	2.7
Miscellaneous Parameters (mg/kg)					
Total Organic Carbon	6 / 6	--[6]	1,440 -- 8,030	3,499	**6,998**[7]

1 Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected results); duplicates included but not counted.
2 Ranges include duplicate and/or re-sample results, where appropriate.
3 The mean includes detected concentrations and one-half the laboratory reporting limit for nondetect results; duplicate samples and re-sample results were averaged prior to calculation of the mean.
4 Background (BG) Screen is twice the arithmetic mean of the data.
5 All results were nondetects (ND); mean and BG screening value not applicable.
6 All results were positive detects.
7 Bold BG Screen result indicates that value is less than maximum concentration of that chemical.

TABLE 1-2

STATISTICS AND BACKGROUND SCREENING CONCENTRATIONS – SUBSURFACE SOIL
NAVSTA MAYPORT, FLORIDA

Chemical	Frequency of Detection [1]	Range of Reporting Limits [2]	Range of Detected Concentrations [2]	Arithmetic Mean [3]	BG Screen [4]
Inorganics (mg/kg)					
Antimony	0 / 4	1.1 -- 1.2	--[5]	ND[5]	ND[5]
Arsenic	3 / 4	0.13 -- 0.13	0.33 -- 0.58	0.35	0.70
Barium	4 / 4	--[6]	1.9 -- 6.8	3.6	7.2
Beryllium	1 / 4	0.07 -- 0.07	0.07	0.04	0.09
Cadmium	0 / 4	0.22 -- 0.23	--[5]	ND[5]	ND[5]
Chromium	3 / 4	0.57 -- 0.57	1.4 -- 3	1.4	2.7
Cobalt	1 / 4	0.67 -- 0.72	0.71	0.4	0.8
Copper	2 / 4	0.2 -- 0.9	1.4 -- 2.3	1.0	**2.1**[7]
Cyanide	1 / 4	0.15 -- 0.16	0.58	0.1	**0.3**[7]
Lead	2 / 4	0.58 -- 0.59	0.75 -- 1.9	0.83	**1.66**[7]
Mercury	3 / 4	0.03 -- 0.03	0.03 -- 0.03	0.02	0.05
Nickel	0 / 4	1.3 -- 1.4	--[5]	ND[5]	ND[5]
Selenium	0 / 4	0.13 -- 0.14	--[5]	ND[5]	ND[5]
Silver	0 / 4	0.45 -- 0.49	--[5]	ND[5]	ND[5]
Thallium	0 / 4	0.13 -- 0.14	--[5]	ND[5]	ND[5]
Tin	4 / 4	--[6]	2.2 -- 4	2.7	5.4
Vanadium	4 / 4	--[6]	0.71 -- 2.5	1.6	3.1
Zinc	4 / 4	--[6]	2 -- 2.9	2.4	4.9

1 Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected results); duplicates included but not counted.
2 Ranges include duplicate and/or re-sample results, where appropriate.
3 The mean includes detected concentrations and one-half the laboratory reporting limit for nondetect results; duplicate samples and re-sample results were averaged prior to calculation of the mean.
4 Background (BG) Screen is twice the arithmetic mean of the data.
5 All results were nondetects (ND); mean and BG screening value not applicable.
6 All results were positive detects.
7 Bold BG Screen result indicates that value is less than maximum concentration of that chemical.

TABLE 1-3

STATISTICS AND BACKGROUND SCREENING CONCENTRATIONS – GROUNDWATER
NAVSTA MAYPORT, FLORIDA

Chemical	Frequency of Detection [1]	Range of Reporting Limits [2]	Range of Detected Concentrations [2]	Arithmetic Mean [3]	BG Screen [4]
Inorganics (µg/L)					
Arsenic	5 / 8	0.6 -- 6	0.6 -- 6	2.6	**5.3** [5]
Antimony	0 / 8	2.2 -- 50	-- [6]	ND [6]	ND [6]
Barium	5 / 8	1.2 -- 3.3	6.4 -- 75.5	18.9	**37.8** [5]
Beryllium	0 / 8	0.18 -- 0.3	-- [6]	ND [6]	ND [6]
Cadmium	0 / 8	1 -- 3	-- [6]	ND [6]	ND [6]
Calcium	8 / 8	-- [7]	65,000 -- 251,000	113,063	**226,125** [5]
Chromium	0 / 8	2 -- 2.6	-- [6]	ND [6]	ND [6]
Cobalt	0 / 8	2.7 -- 3.1	-- [6]	ND [6]	ND [6]
Copper	0 / 8	0.9 -- 12.7	-- [6]	ND [6]	ND [6]
Cyanide	1 / 8	0.81 -- 2.7	0.95	1	2
Iron	6 / 8	68.2 -- 78.6	15.4 -- 660	247	**494** [5]
Lead	1 / 8	0.6 -- 6	1.5	1	2
Magnesium	6 / 8	18,800 -- 19,700	28,60 -- 419,000	92,196	**184,393** [5]
Manganese	6 / 8	20.1 -- 23.6	7.1 -- 228	70	**141** [5]
Mercury	2 / 8	0.08 -- 0.5	0.08 -- 0.1	0.08	0.16
Nickel	0 / 8	5.9 -- 7.3	-- [6]	ND [6]	ND [6]
Selenium	0 / 6	0.6 -- 13.2	-- [6]	ND [6]	ND [6]
Silver	0 / 8	2.1 -- 2.3	-- [6]	ND [6]	ND [6]
Sodium	6 / 8	31,500 -- 39,500	9,300 -- 3,310,000	762,294	**1,524,588** [5]
Thallium	0 / 8	0.6 -- 6	-- [6]	ND [6]	ND [6]
Tin	0 / 8	8 -- 9.4	-- [6]	ND [6]	ND [6]
Vanadium	6 / 8	1.5 -- 1.7	2.3 -- 5.8	3	6
Zinc	1 / 8	1.82 -- 8.8	4.3	2.9	5.8
Miscellaneous Parameters (mg/L)					
Ammonia, as nitrogen	3 / 3	-- [7]	0.7 -- 1.3	1.0	2.1
Chloride	6 / 6	-- [7]	15 -- 6,600	1,142	**2,284** [5]
Sulfate	6 / 6	-- [7]	36.4 -- 1,230	257	514
Total dissolved solids	6 / 6	-- [7]	417 -- 8,150	1,881	3,762

1 Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected results); duplicates included but not counted.
2 Ranges include duplicate and/or re-sample results, where appropriate.
3 The mean includes detected concentrations and one-half the laboratory reporting limit for nondetect results; duplicate samples and re-sample results were averaged prior to calculation of the mean.
4 Background (BG) Screen is twice the arithmetic mean of the data.
5 Bold BG Screen result indicates that value is less than maximum concentration of that chemical.
6 All results were nondetects (ND); mean and BG screening value not applicable.
7 All results were positive detects.

TABLE 1-4

STATISTICS AND BACKGROUND SCREENING CONCENTRATIONS – SEDIMENT
NAVSTA MAYPORT, FLORIDA

Chemical	Frequency of Detection [1]	Range of Reporting Limits [2]	Range of Detected Concentrations [2]	Arithmetic Mean [3]	BG Screen [4]
Inorganics (mg/kg)					
Antimony	0 / 8	0.94 -- 18.2	--[5]	ND [5]	ND [5]
Arsenic	4 / 8	0.01 -- 0.21	0.68 -- 6.6	1.2	**2.5** [6]
Barium	8 / 8	0 -- 0	3.6 -- 16.1	7.2	**14.3** [6]
Beryllium	2 / 8	0.045 -- 0.59	0.1 -- 0.47	0.1	**0.2** [6]
Cadmium	1 / 8	0.44 -- 1.3	0.82	0.5	0.9
Chromium	8 / 8	0 -- 0	1.3 -- 28.1	7.3	**14.7** [6]
Cobalt	1 / 8	0.56 -- 6.4	2.4	1.0	**2.0** [6]
Copper	7 / 8	0.43 -- 0.43	0.88 -- 7.5	2.5	**5.0** [6]
Cyanide	0 / 5	0.07 -- 0.22	--[5]	ND [5]	ND [5]
Lead	6 / 8	0.2 -- 1.2	1.5 -- 10	3.4	**6.8** [6]
Mercury	3 / 8	0.04 -- 0.24	0.22 -- 1.1	0.2	**0.3** [6]
Nickel	3 / 8	2 -- 3.6	5.1 -- 7.1	3.1	**6.2** [6]
Selenium	6 / 8	0.56 -- 1.1	0.32 -- 0.81	0.5	1.1
Silver	0 / 8	0.6 -- 1.1	--[5]	ND [5]	ND [5]
Thallium	1 / 8	0.39 -- 0.74	0.88	0.3	**0.7** [6]
Tin	1 / 8	5 -- 94.8	12.3	17.9	35.8
Vanadium	8 / 8	--[7]	1.6 -- 28.4	7.1	**14.3** [6]
Zinc	8 / 8	--[7]	2.1 -- 34.3	12.1	**24.2** [6]
Miscellaneous Parameters (mg/kg)					
Total organic carbon	5 / 5	--[7]	5,160 -- 20,400	9,364	**18,728** [6]

1 Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected results); duplicates included but not counted.
2 Ranges include duplicate and/or re-sample results, where appropriate.
3 The mean includes detected concentrations and one-half the laboratory reporting limit for nondetect results; duplicate samples and re-sample results were averaged prior to calculation of the mean.
4 Background (BG) Screen is twice the arithmetic mean of the data.
5 All results were nondetects (ND); mean and BG screening value not applicable.
6 Bold BG Screen result indicates that value is less than maximum concentration of that chemical.
7 All results were positive detects.

TABLE 1-5

STATISTICS AND BACKGROUND SCREENING CONCENTRATIONS – SURFACE WATER
NAVSTA MAYPORT, FLORIDA

Chemical	Frequency of Detection [1]	Range of Reporting Limits [2]	Range of Detected Concentrations [2]	Arithmetic Mean [3]	BG Screen [4]
Inorganics (µg/L)					
Antimony	1 / 8	3.1 -- 40	57.5	17.5	**35** [5]
Arsenic	5 / 8	0.9 -- 6.9	0.86 -- 8.1	2.8	**5.6** [5]
Barium	8 / 8	-- [6]	6.8 -- 15.4	11.4	22.9
Beryllium	0 / 8	0.1 -- 0.27	-- [7]	ND [7]	ND [7]
Cadmium	1 / 8	1.6 -- 4	2.4	1.6	3.1
Calcium	4 / 4	* -- [6] *	71,100 -- 168,000	141,088	282,175
Chromium	1 / 8	1.9 -- 2.4	4	1.3	**2.6** [5]
Cobalt	2 / 8	2.3 -- 5.1	5.6 -- 9.7	3.2	**6.4** [5]
Copper	3 / 8	1.4 -- 29.5	2.4 -- 37.2	7.2	**14.5** [5]
Cyanide	2 / 8	1.8 -- 3	0.92 -- 3.0	1.5	3.0
Iron	3 / 4	187 -- 187	85.7 -- 435	193	**386** [5]
Lead	2 / 4	0.78 -- 2.6	0.91 -- 1.5	1.0	2.1
Magnesium	4 / 4	-- [6]	54,000 -- 490,000	335,575	671,150
Manganese	4 / 4	-- [6]	10.4 -- 98.7	41.7	**83.5** [5]
Mercury	0 / 8	0.09 -- 0.16	-- [7]	ND [7]	ND [7]
Nickel	1 / 8	7 -- 19.8	13 -- 13	6.3	**12.6** [5]
Selenium	3 / 8	1.1 -- 10.6	1.8 -- 13.7	4.3	**8.5** [5]
Silver	0 / 8	2.1 -- 2.4	-- [7]	ND [7]	ND [7]
Sodium	1 / 4	55.6 -- 55.6	386,000	95,771	**191,542** [5]
Thallium	2 / 5	1.4 -- 1.4	1.8 -- 73.7	10.0	**19.9** [5]
Tin	1 / 8	9.4 -- 208	776	108	**216** [5]
Vanadium	6 / 8	2.2 -- 2.7	3.4 -- 5.2	3.2	6.4
Zinc	1 / 8	1.6 -- 23.5	3.2	4.4	8.8
Miscellaneous Parameters (mg/L)					
Chloride	5 / 5	-- [6]	710 -- 11,500	6,075.0	12,150
Sulfate	5 / 5	-- [6]	130 -- 1,320	839	1,679
Total dissolved solids	4 / 4	-- [6]	1,550 -- 18,600	11,263	22,525
Total organic carbon	4 / 4	-- [6]	10.8 -- 21.6	15	29

1 Frequency of detection is the number of samples in which the analyte was detected divided by the total number of samples analyzed (excluding rejected results); duplicates included but not counted.
2 Ranges include duplicate and/or re-sample results, where appropriate.
3 The mean includes detected concentrations and one-half the laboratory reporting limit for nondetect results; duplicate samples and re-sample results were averaged prior to calculation of the mean.
4 Background (BG) Screen is twice the arithmetic mean of the data.
5 Bold BG Screen result indicates that value is less than maximum concentration of that chemical.
6 All results were positive detects.
7 All results were nondetects (ND); mean and BG screening value not applicable.

- MCOs. MCOs are developed based on regulatory requirements, when available, site-specific risk-based factors, or other available information (e.g., leachability of contaminants from soil to groundwater). MCOs were derived for both human and ecological receptors from information presented in the RFI and IM Reports, or were developed based on the state of Florida 62-777, F.A.C. Cleanup Target Level (CTL) criteria for each medium of concern.

- COCs. Contaminants detected in the media of concern were compared against promulgated regulatory standards or other applicable or relevant and appropriate requirements (ARARs) criteria to identify COPCs in each environmental medium for both human and ecological receptors. COCs are developed from the list of COPCs determined in the RFI Report or as updated in the CMS. COCs define the contaminants that will be evaluated for corrective action in the CMS.

- Volumes of Media of Concern. The volumes (or areas) of media of concern at each SWMU are determined by considering the requirements for protectiveness as identified in the CAOs and the chemical and physical characterization of the site (i.e., the results and conclusions of the RFI and post-RFI activities). Essentially, the area and depth of a given medium containing concentrations of COCs that exceed the MCOs were used to define the volumes of media of concern.

- Applicable Technologies. Technologies applicable to contaminated media at each SWMU are identified and screened. Technologies that cannot be implemented technically are eliminated.

- Corrective Measure Alternatives. Technologies that pass the screening phase are assembled into corrective measure alternatives.

- Evaluation of Corrective Measure Alternatives. Recommended corrective measure alternatives are described and evaluated using four criteria: technical, environmental, human health, and institutional factors.

- Recommendation of Corrective Action. The results of the evaluation of alternatives are summarized and a corrective action is recommended for each SWMU.

These components are described further in the CMS Work Plan for NAVSTA Mayport (ABB-ES, 1995c). More detailed discussion of the methodology for CAOs, MCOs, COCs, and COPCs used in this CMS is provided in the following sections.

1.4.1 Corrective Action Objectives

CAOs are aimed at protecting human health and the environment and are expressed for each medium of concern. At SWMUs 18, 20, 21, and 52, the media of concern for the CMS included groundwater, surface soil, and subsurface soil. CAOs were based on the COPCs, the exposure pathway, and the present and future receptors at each SWMU. Development of the CAOs considered the results of the RFI, particularly the human health and ecological risk assessments, as well as the applicable federal and state standards.

For this CMS, CAOs were formulated based on unacceptable human health and ecological risk that exist for direct exposure to groundwater and surface or subsurface soil based on the current and anticipated future use of the sites. All exposure scenarios for human health receptors used the Chapter 62-777, F.A.C. CTL criteria for residential exposure. Exposure scenarios for ecological receptors were developed in the RFI and IM Reports and used ecological benchmarks consistent with current values applicable and relevant to the state of Florida. The current and future receptors are hypothetical future on-site residents, trespassers, construction workers, base workers, and shoreline benthic aquatic receptors in the St. Johns River and Mayport Turning Basin; potential exposure of terrestrial ecological receptors was not considered a pathway of concern in the RFI for these SWMUs. Based on the current and future use receptors, the following CAOs were developed for SWMUs 18, 20, 21, and 52.

Groundwater

CAO 1: Prevent ingestion of surficial aquifer groundwater containing carcinogens in excess of state of Florida GCTLs (Chapter 62-777, F.A.C.) for groundwater criteria until CAO 3 has been met. The cumulative risk for all COCs shall not exceed an excess lifetime cancer risk (ELCR) of 1.0×10^{-6} for residential/industrial exposure to groundwater.

CAO 2: Prevent ingestion of aquifer groundwater containing noncarcinogens in excess of the state of Florida GCTLs (Chapter 62-777, F.A.C.) groundwater criteria until CAO 3 has been met. The hazard quotient (HQ) for each contaminant shall not exceed 1.0 for the residential/industrial exposure to groundwater. The hazard index (HI) (which is the sum of the HQs) shall not exceed 1.0 for the residential/industrial exposure to groundwater.

CAO 3: Restore the groundwater aquifer to the state of Florida GCTLs (Chapter 62-777, F.A.C.) for groundwater criteria.

Soil

CAO 4: Protect human health from carcinogenic and non-carcinogenic risks associated with incidental ingestion of, inhalation of, and dermal contact with contaminated soil in excess of the state of Florida SCTLs (62-777, F.A.C.) for commercial/industrial criteria. The cumulative risk for all COCs shall not exceed an ELCR of 1.0×10^{-6} for residential exposure to soil or sediment. The HQ for each contaminant shall not exceed 1.0 for residential exposure to soil or sediment. The HI (which is the sum of the HQs) shall not exceed 1.0 for residential exposure to soil or sediment.

CAO 5: Prevent leaching of contaminants from soil that would result in groundwater concentrations that do not meet CAOs for groundwater.

CAO 6: Protect the environment from COCs in the soil that cause adverse biological effects.

1.4.2 Media Cleanup Objectives

MCOs establish acceptable exposure levels that are protective of human health and the environment and were estimated for SWMUs 18, 20, 21, and 52 using baseline assumptions and inputs. MCOs are determined based on federal and state standards, contaminants and media of interest, and exposure pathways. These calculations are based on the state of Florida CTLs (62-777, F.A.C.), BSVs, and assumptions regarding ultimate land uses. Specifically MCOs are used to determine COCs, to estimate areas and volumes of impacted media, and to set performance standards for potential remedial alternatives.

Cleanup of inorganic contaminants less than their established background concentrations will not be performed; therefore, background-screening values will be used as the lower limit for MCOs. The MCOs selection criteria are summarized below for each medium.

Groundwater

- The state of Florida GCTLs (Chapter 62-777, F.A.C.) for groundwater criteria (adjusted for a cumulative cancer risk of 1.0×10^{-6} and an HI of 1).

- In areas where groundwater discharges to surface water, the state of Florida Surface Water Cleanup Target Levels (SWCTLs) (Chapter 62-777, F.A.C.) for protection of marine surface water criteria.

- NAVSTA Mayport BSVs will be used as the lower limit for the MCOs of inorganic COCs.

Soil

- The lower of the state of Florida SCTLs (Chapter 62-777, F.A.C.) for residential criteria adjusted for cumulative cancer risk of 1.0×10^{-6} and an HI of 1) and leachability based on groundwater and/or marine surface water criteria for SCTLs (Chapter 62-777, F.A.C.).

- NAVSTA Mayport BSVs will be used as the lower limit for the MCOs of inorganic COCs.

1.4.3 Contaminants of Concern

The determination of COCs for each medium involves a three-step process:

1. Determine the Contaminants of Interest (COIs).
2. Identify the COPCs.
3. Select the COCs.

COIs and COPCs were determined in the RFI; however, since the RFI was issued, additional data have been collected and new regulations have been promulgated. Therefore, the COIs and COPCs have been re-evaluated.

1.4.3.1 Contaminants of Interest

The COIs include any contaminant detected at least once in validated analytical results for environmental samples in any medium at the site during any sampling event. For this CMS, the list of COIs originally presented in the RFI was revised by including any contaminants that were detected during any environmental sampling program conducted after the RFI (e.g., IM actions). The lists of COIs for SWMUs 18, 20, 21, and 52 are presented in Sections 2, 3, and 4, respectively.

1.4.3.2 Contaminants of Potential Concern

The selection of COPCs was based on the list of COIs and considered the concentration, occurrence, and distribution of contaminants detected in the environmental media and the environmental conditions at SWMUs 18, 20, 21, and 52. The COPC selection considered all available validated soil and groundwater sample results and included several rounds of sampling conducted after the RFI Report was submitted.

For each medium, the following criteria were used to exclude detected analytes from the list of COPCs (each criterion by itself was justification for excluding the analyte):

- Infrequent Detection. Frequency of detection is defined as the number of samples in which the analyte is detected divided by the number of samples analyzed for that analyte. A chemical was considered a candidate for exclusion if (1) it had a low frequency of detection (e.g., less than 5 percent), (2) it was not detected in other sampled media or at high concentrations (i.e., contaminated "hot spots" do not exist), and (3) there was no reason to believe that the chemical may be present (USEPA, 1989). Based on these criteria, there were chemicals excluded from the lists of COCs for both subsurface and surface soils and groundwater during the CMS.

- Less than Background Screening Values. If the maximum detected concentration of an analyte in a medium was less than the BSV (organics only), the analyte was not selected as a COPC (USEPA, 1995). Tables 1-1 through 1-5 present BSVs for surface soil, subsurface soil, groundwater, sediment, and surface water, respectively, which were developed for NAVSTA Mayport.

- Less than Risk-based Screening Concentrations, Standards, and Guidelines. If the maximum detected concentration of the analyte in a medium was less than its corresponding adjusted CTL, the analyte was not selected as a COPC. The FDEP SCTLs for direct or residential exposure and the FDEP GCTLs were taken from Chapter 62-777, F.A.C., Table 2, dated April 17, 2005. All risk-based screening levels for carcinogenic effects were adjusted to account for cumulative cancer effects by dividing the screening level by the number of detected carcinogenic chemicals in accordance with the FDEP guidance. GCTLs based on Primary or Secondary Standards were not adjusted.

- Less than Essential Nutrient Screening Values. If the maximum detected concentration of an essential nutrient (i.e., calcium, magnesium, potassium, iron, and sodium) in a medium was less than a toxic level or consistent with or only slightly exceeded its BSV, the essential nutrient was not selected as a COPC.

- Common Laboratory Contaminant. A common laboratory contaminant is defined as an analyte that is frequently found the laboratory and often used in conjunction with sample analysis. If the maximum detected concentration of a common laboratory contaminant (i.e, bis(2-ethylhexyl)phthalate) in a medium was less than the appropriate CTL in all samples in which the analyte was detected, then that laboratory contaminant was not selected as a COPC.

1.4.3.3 Selection of Contaminants of Concern

The list of constituents identified as COPCs may not represent a true picture of the media-specific chemical concentrations or realistic risk exposure at a SWMU. In order to represent overall chemical

concentration levels and exposures, soil COCs were developed from the list of COPCs by statistically calculating a SWMU-specific representative concentration for each COPC, where appropriate. The calculation is performed by statistically estimating the 95 percent Upper Confidence Limit (UCL) for data collected for a given COPC. In instances where the sample population for all soil media at a SWMU was less than 10, a statistical SWMU-specific representative concentration could not be calculated. Therefore, the maximum concentration was used as the representative concentration. For all other media, the maximum concentration is always used as the SWMU-specific representative concentration.

Once the SWMU-specific representative concentration was determined, it was compared to the SWMU-specific MCO for each medium. The MCO for each medium were determined by selecting the higher of either the Mayport BSV or the value calculated by dividing the published CTLs by the number of carcinogenic COPCs or the number of non-carcinogenic COPCs that affect the same target organ system. COPCs whose representative concentration exceeded the MCO were then selected as the COCs to be evaluated in this CMS.

2.0 SWMU 18 - FTC DIESEL GENERATOR SUMP

SWMU 18, the Fleet Training Center Diesel Generator Sump Area, is located at the FFTA, which is part of the current FTC due south of the St. Johns River, approximately 1,000 feet west of Atlantic Ocean in the northeastern part of NAVSTA Mayport (Figure 2-1).

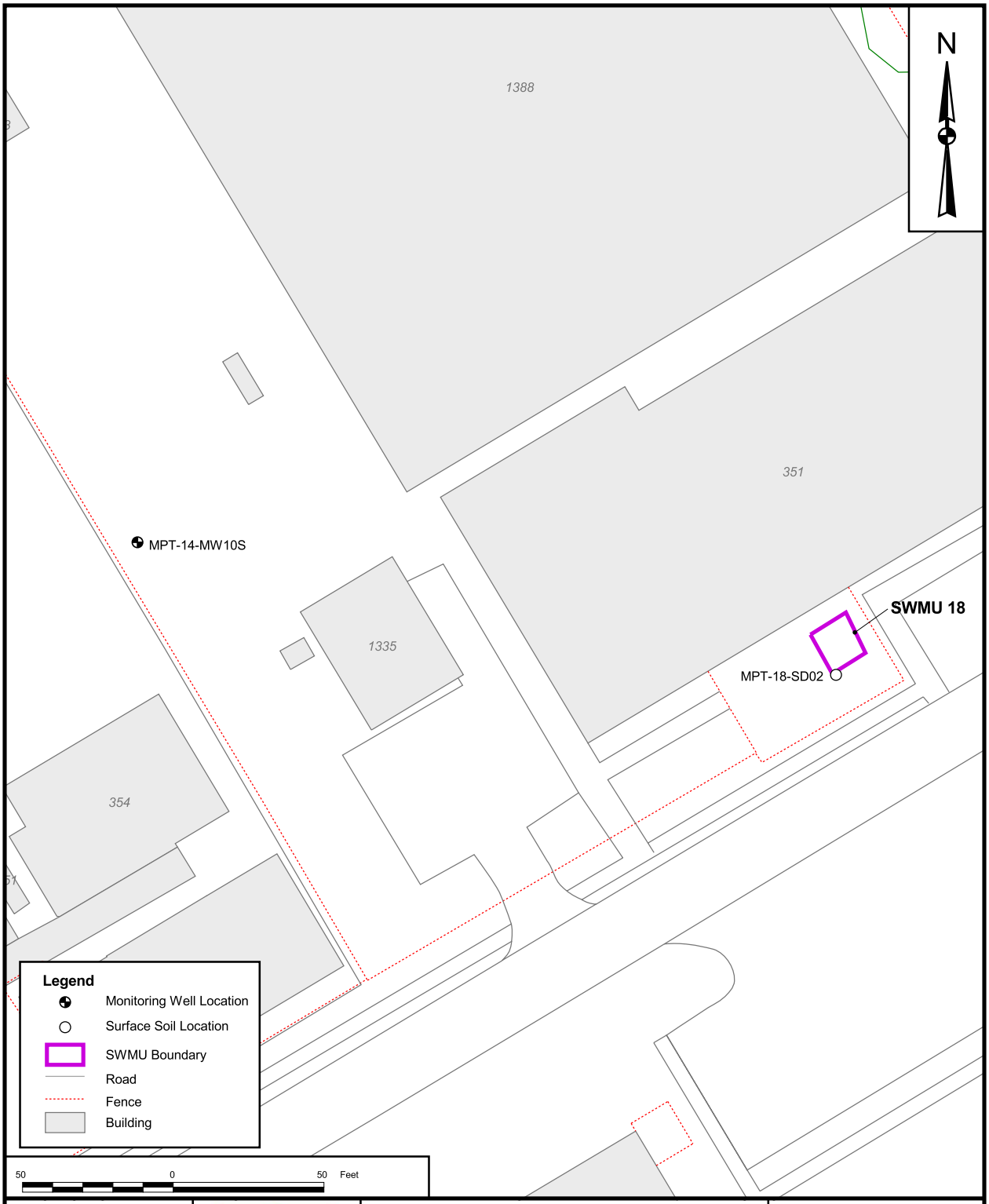
SWMU 18 is the FTC Diesel Generator Sump and consists of a concrete containment structure in which a diesel generator is located. The generator has been at this location since approximately 1982. The sump is approximately 5 feet wide and 10 feet long with 6-inch high sides. A drainpipe exists in one side of the sump to drain stormwater that accumulates in the sump.

During an RFA-VSI in 1988 and RFI activities in 1995, surface soil staining was observed outside of the sump under the drainpipe's valve and within the flow path extending towards an open stormwater ditch 4 feet to the south. The flow path continued down the ditch to a stormwater sewer catch basin approximately 10 feet to the southwest. Stormwater collected at the catch basin appeared to discharge from an outlet on the east side of Building 351, but could flow to the firefighting apron/retention area. In addition, FFTA waste petroleum liquids were reported to have entered the ditch during overflow at an upstream manhole.

From March through October 1995, an RFI was conducted to delineate the nature and extent of contamination. The activities conducted during the RFI are described in Section 2.1.

2.1 DESCRIPTION OF CURRENT CONDITIONS

The description of current conditions is based on descriptions and data presented in the RFI conducted at SWMU 18. This information is summarized in the following sections; however, the original documents should be reviewed for further details and in-depth analyses of the data presented herein. The information and analytical data from all of the sources were utilized to form an up-to-date understanding of the current conditions at SWMU 18 from which COCs were identified and for which corrective actions were recommended.



DRAWN BY S. PAXTON	DATE 3/29/07	GENERAL LOCATION MAP FTC DIESEL GENERATOR SUMP SWMU 18 NAVAL STATION MAYPORT MAYPORT, FLORIDA	CONTRACT NUMBER CTO 0033
CHECKED BY K. WIMBLE	DATE 3/29/07		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2 - 1 / REV 0

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2.1.1 RCRA Facility Investigation

An RFI was conducted from March through October 1995 at SWMU 18. Field activities consisted of a preliminary screening of groundwater samples using a gas chromatograph, the collection of surface and subsurface soil samples, the collection of sediment samples, the installation of groundwater monitoring wells, and the collection of groundwater samples. Information regarding the investigation methods and sampling procedures are provided in the NAVSTA Mayport GIR (ABB-ES, 1995b) and in the NAVSTA Mayport RFI Work Plan (ABB-ES, 1991). A total of four surface soil, three subsurface soil, four groundwater, and three sediment samples, and associated duplicate samples were analyzed by a fixed-base laboratory during the RFI; however, only one soil sample and one groundwater sample were considered for the CMS (Table 2-1). The sediment samples collected at the FTC were treated as surface soil samples for evaluation since surface water was temporal. Figure 2-2 depicts the locations of various environmental samples collected during the RFI and subsequent investigations.

TABLE 2-1

SWMU 18, SOIL AND GROUNDWATER SAMPLE IDENTIFICATION
NAVSTA MAYPORT – MAYPORT, FLORIDA

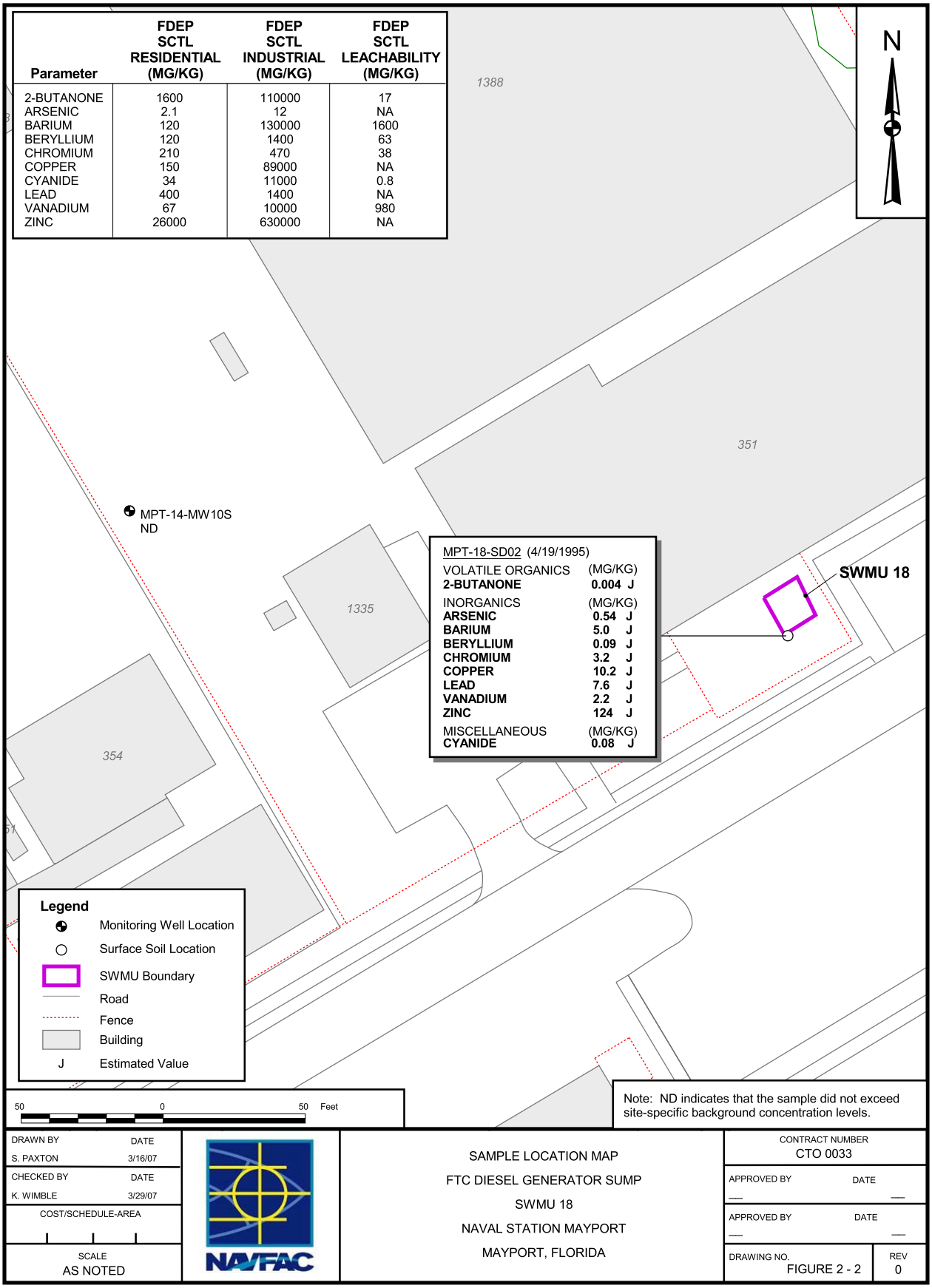
Sample Location	Sample ID	Sample Date	Volatile Organics	Semivolatile Organics	Inorganics	Pesticides	Total Petroleum Hydrocarbons	Water Quality
Surface Soil								
MPT-18-SD01	18D00101	04/19/95	x	x	x	x		
Groundwater								
MPT-14-MW10S	MPT-14-MW10S-08	10/29/2003	x	x	x		x	x

2.1.2 RFI Evaluation

Surface Soil

One volatile organic compound (VOC) (2-butanone) was detected in the surface soil sample at SWMU 18. Similarly, eight inorganics (arsenic, barium, beryllium, chromium, copper, lead, vanadium, and zinc), and cyanide were detected at SWMU 18.

Parameter	FDEP SCTL RESIDENTIAL (MG/KG)	FDEP SCTL INDUSTRIAL (MG/KG)	FDEP SCTL LEACHABILITY (MG/KG)
2-BUTANONE	1600	110000	17
ARSENIC	2.1	12	NA
BARIUM	120	130000	1600
BERYLLIUM	120	1400	63
CHROMIUM	210	470	38
COPPER	150	89000	NA
CYANIDE	34	11000	0.8
LEAD	400	1400	NA
VANADIUM	67	10000	980
ZINC	26000	630000	NA



DRAWN BY S. PAXTON	DATE 3/16/07	SAMPLE LOCATION MAP FTC DIESEL GENERATOR SUMP SWMU 18 NAVAL STATION MAYPORT MAYPORT, FLORIDA	CONTRACT NUMBER CTO 0033
CHECKED BY K. WIMBLE	DATE 3/29/07		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 2 - 2 / REV 0

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Groundwater

One VOC (methane), one semivolatile organic compound (SVOC) (naphthalene), and total petroleum hydrocarbons (TPH) were detected in groundwater samples at SWMU 18. Two inorganic analytes (iron and manganese) were detected in groundwater samples at SWMU 18.

2.1.3 RFI Assessment of Human Health Impacts

Risk characterization for SWMU 18 was conducted for potential exposures to surface and subsurface soil, surface water, sediment, and groundwater under current and future land-use scenarios. The risk assessment was conducted for SWMUs 14 and 18 in the RFI because they are adjacent to one another, shared similar topographic and hydrologic settings, and have similar contaminants.

Soil

The ELCRs associated with ingestion, dermal contact, and fugitive dust inhalation of surface soil for current land use were 2×10^{-6} for the trespasser and 3×10^{-7} for the excavation worker. Under hypothetical future land use these ELCRs became 2×10^{-5} for the resident, 4×10^{-6} for the occupational worker, and 1×10^{-6} for the site maintenance worker. All of the ELCRs were within the USEPA's target ELCR range of 1.0×10^{-4} to 1.0×10^{-6}. All the ELCRs except for the excavation worker exceeded the FDEP's target ELCR level of 1.0×10^{-6}.

Noncancer risks associated with surface soil ingestion, dermal contact, and inhalation of fugitive dust for current land use (adolescent trespasser, adult trespasser, and excavation worker) were all less than the USEPA's and FDEP's target HI of 1.0. Noncancer risks associated with surface soil for future land use (child resident, adult resident, occupational worker, and site maintenance worker) were also less than the USEPA's and FDEP's target HI of 1.0.

COPCs were not identified for subsurface soil during the screening evaluation; therefore, a risk characterization was not conducted for this medium in the RFI.

Groundwater

The total ELCR associated with ingestion of groundwater was 7×10^{-5} for the hypothetical future adult resident. The ELCR associated with arsenic, the only contributor to the ELCR for the future resident,

exceeded FDEP's target ELCR of 1 x 10^{-6} but was within the USEPA's target ELCR range. Noncancer risk associated with groundwater ingestion was less than USEPA's and FDEP's target HI of 1.0.

2.1.4 RFI Assessment of Ecological Impacts

The RFI ecological risk assessment (ERA) evaluated potential pathways of exposure to ecological receptors by contamination in surface water, sediment, and groundwater. Exposure of ecological receptors to soil was prevented by buildings and pavement covering the surface and preventing the growth of vegetation that could provide a habitat. Groundwater is assumed to discharge to the tidal flats.

In the ERA, analytes detected in environmental media with complete pathways were compared with BSVs, ecological screening values, regulatory criteria, and toxicity benchmark values protective of ecological receptors to select ecological contaminants of potential concern. Once ecological COPCs were selected, an exposure dose was calculated for the ecological receptors. Terrestrial wildlife receptors used in the RFI were marsh rabbit, herring gull, and spotted sandpiper. Aquatic receptors used in the RFI included fish, invertebrates, mollusks, and aquatic plants. Exposure of ecological receptors to surface soil was not evaluated since there was no complete pathway.

Exposure doses were calculated for terrestrial wildlife by estimating contaminant concentrations in food items and using the contaminant concentrations measured in surface water. The calculated total exposure dose was compared to reference toxicity values for the wildlife species. When the estimated exposure dose was less than the reference toxicity value, the contaminant exposure was assumed to have no adverse effects to the individual animal and pose no risk to the wildlife population.

Surface Water

No evaluation of ERA is presented because surface water samples were not collected at SWMU 18 during the RFI.

Groundwater

Seventeen monitoring wells were sampled for unfiltered groundwater in the RFI at SWMUs 14 and 18 (13 samples at SWMU 14 and 4 samples at SWMU 18). Analytes selected as ecological COPCs in the RFI included 2-methylnaphthalene, dibenzofuran, fluorene, naphthalene, phenanthrene, bis(2-ethylhexyl)phthalate, cyanide, iron, manganese, and vanadium. The maximum concentrations in groundwater were compared to FDEP surface water quality criteria for Class III marine waters (Chapter 62-302 F.A.C.), USEPA's ambient water quality criteria, and lowest observed adverse effect

level from the AQUIRE toxicity database. The maximum concentrations of ecological COPCs in groundwater were less than the lowest toxicity benchmarks for all ecological COPCs except for cyanide and iron. However, the maximum concentration of cyanide was consistent with surface water samples from the St. Johns River, and the maximum concentration of iron was less than the RFI background concentration for iron. Therefore, the discharge of groundwater into surface water was deemed unlikely to increase risks to aquatic receptors.

2.1.5 RFI Recommendations

Under the current industrial land use scenario, additional investigation under an RFI or CMS was not recommended for surface soil, subsurface soil, or groundwater. However, the RFI recommended consideration of an IM to remove sediments from a drop inlet that receives flow from SWMUs 14 and 18. The IM was performed as part of SWMU 14 activities.

2.1.6 Post-Draft CMS Evaluation

A SWMU boundary evaluation was performed at SWMU 18 in response to a November 2004 Partnering Team Meeting. This evaluation concluded that 1) SWMU 18 was not the source of the contamination in the drainage ditch and the adjacent road and parking lot were the most likely sources and 2) the SWMU boundary is localized to the generator and the sump (see Figure 2-2).

Because the new boundary was localized to the generator and the sump, only one surface soil sample (MPT-18-SD02) was collected within the new SWMU perimeter and no subsurface soil samples were collected. For the purposes of this CMS, the results from the most recent sampling event at MPT-14-MW10S were used for the groundwater COC selection process. MPT-14-MW10S was selected because it is the closest monitoring well location downgradient from SWMU 18.

LUCs, which were approved as an additional IM and implemented at SWMU 18, restrict current and future land use to other than residential. By a separate MOA, effective August 31, 1998, the Navy agreed with the USEPA and FDEP to implement facility-wide periodic site inspections, designed to ensure the maintenance by Navy personnel of any site-specific LUCs deemed necessary for the future protection of human health and the environment.

2.1.7 CMS Data Set

The results of environmental samples collected during the RFI conducted in 1995 and the post-draft CMS evaluation were used to evaluate COPCs and to select COCs in this CMS. Table 2-1 provides a list of all samples for each medium that was used in the RFI. The post draft CMS evaluation resulted in limiting sample locations to MPT-18-SD01 and MPT-14-MW10S in the CMS. Tables listing the complete analytical results of all sampling events per medium are included in Appendix A.

2.2 CHEMICALS OF CONCERN – HUMAN HEALTH

The determination of COCs for surface soil at SWMU 18 involved a three-step process as described in Section 1.4.3:

- Determination of COIs
- Identification of the COPCs
- Selection of COCs

COIs and COPCs were determined in the RFI or the RFA; however, since the RFI and RFA Reports were issued, new CTLs have been promulgated by the FDEP in 2005. The COIs and COPCs for SWMU 18 are independently evaluated in the following sections to select the COCs to be carried forward in the CMS remedy selection process.

2.2.1 Contaminants of Interest – Human Health

The COIs included any contaminant detected at least once in validated analytical results for environmental samples in any medium collected at SWMU 18. The soil sampling locations at SWMU 18 are shown in Figure 2-2. The revised list of COIs for SWMU 18 is provided in Table 2-2.

2.2.2 Contaminants of Potential Concern – Human Health

The maximum concentration of the COIs for each environmental medium was compared to the Florida CTLs (Chapter 62-777, F.A.C.) for surface soil and groundwater, as appropriate. Section 1.4.3.2 provides a detailed description of the process for the identification of COPCs.

TABLE 2-2

SWMU 18, CONTAMINANTS OF INTEREST
NAVSTA MAYPORT, FLORIDA

List of COIs	Surface Soil	Groundwater
Volatile Organics		
Methane		X
2-Butanone	X	
Semivolatile Organics		
Naphthalene		X
Inorganics		
Arsenic	X	
Barium	X	
Beryllium	X	
Chromium	X	
Copper	X	
Lead	X	
Manganese		X
Vanadium	X	
Zinc	X	
Miscellaneous		
TPH		X

Calcium, magnesium, potassium, iron, and sodium are considered to be essential human nutrients and were not considered in the COPC selection process. In addition, several water quality parameters that were measured during the groundwater analyses were not evaluated, including alkalinity, hardness, sulfide, total dissolved solids (TDS), total Kjeldahl nitrogen (TKN), total organic carbon (TOC), and total phosphorus.

2.2.2.1 Selection of Surface Soil COPCs – Human Health

The COPC screening evaluation for soil involves an evaluation of COIs for direct exposure and leaching to groundwater. Because less than 20 surface soil samples were collected at SWMU 18; none of the COIs were eliminated based on frequency of detection. As shown in Table 2-3, the direct exposure COPC screening process for surface soil identified no contaminants that exceeded the residential SCTLs.

Because surface water (i.e., St. Johns River) is not located within 300 feet of SWMU 18, leaching of soil to marine surface water was not evaluated. The leaching to groundwater evaluation involves a direct comparison to the leaching to GCTLs. Table 2-4 shows the leaching to groundwater evaluation. The leaching to groundwater evaluation determined that no contaminants have the potential to leach from the soil and impact groundwater/surface water. Therefore, no contaminants were selected as COPCs for surface soil leaching.

TABLE 2-3

SWMU 18, SURFACE SOIL COPCs - RESIDENTIAL DIRECT EXPOSURE
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Residential[1] (mg/kg)	Target Organ/System or Effect	Exceeds Residential SCTLs[2]
Volatile Organics						
2-Butanone	78-93-3	1/1	0.004	16,000	Developmental	No
Inorganics						
Arsenic	7440-38-2	1/1	0.54	2.1	Carcinogen -Cardiovascular -Skin	No
Barium	7440-39-3	1/1	5	120	Cardiovascular	No
Beryllium	7440-41-7	1/1	0.09	120	Carcinogen -Gastrointestinal -Respiratory	No
Chromium[3]	7440-47-3	1/1	3.2	210	Carcinogen -Respiratory	No
Copper	7440-50-8	1/1	10.2	150	Gastrointestinal	No
Cyanide	57-12-5	1/1	0.08	34	Neurological -Thyroid	No
Lead	7439-92-1	1/1	7.6	400	Neurological	No
Vanadium	7440-62-2	1/1	2.2	67	Hair Loss	No
Zinc	7440-66-6	1/1	124	26,000	Blood	No

Notes:
1 - SCTL - Soil Cleanup Target Level for Residential Direct Exposure - Chapter 62-777 F.A.C., April 2005.
2 - Comparison of the Residential SCTLs with the Maximum Concentration.
3 - SCTL Residential screening values used for Chromium (Hexavalent).

TABLE 2-4

SWMU 18, SURFACE SOIL COPCs - LEACHING
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Leaching to Groundwater [1] (mg/kg)	SCTL Leaching to Surface Water [2] (mg/kg)	Leaching Target Criteria [3] (mg/kg)	COPC Based on Leaching[4] (Yes/No)
Volatile Organics							
2-Butanone	78-93-3	1/1	0.004	17	NA	17	No
Inorganics							
Arsenic	7440-38-2	1/1	0.54	No Criteria	NA	No Criteria	No
Barium	7440-39-3	1/1	5	1600	NA	1600	No
Beryllium	7440-41-7	1/1	0.09	63	NA	63	No
Chromium[5]	7440-47-3	1/1	3.2	38	NA	38	No
Copper	7440-50-8	1/1	10.2	No Criteria	NA	No Criteria	No
Cyanide	57-12-5	1/1	0.08	0.8	NA	0.8	No
Lead	7439-92-1	1/1	7.6	No Criteria	NA	No Criteria	No
Vanadium	7440-62-2	1/1	2.2	980	NA	980	No
Zinc	7440-66-6	1/1	124	No Criteria	NA	No Criteria	No

Notes:
1 - SCTL - Soil Cleanup Target Level for Soil leaching to groundwater - Chapter 62-777 F.A.C., April 2005.
2 - SCTL - Soil Cleanup Target Level for Soil leaching to surface water - Chapter 62-777 F.A.C., April 2005.
3 - Minimum SCTL based on soil leaching to groundwater and soil leaching to surface water (if applicable).
4 - A COI is selected as a COPC if the maximum concentration of that chemical exceeds the leaching target criteria.
5 - SCTL screening value used for Chromium (Total).

2.2.2.2 Selection of Groundwater COPCs – Human Health

The COPC screening process for groundwater begins with comparing the maximum concentration directly to the GCTLs to determine COPCs. Because SWMU 18 is located more than 300 feet away from the nearest surface water body, the discharge of groundwater into surface water was not evaluated as a pathway of concern. The COPC screening process identified that manganese exceeded the GCTLs as shown in Table 2-5.

2.2.3 Contaminants of Concern - Human Health

The maximum concentration of the COPCs for each environmental medium was compared to the state of Florida CTLs (Chapter 62-777, F.A.C.) for surface soil and groundwater, as appropriate. Section 1.4.3.3 provides a detailed description of the process for the identification of COCs.

2.2.3.1 Selection of Surface Soil COCs – Human Health

There were no surface soil COPCs, therefore, a surface soil COC evaluation is not required and there are no surface soil COCs for SWMU 18.

2.2.3.2 Selection of Groundwater COCs – Human Health

One contaminant shown in Table 2-6 was identified as a COPC in groundwater at SWMU 18. The evaluation for the human health evaluation shows that the COPC is less than its site-specific background concentration. Therefore, there are no groundwater COCs for SWMU 18.

2.3 CONTAMINANTS OF CONCERN – ECOLOGICAL

Based on the RFI findings, no risk to terrestrial wildlife populations was determined to be likely due to exposure to surface soil. No pathway for ecological exposure to subsurface soil was identified in the RFI. Additionally, the RFI found groundwater discharge into St. Johns River did not pose a risk to aquatic receptors including fish, amphibians, plants, and invertebrates. This is based on the assumption that the groundwater concentration at the surface water discharge point will be lower than the concentration measured in the well, due to advection, dispersion, mixing, and retardation.

COC Summary

No COCs for surface soil or groundwater were identified for SWMU 18.

TABLE 2-5

SWMU 18, GROUNDWATER COPCs - GCTLs
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (µg/L)	GCTL[1] (µg/L)	Target Criteria[2] (P/S, HH)	Target Organ/System or Effect	Exceeds GCTLs[3]
Inorganics							
Manganese	7439-96-5	1/1	78.4	50	P/S	Neurological	Yes
Miscellaneous Parameters							
TPH	No CAS Number	1/1	258	5,000	P/S	Multiple Endpoints Mixed Contaminants	No
Semivolatile Organics							
Naphthalene	91-20-3	1/1	0.61	14	P/S	Nasal	No
Volatile Organics							
Methane	No CAS Number	1/1	10.2	No Criteria	No Criteria	No Criteria	No

Notes:
1 - GCTL - Groundwater Cleanup Target Levels - Chapter 62-777 F.A.C. April 2005.
2 - P/S - Primary Standard/Secondary Standard - F.A.C. 62-550 and Chapter 62-777, Table 1, dated April 2005. HH - Human Health Criteria.
3 - Comparison of the GCTL with the Maximum Concentration.
µg/L – micrograms per liter.

TABLE 2-6

SWMU 18, SELECTION OF GROUNDWATER COCs
NAVSTA MAYPORT, FLORIDA

COPC	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (µg/L)	GCTL [1] (µg/L)	Target Criteria [2]	Target Level (µg/L)	Background Concentration [3] (µg/L)	Site Specific Cleanup Standard – GCTL [4] (µg/L)	COCs Based on GCTLs [5]
Constituents with Primary or Secondary Standards									
Inorganics									
Manganese	7439-96-5	1/1	78.4	50	P/S	50	141	141	No

Notes:
1 - GCTL - Groundwater Cleanup Target Levels - Chapter 62-777 F.A.C. April 2005.
2 - P/S - Primary Standard/Secondary Standard - F.A.C. 62-550 and Chapter 62-777, Table 1, dated April 2005.
3 - Mayport background screening value (TtNUS, 2000).
4 - The Media Cleanup Objective (MCO) is the GCTL or the background screening value, whichever is greater.
5 - A COPC is selected as a COC if the maximum concentration exceeds the MCO.

2.4 VOLUMES OF CONTAMINATED MEDIA

No COCs were identified for surface or groundwater at SWMU 18; therefore, no areas of contaminated media were identified and contamination maps were not prepared.

2.5 IDENTIFICATION AND SCREENING OF CORRECTIVE MEASURES TECHNOLOGIES

Corrective measure technologies are identified and screened to address the CAOs identified for SWMU 18 (see Section 1.4.1). Soil or groundwater technologies are not required because there are no soil or groundwater COCs at SWMU 18.

2.6 RECOMMENDATION FOR A FINAL CORRECTIVE MEASURE

Because no contaminants exceeded FDEP CTLs, No Action is recommended for addressing the soil and groundwater at SWMU 18.

3.0 SWMUs 20 AND 21 - HOBBY SHOP DRAIN AND SCRAP STORAGE AREA

SWMUs 20 and 21, the Hobby Shop Drain and the Hobby Shop Scrap Storage Area, respectively, are located adjacent to Building 414 in the southeastern part of NAVSTA Mayport near the Mayport Turning Basin (see Figure 1-2).

SWMU 20 - Hobby Shop Drain

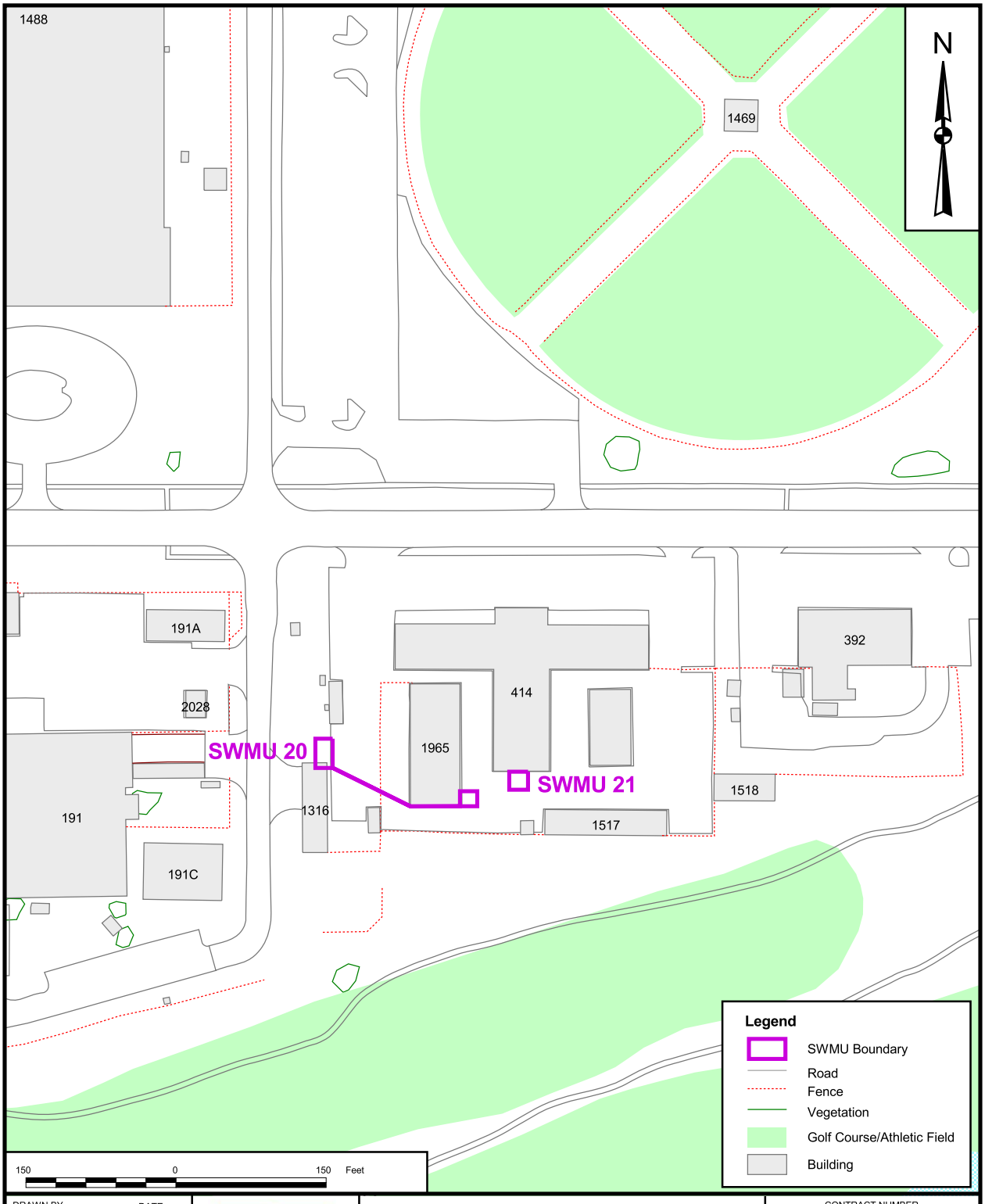
According to the RFA-VSI conducted by A. T. Kearney, Inc. in 1989, the Hobby Shop Drain was located at the southeast corner of Building 1965 (formerly Building 1277A) (Figure 3-1). The drain was located on the soil adjacent to a sloped concrete apron leading to the raised concrete floor of Building 1965. The drain inlet was covered with a screen that was connected to an underground pipe which in turn was connected to an outlet on the western side of Building 1965.

During the VSI, the soil in the area of the drain inlet and along the edge of the concrete apron was stained and oily. Stains were also noticed from the outlet of the drain pipe, across the parking lot, and towards a storm drainage ditch that runs parallel to Massey Avenue on the south side of the roadway. Dark oily sediments were also observed in the drainage ditch and an oily sheen was also noted at the point where the water in the drainage ditch entered a drain pipe.

The source of the dark staining and oil was not identified during VSI; however, it was anticipated that the possible sources could have been the material drained from inside the automobile maintenance and repair bays or runoff from the roadway and parking area to the east of Building 1965. The 1989 RFA-VSI recommended additional investigation to characterize and identify the extent of the releases to the environment.

SWMU 21 - Hobby Shop Scrap Storage Area

The RFA-VSI conducted by A. T. Kearney, Inc. in 1989 for the Hobby Shop Scrap Storage Area, described the facility as approximately 20 square feet located adjacent to the south side of the east wing of Building 414, and surrounded by fencing with an entrance gate on the south side. At that time, the area was underlain by old, pitted asphalt and there were no berms or containment structures. The facility contained scrap metal, engine parts, open gas cylinders and a Freon 22™ container, an automotive battery, old appliances, and other scrap metal items that were ultimately collected by the DRMO for resale. Several of the engine parts were observed to be oily, and the base of the area was observed to



DRAWN BY S. PAXTON	DATE 3/19/07	SITE LOCATION MAP HOBBY SHOP DRAIN/HOBBY SHOP SCRAP STORAGE SWMUs 20 AND 21 NAVAL STATION MAYPORT MAYPORT, FLORIDA	CONTRACT NUMBER CTO 0033
CHECKED BY K. WIMBLE	DATE 3/29/07		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED	NAVFAC		DRAWING NO. FIGURE 3 - 1 REV 0

P:\GIS\MAYPORT_NS\MAPDOCS\APR\SWMU18_20_21_52.APR SWMU 20 & 21 SITE LOCATION LAYOUT 3/29/07 SP

be heavily stained by dark oily materials. The age of the facility was not known, but it was assumed to have been in operation for many years since the Hobby Shop was reported to have been in operation since 1959. The 1989 RFA-VSI recommended additional investigation of SWMU 21 to determine the characteristics of materials released to the environment and the extent of the impacts from any hazardous constituents.

3.1 DESCRIPTION OF CURRENT CONDITIONS

The description of current conditions is based on descriptions and data collected by ABB-ES during a site visit conducted in May 1994. This information was taken from the Group III RFA-VSI Report (ABB-ES, 1997) and is summarized in the following sections; however, the Group III RFA-VSI Report and referenced documents should be reviewed for further details and in-depth analyses of the data presented herein. The information and analytical data from all of these sources were utilized to form an up-to-date understanding of the current conditions at SWMUs 20 and 21 from which COCs were identified and for which remedial actions were selected. A formal RFI was not conducted at either of these SWMUs.

In 1991, the Hobby Shop area underwent renovations, which included construction of a new Building 1965, installation of a new drain system (connected to an oil-water separator) to intercept discharge from the garage bays and surrounding parking lot, and new concrete pavement across the entire site. According to NAVSTA Mayport PWD personnel, soil was excavated and removed from the site during the construction work; however, the documentation for the soil excavation and removal was not available. On May 5, 1994, ABB-ES conducted a site visit at SWMUs 20 and 21 and reported that the conditions described during the 1989 RFA-VSI were no longer applicable. However, a small waste oil storage area was observed along the south edge of the parking lot area (near the west end of Building 1517). This facility consisted of a curbed containment area on concrete pavement with waste oil containers of unknown capacity sitting on stands. A valved drainpipe extended through the southern curb and drained to an adjacent grassy area. The drain was used to remove accumulated rainwater from within the curbed area. A small area (less than 1 square yard) of stained soil was observed at this location. During this time, the RFA-VSI field investigations were conducted as described below. A new scrap storage area was also observed during May 1994, located east of Building 414 near the eastern edge of the Hobby Shop site. No signs of a release or oily scrap materials were observed at this site.

3.1.1 RFA-VSI Field Investigation

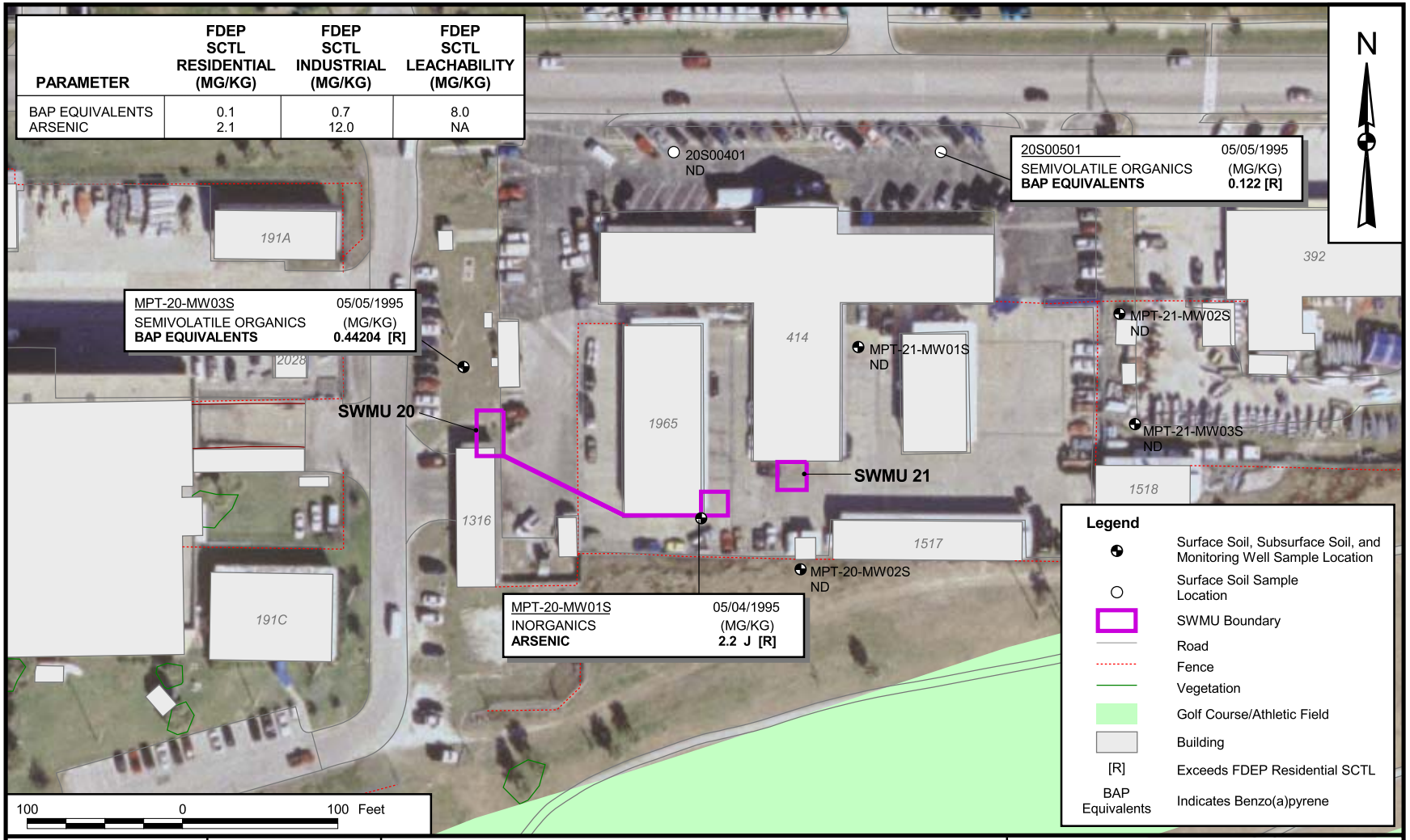
Limited confirmatory sampling was conducted by ABB-ES in May of 1995 at SWMUs 20 and 21 as part of the RFA-VSI. Field activities included the collection of eight surface and six subsurface soil samples and the installation and sampling of six shallow groundwater monitoring wells (Figure 3-2). No attempt was made at that time to characterize the horizontal and vertical extent of contaminants. Two surface soil samples (0 to 1 foot depth bgs) were collected in the ditch along the south side of Massey Avenue; this ditch was reported to have received runoff from potentially impacted ditches along the east and west sides of SWMUs 20 and 21. Surface and subsurface soil samples were also collected during the drilling of six monitoring wells at the following locations: well MPT-20-MW01S near the former drain at the southeast corner of Building 1965; well MPT-20-MW02S near the current waste oil storage area along the southern portion of SWMU 20; well MPT-20-MW03S located west of Building 1965 where the former drain pipe was observed to discharge and near the current location of the oil-water separator; well MPT-21-MW01S at the former scrap storage area; well MPT-21-MW02S located near the current scrap storage area located east of Building 414; and well MPT-21-MW03S in the parking lot east of Building 414 where drainage from the former scrap storage area may have caused adverse effects (see Figure 3-2).

Information regarding the investigation methods and sampling procedures are provided in the NAVSTA Mayport GIR (ABB-ES, 1995b) and in the NAVSTA Mayport RFI Work Plan (ABB-ES, 1991). The groundwater samples were collected using low-flow purging and sampling techniques. The soil and groundwater samples, and associated duplicates, were analyzed for VOCs, SVOCs, pesticides, polychlorinated biphenyls (PCBs), inorganics, cyanide (subsurface soil only), and water quality parameters (Table 3-1). Figure 3-2 depicts the locations of environmental samples collected during the RFA-VSI investigation.

3.1.1.1 RFA-VSI Evaluation

Surface Soil

Four VOCs, 12 SVOCs, 5 pesticides, and 12 inorganic analytes were detected in the surface soil samples. Of the constituents detected, only the benzo(a)pyrene equivalents and arsenic were detected at concentrations that exceeded the FDEP SCTL residential exposure; none of the other constituents exceeded the cleanup criteria for residential direct exposure.



DRAWN BY S. PAXTON	DATE 3/16/07	SURFACE SOIL EXCEEDANCE MAP SWMUS 20 AND 21 NAVAL STATION MAYPORT MAYPORT, FLORIDA	CONTRACT NUMBER CTO 0033
CHECKED BY K. WIMBLE	DATE 3/29/07		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 3 - 2 / REV 0

P:\GIS\MAYPORT_NS\MAPDOCS\APR\SWMU18_20_21_52.APR SWMU 20 & 21 SURFACE SOIL EXCEEDANCE MAP 3/29/07 SP

TABLE 3-1

**SWMUs 20 AND 21, SOIL AND GROUNDWATER SAMPLE IDENTIFICATION
NAVSTA MAYPORT, FLORIDA**

Sample Location	Sample ID	Sample Date	Volatile Organics	Semivolatile Organics	Inorganics	Miscellaneous	Pesticides	TPH
SURFACE SOIL								
MPT-20-MW01S	20S00101	5/4/1995	✔	✔	✔		✔	
MPT-20-MW02S	20S00201	5/5/1995	✔	✔	✔		✔	
MPT-20-MW03S	20S00301	5/5/1995	✔	✔	✔		✔	
MPT-20-SS04	20S00401	5/5/1995	✔	✔	✔		✔	
MPT-20-SS05	20S00501	5/5/1995	✔	✔	✔		✔	
MPT-21-MW01S	21S00101	5/4/1995	✔	✔	✔		✔	
MPT-21-MW02S	21S00201	5/4/1995	✔	✔	✔		✔	
MPT-21-MW03S	21S00301	5/4/1995	✔	✔	✔		✔	
SUBSURFACE SOIL								
MPT-20-MW01S	20B00105	5/4/1995	✔	✔	✔		✔	
MPT-20-MW02S	20B00205	5/5/1995	✔	✔	✔		✔	
MPT-20-MW03S	20B00305	5/5/1995	✔	✔	✔		✔	
MPT-21-MW01S	21B00104	5/4/1995	✔	✔	✔		✔	
MPT-21-MW02S	21B00203	5/4/1995	✔	✔	✔		✔	
MPT-21-MW03S	21B00303	5/4/1995	✔	✔	✔		✔	
GROUNDWATER								
MPT-20-MW01S	20G00101	6/1/1995	✔	✔	✔	✔	✔	✔
MPT-20-MW02S	20G00201	6/3/1995	✔	✔	✔	✔	✔	✔
MPT-20-MW03S	20G00301	6/1/1995	✔	✔	✔	✔	✔	✔
MPT-21-MW01S	21G00101	6/2/1995	✔	✔	✔	✔	✔	✔
MPT-21-MW02S	21G00201	6/2/1995	✔	✔	✔	✔	✔	✔
MPT-21-MW03S	21G00301	6/2/1995	✔	✔	✔	✔	✔	✔

Subsurface Soil

Two VOCs, one SVOC, one pesticide, and eight inorganic analytes were detected in the subsurface soil samples. Of the constituents detected, none were detected at concentrations that exceeded the FDEP soil cleanup goals for residential direct exposure.

Groundwater

Organic compounds detected in groundwater samples consisted of one VOC (acetone) and one SVOC [bis(2-ethylhexyl)phthalate]. The frequency of detection was two in six and one in six samples, respectively. Neither of these organic compounds exceeded the benchmark screening values that included the BSV, the USEPA Region III Risk-based Concentrations (RBCs) and the Florida groundwater guidance concentrations.

Ten inorganic analytes were detected in groundwater samples collected during the RFA-VSI. Two of the analytes, arsenic and manganese, were detected in groundwater samples at concentrations greater than the RBC benchmark values used in the RFA-VSI Report. One analyte, manganese, exceeded the Florida guidance benchmark values used in the RFA-VSI Report.

3.1.1.2 RFA-VSI Preliminary Assessment of Human Health Impacts

A preliminary risk characterization for SWMUs 20 and 21 was conducted for potential exposures to current and future land-use scenarios. The soil and groundwater samples used in the assessment were collected in May 1995 during the RFA-VSI field investigations described above.

Soil

The results from eight surface and six subsurface soil samples were evaluated for the preliminary Human Health Risk Assessment that was presented in the RFA-VSI Report (ABB-ES, 1997). The soil concentrations were compared to the aggregate residential exposure (child and adult) for USEPA Region III RBCs and FDEP residential cleanup goals. The assumptions used to calculate these benchmark values were identified as possibly being unrepresentative of the site which could lead to overstating the specific exposure at the site. Three of the eight surface soil samples contained benzo(a)pyrene equivalents concentrations that exceeded the USEPA RBCs of 88 µg/kg (3.2×10^{-6} cancer risk ELCR) and one exceeded the FDEP residential cleanup goal of 100 µg/kg (2.8×10^{-6} cancer risk ELCR). For arsenic, six of the eight surface soil samples contained concentrations that exceeded the USEPA RBC of 0.37 mg/kg (5.9×10^{-6} cancer risk ELCR) and one exceeded the FDEP residential cleanup goal of

2.1 mg/kg (2.7×10^{-6} cancer risk ELCR). The preliminary assessment suggested that hypothetical residential exposures that might occur at the site are likely to be within the risk management range of 1×10^{-4} to 1×10^{-6} that is acceptable to the USEPA. Concentrations in subsurface soil did not exceed any of the risk benchmarks.

Groundwater

None of the organic analytes detected in groundwater samples exceeded any of the benchmark values used in the RFA-VSI Report. However, two inorganic analytes (arsenic and manganese) exceeded benchmark concentrations. Arsenic was detected at a single well exceeded the USEPA Region III RBC benchmark of 0.038 µg/L, but was less than the BSV of 1,728 µg/L and less than the FDEP guidance concentration of 10 µg/L. Manganese exceeded the USEPA Region III RBC benchmark of 18 µg/L at five of the six well locations, and exceeded the FDEP guidance concentration of 50 µg/L at four of the six well locations. However, all concentrations were less than the BSV of 210 µg/L.

The RFA-VSI Report concluded that because all detected concentrations of inorganic analytes in groundwater were less than the BSVs, it was likely that the concentrations detected were related to natural and/or anthropogenic conditions and not a release from the SWMUs.

3.1.1.3 RFA-VSI Assessment of Ecological Impacts

An assessment of ecological impacts was not performed for SWMUs 20 and 21 in the RFA-VSI Report.

3.1.1.4 RFA-VSI Recommendations

The RFA-VSI Report concluded that conditions observed in 1989 were no longer present at the site in 1994 and 1995. Furthermore, it was recognized that soil removal actions performed during site renovation conducted in 1991 may have altered soil impacts; however, new concrete pavement across the site prevented visual observation of the impacted soil identified in 1989. Based on the evaluation of the surface and subsurface soil sample analytical results and comparison to residential and industrial risk benchmarks, additional investigation of soil was deemed unwarranted at that time.

Because all inorganic analytes detected in groundwater at SWMUs 20 and 21 were less than their respective BSVs, the RFA-VSI Report concluded that additional investigation of groundwater was not warranted.

Based on future use of the SWMUs, the RFA-VSI Report recommended no further investigation at that time. However, the report recognized that the recommendation should be reevaluated if use of the site changes in the future.

3.1.2 Post-Draft CMS Evaluation

A SWMU boundary evaluation was performed at SWMUS 20 and 21 in response to a November 2004 Partnering Team Meeting. This evaluation concluded that SWMUs 20 and 21 were not the source of the contamination in the drainage ditch and the road and the parking lot were the most likely sources.

LUCs, which were approved as an additional IM and implemented at SWMUs 20 and 21, restrict current and future land use to other than residential. By a separate MOA, effective August 31, 1998, with the USEPA and FDEP, the Navy agreed with the USEPA and FDEP to implement facility-wide periodic site inspections, designed to ensure the maintenance by Navy personnel of any site-specific LUCs deemed necessary for future protection of human health and the environment.

3.1.3 CMS Data Set

The results of environmental samples collected during the RFA-VSI investigation conducted in 1995 were used to evaluate COPCs and to select COCs in this CMS. Table 3-1 provides a list of all samples for each medium that was used in the CMS. Tables listing the complete analytical results of all sampling events per medium are included in Appendix A.

3.2 CHEMICALS OF CONCERN – HUMAN HEALTH

The determination of COCs for surface and subsurface soil at SWMUs 20 and 21 involved a three-step process as described in Section 1.4.3:

- Determination of COIs
- Identification of the COPCs
- Selection of COCs

COIs and COPCs were determined in the RFI or the RFA Reports; however, since the RFI and RFA Reports were issued, new soil CTLs have been promulgated. The COIs and COPCs for SWMUs 20 and 21 are independently evaluated in the following sections to select the COCs to be carried forward in the CMS remedy selection process.

3.3 CONTAMINANTS OF INTEREST – HUMAN HEALTH

The COIs included any contaminant detected at least once in validated analytical results for environmental samples in any medium collected at SWMUs 20 and 21. The locations of soil sampling locations at SWMUs 20 and 21 are shown in Figure 3-2. The revised list of COIs for soil only at SWMUs 20 and 21 is provided in Table 3-2.

3.3.1 Contaminants of Potential Concern – Human Health

The maximum concentration of the COIs for each environmental medium was compared to the Florida CTLs (Chapter 62-777, F.A.C.) for surface soil, subsurface soil, and groundwater, as appropriate. Section 1.4.3.2 provides a detailed description of the process for the identification of COPCs.

Calcium, magnesium, potassium, iron, and sodium are considered to be essential human nutrients and were not considered in the COPC selection process. In addition, several water quality parameters that were measured during the groundwater analyses were not evaluated, including alkalinity, hardness, sulfide, TDS, TKN, TOC, and total phosphorus.

3.3.1.1 Selection of Surface Soil COPCs – Human Health

The COPC screening evaluation for soil involves an evaluation of COIs for direct exposure and leaching to groundwater. Because less than 20 surface soil samples were collected at SWMUs 20 and 21; none of the COIs were eliminated based on frequency of detection. As shown in Table 3-3, the direct exposure COPC screening process for surface soil identified two contaminants, arsenic and the benzo(a)pyrene equivalents, that exceeded the SCTLs for residential direct exposure. Therefore, these contaminants were selected as COPCs for surface soil.

Because surface water (i.e., St. Johns River) is not located within 300 feet of SWMUs 20 and 21, leaching of soil to marine surface water was not evaluated. The leaching to groundwater evaluation involves a direct comparison to the leaching to groundwater CTLs. Table 3-4 shows the leaching to groundwater evaluation. The leaching to groundwater evaluation determined that no contaminants have the potential to leach from the soil and impact groundwater.

3.3.1.2 Selection of Subsurface Soil COPCs – Human Health

The COPC screening evaluation for subsurface soil involves an evaluation of COIs for direct exposure and leaching to groundwater.

TABLE 3-2

SWMUs 20 AND 21, CONTAMINANTS OF INTEREST
NAVSTA MAYPORT, FLORIDA

List of COIs	Surface Soil	Subsurface Soil	Groundwater
Volatile Organics			
Acetone			X
2-Butanone		X	
Carbon Disulfide	X		
Ethylbenzene	X		
Toluene	X		
Xylenes, Total	X	X	
Semivolatile Organics			
Benzo(a)anthracene	X		
Benzo(a)pyrene	X		
Benzo(b)fluoranthene	X		
Benzo(g,h,i)perylene	X		
Benzo(k)fluoranthene	X		
Bis(2-Ethylhexyl)phthalate			X
Butyl Benzyl Phthalate	X	X	
Chrysene	X		
Dibenzo(a,h)anthracene	X		
Fluoranthene	X		
Indeno(1,2,3-cd)pyrene	X		
Phenanthrene	X		
Pyrene	X		
Pesticides/PCBs			
Chlordane	X	X	
4,4'-DDD	X		
4,4'-DDE	X		
4,4'-DDT	X		
Endrin Ketone	X		
Inorganics			
Arsenic	X	X	X
Barium	X	X	X
Beryllium	X	X	
Cadmium	X		
Chromium	X	X	
Cobalt	X		
Copper	X		X
Cyanide		X	
Lead	X	X	
Manganese			X
Nickel	X		X
Selenium	X		X
Vanadium	X	X	X
Zinc	X	X	

TABLE 3-3

SWMUs 20 AND 21, SURFACE SOIL COPCs - RESIDENTIAL DIRECT EXPOSURE
NAVSTA MAYPORT, FLORIDA
PAGE 1 OF 2

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Residential (mg/kg)	Target Organ/System or Effect	Exceeds Residential SCTL[2]
Volatile Organics						
Carbon Disulfide	75-15-0	3/8	0.011	270	Developmental -Neurological	No
Ethylbenzene	100-41-4	1/8	0.001	1,500	Developmental -Kidney -Liver	No
Toluene	108-88-3	1/8	0.002	7,500	Kidney -Liver -Neurological	No
Xylenes, Total	1330-20-7	6/8	0.018	130	Neurological	No
Semivolatile Organics						
Benzo(a)anthracene	56-55-3	2/8	0.24 [5]	0.1	Carcinogen	Yes
Benzo(a)pyrene	50-32-8	2/8	0.28 [5]	0.1	Carcinogen	Yes
Benzo(b)fluoranthene	205-99-2	2/8	0.38 [5]	0.1	Carcinogen	Yes
Benzo(g,h,i)perylene	191-24-2	2/8	0.17	2,500	Neurological	No
Benzo(k)fluoranthene	207-08-9	2/8	0.35 [5]	0.1	Carcinogen	Yes
Butyl Benzyl Phthalate	85-68-7	2/8	0.32	17.000	Liver	No
Chrysene	218-01-9	3/8	0.34[5]	0.1	Carcinogen	Yes
Dibenzo(a,h)anthracene	53-70-3	1/8	0.08[5]	0.1	Carcinogen	Yes
Fluoranthene	206-44-0	3/8	0.56	3,200	Blood -Kidney -Liver	No
Indeno(1,2,3-cd)pyrene	193-39-5	1/8	0.18 [5]	0.1	Carcinogen	Yes
Phenanthrene	85-01-8	1/8	0.16	2,200	Kidney	No
Pyrene	129-00-0	2/8	0.34	2,400	Kidney	No
Pesticides/PCBs						
4,4'-DDD	72-54-8	1/8	0.0018	4.2	Carcinogen	No
4,4'-DDE	72-55-9	2/8	0.0055	2.9	Carcinogen	No
4,4'-DDT	50-29-3	1/8	0.0042	2.9	Carcinogen -Liver	No
Chlordane	57-74-9	2/8	0.24	2.8	Carcinogen -Liver	No
Endrin Ketone [4]	53494-70-5	1/8	0.0024	25	Liver	No
Inorganics						
Arsenic	7440-38-2	8/8	2.2	2.1	Carcinogen -Cardiovascular -Skin	Yes
Barium	7440-39-3	8/8	25.7	120	Cardiovascular	No
Beryllium	7440-41-7	6/8	0.11	120	Carcinogen -Gastrointestinal -Respiratory	No
Cadmium	7440-43-9	4/8	1.6	8.2	Carcinogen -Kidney	No
Chromium[3]	7440-47-3	8/8	17.3	210	Carcinogen -Respiratory	No

TABLE 3-3

SWMUS 20 AND 21, SURFACE SOIL COPCs - RESIDENTIAL DIRECT EXPOSURE
NAVSTA MAYPORT, FLORIDA
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Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Residential[1] (mg/kg)	Target Organ/System or Effect	Exceeds Residential SCTLs[2]
Inorganics						
Cobalt	7440-48-4	1/8	0.85	1,700	Cardiovascular -Immunological -Neurological-Reproductive	No
Copper	7440-50-8	3/8	40.9	150	Gastrointestinal	No
Lead	7439-92-1	7/8	240	400	Neurological	Yes
Nickel	7440-02-0	4/8	9.6	340	Body Weight	No
Selenium	7782-49-2	2/8	0.15	440	Hair Loss -Neurological -Skin	No
Vanadium	7440-62-2	8/8	8.9	67	Hair Loss	No
Zinc	7440-66-6	8/8	161	26,000	Blood	No

Notes:
1 - SCTL - Soil Cleanup Target Level for Residential - Chapter 62-777 F.A.C., April 2005.
2 - Comparison of the Residential SCTL with the Maximum Concentration.
3 - SCTL Residential screening values used for Chromium (Hexavalent).
4 - SCTL Residential screening values used for Endrin.
5 - Refer to the table below for the Total Benzo(a)pyrene Equivalents calculation which shows that the equivalent concentration exceeded the residential direct exposure SCTL of 0.1 mg/kg.

Contaminant	Concentration (mg/kg	Toxic Equivalency Factor	Benzo(a)pyrene Equivalents
Benzo(a)anthracene	0.24	0.1	0.024
Benzo(a)pyrene	0.28	1.0	0.28
Benzo(b)fluoranthene	0.38	0.1	0.038
Benzo(k)fluoranthene	0.35	0.1	0.035
Chrysene	0.34	0.001	0.00034
Dibenzo(a,h)anthracene	0.08	1.0	0.08
Indeno(1,2,3-cd)pyrene	0.18	0.1	0.018

Direct Exposure Residential SCTL = 0.1 mg/kg; Total Benzo(a)pyrene Equivalents = **0.47**

TABLE 3-4

SWMUs 20 AND 21, SURFACE SOIL COPCs - LEACHING
NAVSTA MAYPORT, FLORIDA
PAGE 1 OF 2

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Leaching to Groundwater [1] (mg/kg)	SCTL Leaching to Surface Water [2] (mg/kg)	Leaching Target Criteria [3] (mg/kg)	COPC Based on Leaching[4] (Yes/No)
Volatile Organics							
Carbon Disulfide	75-15-0	3/8	0.011	5.6	NA	5.6	No
Ethylbenzene	100-41-4	1/8	0.001	0.6	NA	0.6	No
Toluene	108-88-3	1/8	0.002	0.5	NA	0.5	No
Xylenes, Total	1330-20-7	6/8	0.018	0.2	NA	0.2	No
Semivolatile Organics							
Benzo(a)anthracene	56-55-3	2/8	0.24	0.8	NA	0.8	No
Benzo(a)pyrene	50-32-8	2/8	0.28	8	NA	8	No
Benzo(b)fluoranthene	205-99-2	2/8	0.38	2.4	NA	2.4	No
Benzo(g,h,i)perylene	191-24-2	2/8	0.17	32,000	NA	32,000	No
Benzo(k)fluoranthene	207-08-9	2/8	0.35	24	NA	24	No
Butyl Benzyl Phthalate	85-68-7	2/8	0.32	310	NA	310	No
Chrysene	218-01-9	3/8	0.34	77	NA	77	No
Dibenzo(a,h)anthracene	53-70-3	1/8	0.08	0.7	NA	0.7	No
Fluoranthene	206-44-0	3/8	0.56	1,200	NA	1,200	No
Indeno(1,2,3-cd)pyrene	193-39-5	1/8	0.18	6.6	NA	6.6	No
Phenanthrene	85-01-8	1/8	0.16	250	NA	250	No
Pyrene	129-00-0	2/8	0.34	880	NA	880	No
Pesticides/PCBs							
4,4'-DDD	72-54-8	1/8	0.0018	5.8	NA	5.8	No
4,4'-DDE	72-55-9	2/8	0.0055	18	NA	18	No
4,4'-DDT	50-29-3	1/8	0.0042	11	NA	11	No
Chlordane	57-74-9	2/8	0.24	9.6	NA	9.6	No
Endrin Ketone[6]	53494-70-5	1/8	0.0024	1	NA	1	No
Inorganics							
Arsenic	7440-38-2	8/8	2.2	29 [7]	NA	29 [7]	No
Barium	7440-39-3	8/8	25.7	1,600	NA	1,600	No
Beryllium	7440-41-7	6/8	0.11	63	NA	63	No
Cadmium	7440-43-9	4/8	1.6	7.5	NA	7.5	No
Chromium[5]	7440-47-3	8/8	17.3	38	NA	38	No

TABLE 3-4

SWMUS 20 AND 21, SURFACE SOIL COPCs - LEACHING
NAVSTA MAYPORT, FLORIDA
PAGE 2 OF 2

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Leaching to Groundwater [1] (mg/kg)	SCTL Leaching to Surface Water [2] (mg/kg)	Leaching Target Criteria [3] (mg/kg)	COPC Based on Leaching [4] (Yes/No)
Inorganics							
Cobalt	7440-48-4	1/8	0.85	No Criteria	NA	No Criteria	No
Copper	7440-50-8	3/8	40.9	No Criteria	NA	No Criteria	No
Lead	7439-92-1	7/8	240	No Criteria	NA	No Criteria	No
Nickel	7440-02-0	4/8	9.6	130	NA	130	No
Selenium	7782-49-2	2/8	0.15	5.2	NA	5.2	No
Vanadium	7440-62-2	8/8	8.9	980	NA	980	No
Zinc	7440-66-6	8/8	161	6,000 [7]	NA	6,000 [7]	No

Notes:
1 - SCTL - Soil Cleanup Target Level for Soil leaching to groundwater - Chapter 62-777 F.A.C., April 2005.
2 - SCTL - Soil Cleanup Target Level for Soil leaching to surface water - Chapter 62-777 F.A.C., April 2005.
3 - Minimum SCTL based to soil leaching to groundwater and soil leaching to surface water (if applicable).
4 - A COI is selected as a COPC if the maximum concentration of that chemical exceeds the leaching target criteria.
5 - SCTL screening value used for Chromium (Total).
6 - SCTL screening value used for Endrin.
7 - SCTL - Soil Cleanup Target Level for Residential - Chapter 62-777 F.A.C., May 1999 because no value provided in April 2005 tables

Less than 20 subsurface soil samples were collected at SWMUs 20 and 21; therefore, none of the COIs were eliminated based on frequency of detection. The direct exposure COPC screening process for subsurface soil is shown in Table 3-5 and identified no contaminants that exceeded the SCTLs for residential direct exposure.

Because surface water (i.e., St. Johns River) is located more than 300 feet from SWMUs 20 and 21, leaching of soil to marine surface water was not evaluated. The leaching to groundwater evaluation involves a direct comparison to the leaching to groundwater CTLs. Table 3-6 shows the leaching to groundwater evaluation. The leaching to groundwater evaluation determined that no contaminants have the potential to leach from the soil and impact groundwater/surface water. Therefore, no contaminants were selected as a COPC for subsurface soil.

3.3.1.3 Selection of Groundwater COPCs – Human Health

The COPC screening process is performed by comparing the maximum groundwater concentrations directly to the GCTLs to determine COPCs. Because SWMUs are located more than 300 feet away from the nearest surface water body, the discharge of groundwater into surface water was not evaluated as a pathway of concern. The COPC screening process identified one contaminant, manganese, which exceeded the GCTLs as shown in Table 3-7.

3.3.2 Contaminants of Concern – Human Health

The representative concentration of the COPCs for each environmental medium was compared to the state of Florida CTLs (Chapter 62-777, F.A.C.) for surface soil, subsurface soil, and groundwater, as appropriate. Section 1.4.3.3 provides a detailed description of the process for the identification of COCs.

3.3.2.1 Selection of Surface Soil COCs – Human Health

The COPC screening evaluation for subsurface soil involves an evaluation of COIs for direct exposure and leaching to groundwater. Less than 20 surface soil samples were collected at SWMUs 20 and 21. Therefore, none of the COIs were eliminated based on frequency of detection. The direct exposure COPC screening process in Table 3-8 for surface soil identified two contaminants, benzo(a)pyrene equivalents and arsenic, that exceeded the SCTLs for residential direct exposure (target criteria).

TABLE 3-5

SWMUs 20 AND 21, SUBSURFACE SOIL COPCs - RESIDENTIAL DIRECT EXPOSURE
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Residential[1] (mg/kg)	Target Organ/System or Effect	Exceeds Residential SCTL[2]
Volatile Organics						
2-Butanone	78-93-3	1/6	0.004	17	Developmental	No
Xylenes, Total	1330-20-7	4/6	0.003	130	Neurological	No
Semivolatile Organics						
Butyl Benzyl Phthalate	85-68-7	1/6	0.086	17,000	Liver	No
Pesticides/PCBs						
Chlordane	57-74-9	1/6	0.031	2.8	Carcinogen –Liver	No
Inorganics						
Arsenic	7440-38-2	6/6	0.77	2.1	Carcinogen -Cardiovascular –Skin	No
Barium	7440-39-3	6/6	4.6	120	Cardiovascular	No
Beryllium	7440-41-7	1/6	0.11	120	Carcinogen -Gastrointestinal -Respiratory	No
Chromium[3]	7440-47-3	6/6	1.8	210	Carcinogen –Respiratory	No
Cyanide	57-12-5	1/6	0.14	34	Neurological –Thyroid	No
Lead	7439-92-1	5/6	16.4	400	Neurological	No
Vanadium	7440-62-2	6/6	2.8	67	Hair Loss	No
Zinc	7440-66-6	4/6	13.2	26,000	Blood	No

Notes:
1 - SCTL - Soil Cleanup Target Level for Residential - Chapter 62-777 F.A.C., April 2005.
2 - Comparison of the Residential SCTL with the Maximum Concentration.
3 - SCTL screening value used for Chromium (Hexavalent).

TABLE 3-6

SWMUs 20 AND 21, SUBSURFACE SOIL COPCs - LEACHING
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Leaching to Groundwater [1] (mg/kg)	SCTL Leaching to Surface Water [2] (mg/kg)	Leaching Target Criteria [3] (mg/kg)	COPC Based on Leaching[4] (Yes/No)
Volatile Organics							
2-Butanone	78-93-3	1/6	0.004	17	NA	17	No
Xylenes, Total	1330-20-7	4/6	0.003	0.2	NA	0.2	No
Semivolatile Organics							
Butyl Benzyl Phthalate	85-68-7	1/6	0.086	310	NA	310	No
Pesticides/PCBs							
Chlordane	57-74-9	1/6	0.031	9.6	NA	9.6	No
Inorganics							
Arsenic	7440-38-2	6/6	0.77	29 [6]	NA	29 [6]	No
Barium	7440-39-3	6/6	4.6	1,600	NA	1,600	No
Beryllium	7440-41-7	1/6	0.11	63	NA	63	No
Chromium [5]	7440-47-3	6/6	1.8	38	NA	38	No
Cyanide	57-12-5	1/6	0.14	0.8	NA	0.8	No
Lead	7439-92-1	5/6	16.4	No Criteria	NA	No Criteria	No
Vanadium	7440-62-2	6/6	2.8	980	NA	980	No
Zinc	7440-66-6	4/6	13.2	6,000 [6]	NA	6,000 [6]	No

Notes:
1 - SCTL – Soil Cleanup Target Level for Soil leaching to groundwater – Chapter 62-777 F.A.C., April 2005.
2 - SCTL – Soil Cleanup Target Level for Soil leaching to surface water – Chapter 62-777 F.A.C., April 2005.
3 - Minimum SCTL based to soil leaching to groundwater and soil leaching to surface water (if applicable).
4 - A COI is selected as a COPC if the maximum concentration of that chemical exceeds the leaching target criteria.
5 - SCTL screening value used for Chromium (Total).
6 - SCTL - Soil Cleanup Target Level for Residential - Chapter 62-777 F.A.C., May 1999 because no value provided in April 2005 tables

TABLE 3-7

SWMUs 20 AND 21, GROUNDWATER COPCs – GCTLs
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (µg/L)	GCTL[1] (µg/L)	Target Criteria[2] (P/S, HH)	Exceeds GCTL[3]
Volatile Organics						
Semivolatile Organics						
Bis(2-Ethylhexyl)phthalate	117-81-7	1/6	2	6	P/S	No
Inorganics						
Arsenic	7440-38-2	1/6	5.5	10	P/S	No
Barium	7440-39-3	6/6	29.8	2,000	P/S	No
Manganese	7439-96-5	6/6	140	50	P/S	Yes
Nickel	7440-02-0	1/6	6.4	100	P/S	No
Selenium	7782-49-2	1/6	0.91	50	P/S	No

Notes:
1 - GCTL - Groundwater Cleanup Target Levels - Chapter 62-777 F.A.C., April 2005.
2 - P/S - Primary Standard/Secondary Standard - F.A.C. 62-550 and Chapter 62-777, Table 1, dated April 2005. HH - Human Health Criteria.
3 - Comparison of the GCTL with the Maximum Concentration.

TABLE 3-8

SWMUs 20 AND 21, SELECTION OF SURFACE SOIL COCs
NAVSTA MAYPORT, FLORIDA

COPC	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	Representative Concentration[1] (mg/kg)	Residential SCTL[2] (mg/kg)	Target Criteria[3]	Background Concentration[4] (mg/kg)	Target Organ/System or Effect	Site Specific Cleanup Objective – GCTL (mg/kg)	COCs Based on GCTLs
Semivolatiles										
Benzo(a)pyrene Equivalents[5]	50-32-8	2/8	0.28	NA	0.1	P/S	NA	Carcinogen	0.1	No[6]
Inorganics										
Arsenic	7440-38-2	8/8	2.2	1.12	2.1	P/S	NA	Carcinogen – Cardiovascular-Skin	2.2	No

Notes:
1 - The representative concentration is the 95% UCL (where appropriate) or the maximum detected concentration, whichever is less.
2 - GCTL - Groundwater Cleanup Target Levels - Chapter 62-777 F.A.C. April 2005.
3 - P/S - Primary Standard/Secondary Standard - F.A.C. 62-550 and Chapter 62-777, Table 1, dated April 2005.
4 - Mayport background screening value (TtNUS, 2000).
5 - Refer to the table below for the Total Benzo(a)pyrene Equivalent calculation which shows that the equivalent concentration exceeded the residential direct exposure SCTL of 0.1.
6 - Please see section 3.3.21 for an explanation.

Contaminant	Concentration (mg/kg)	Toxic Equivalency Factor	Benzo(a)pyrene Equivalents
Benzo(a)anthracene	0.24	0.1	0.024
Benzo(a)pyrene	0.28	1.0	0.28
Benzo(b)fluoranthene	0.38	0.1	0.038
Benzo(k)fluoranthene	0.35	0.1	0.035
Chrysene	0.34	0.001	0.00034
Dibenzo(a,h)anthracene	0.08	1.0	0.08
Indeno(1,2,3-cd)pyrene	0.18	0.1	0.018

Direct Exposure Residential SCTL = 0.1 mg/kg; Total Benzo(a)pyrene Equivalents = **0.47**

The exceedances of benzo(a)pyrene equivalents in surface soil at SWMUs 20 and 21 were detected in asphalt-covered parking lots areas. Based upon site inspections and aerial photographs, the FDEP regulator concurred that the benzo(a)pyrene equivalents were anthropogenic, and not resulting from a release at the SWMUs. Therefore, benzo(a)pyrene equivalents are not considered COCs in the surface soil at SWMUs 20 and 21.

A 95 percent UCL calculation was used to determine a representative concentration for arsenic detected the soils at SWMUs 20 and 21 (see Appendix B). The 95 percent UCL concentration was determined to be 1.12 mg/kg, which was less than the FDEP Residential Direct Exposure SCTLs in soil. As shown in Table 3-8, the representative concentration was less than the maximum concentration detected at SWMUs 20 and 21. Therefore, arsenic was not selected to be a COC. Based on these determinations, no COCs were identified in the surface soil at SWMUs 20 and 21.

3.3.2.2 Selection of Subsurface Soil COCs – Human Health

There were no subsurface soil COPCs; therefore, a subsurface soil COC evaluation is not required and there are no subsurface soil COCs for SWMUs 20 and 21.

3.3.2.3 Selection of Groundwater COCs – Human Health

One contaminant shown in Table 3-7 was identified as a COPC in groundwater at SWMUs 20 and 21. Table 3-9 shows that manganese did not exceed the site-specific GCTL and is not a COC for SWMUs 20 and 21. Therefore, manganese is not considered a COC for SWMUs 20 and 21 and there are no groundwater COCs for SWMUs 20 and 21.

3.4 CONTAMINANTS OF CONCERN IN SOIL – ECOLOGICAL

Based on the RFA-VSI findings, no risk to terrestrial wildlife populations was determined to be likely due to exposure to surface soil. No pathway for ecological exposure to subsurface soil was identified in the RFA-VSI. Additionally, the RFA-VSI found groundwater discharge into St. Johns River did not pose a risk to aquatic receptors including fish, amphibians, plants, and invertebrates. This is based on the assumption that the groundwater concentration at the surface water discharge point will be lower than the concentration measured in the well, due to advection, dispersion, mixing, and retardation.

TABLE 3-9

SWMUs 20 AND 21, SELECTION OF GROUNDWATER COCs
NAVSTA MAYPORT, FLORIDA

COPC	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (µg/L)	Representative Concentration [1] (µg/L)	GCTL [2] (µg/L)	Target Criteria [3]	Background Concentration [4] (µg/L)	Target Organ/System or Effect	Site Specific Cleanup Objective – GCTL (µg/L)	COCs Based on GCTLs
Inorganics										
Manganese	7439-96-5	6/6	140	140	50	P/S	141	Neurological	141	No

Notes:
1 - The representative concentration is the 95% UCL (where appropriate) or the maximum detected concentration, whichever is less.
2 - GCTL - Groundwater Cleanup Target Levels - Chapter 62-777 F.A.C. April 2005.
3 - P/S - Primary Standard/Secondary Standard - F.A.C. 62-550 and Chapter 62-777, Table 1, dated April 2005.
4 - Mayport background screening value (TtNUS, 2000).

3.4.1 COC Summary

No COCs for surface soil, subsurface soil, or groundwater were identified for SWMUs 20 and 21.

3.5 VOLUMES OF CONTAMINATED MEDIA

No COCs were identified for surface soil, subsurface soil, or groundwater at SWMUs 20 and 21; therefore, contamination maps were not prepared.

3.6 IDENTIFICATION AND SCREENING OF CORRECTIVE MEASURES TECHNOLOGIES

Corrective measure technologies are identified and screened to address the CAOs identified for SWMUs 20 and 21 (see Section 1.4.1). Soil or groundwater technologies are not required because there are no soil or groundwater COCs at SWMUs 20 and 21.

3.7 RECOMMENDATION FOR A FINAL CORRECTIVE MEASURE

No Action is recommended for addressing the soil and groundwater at SWMUs 20 and 21.

4.0 SWMU 52 - PWD SERVICE STATION STORAGE AREA

SWMU 52, the PWD Service Station Storage Area, is located at Building 25 in the central part of NAVSTA Mayport near the Mayport Turning Basin (Figure 4-1). The PWD Service Station Storage Area is located on and adjacent to a concrete slab that is 30 feet long and 20 feet wide and is situated along the northeast wall of Building 25. There is a drain in the concrete slab that discharges to a nearby oil-water separator.

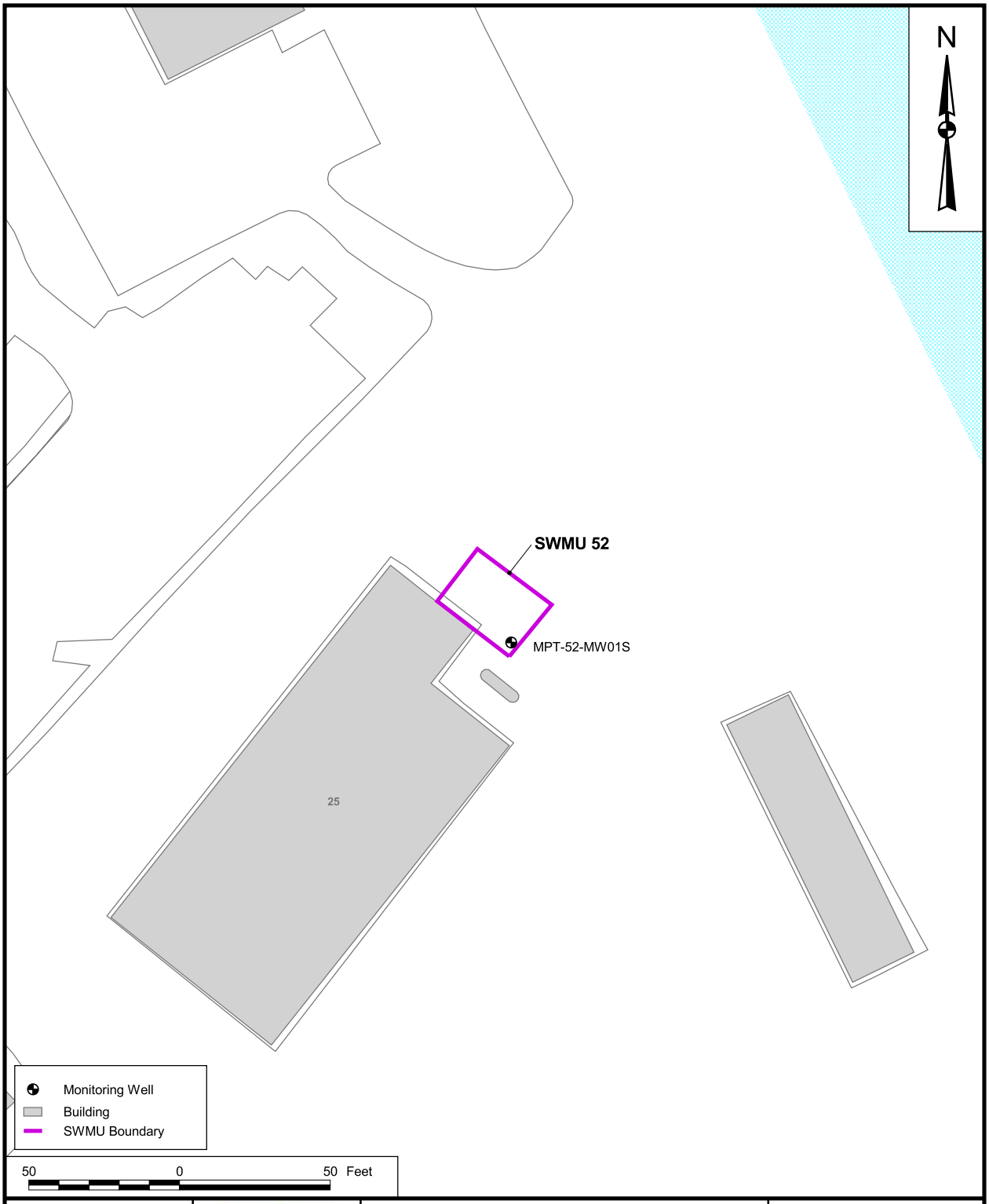
The RFA Report (A.T. Kearney, 1989) identified items of potential concern located in the area of the concrete pad at the rear of Building 25. These items included 55-gallon drums, a bowser, and a drain leading to an oil-water separator.

At the time of the VSI in 1989, there were at least four 55-gallon drums stored on the concrete slab. Facility personnel indicated that one drum contained window washing solution, one contained coolant, and one contained waste oil. Another drum had an open bung and appeared to be one quarter full of an oily substance. A waste oil bowser of approximately 300-gallon capacity was located on the asphalt just off the northeast edge of the concrete slab. The bowser was reported to be emptied periodically and the oil taken offsite to be recycled. Dark stains were noted on the asphalt beneath the waste oil bowser.

Additional investigation appeared warranted in 1989 for SWMU 52 based on the highly permeable soil in the area, the proximity to Mayport Turning Basin, and the evidence of a release (staining of the asphalt) noted during the VSI. It was suggested in the RFA Report that soil samples should be collected in the area of the stained asphalt and should be analyzed for VOCs, SVOCs, and metals to determine the nature and extent of the potential release of hazardous constituents.

4.1 DESCRIPTION OF CURRENT CONDITIONS

The description of current conditions is based on descriptions and data collected by ABB-ES during a site visit conducted in May-June 1995. This information was taken from the Group III RFA-VSI Report (ABB-ES, 1997) and is summarized in the following sections; however, the Group III RFA-VSI Report and referenced documents should be reviewed for further details and in-depth analyses of the data presented herein. The information and analytical data from RFA-VSI were utilized to form an up-to-date understanding of the current conditions at SWMU 52 from which COCs were identified and for which remedial actions were selected. A formal RFI was not conducted at SWMU 52.



DRAWN BY S. STROZ	DATE 9/19/06	SAMPLE LOCATION MAP SWMU 52 NAVAL STATION MAYPORT MAYPORT, FLORIDA	CONTRACT NUMBER CTO 0033
CHECKED BY K. WIMBLE	DATE 3/29/07		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 1 / REV 0

P:\GIS\MAYPORT_NS\APR\2868.APR SWMU 52 LAYOUT 3/29/07 SP

During the site visit by ABB-ES personnel on May 5, 1994, the site generally appeared as described in the 1989 RFA. However, no drums were present on the pad and in place of the bowser there was a small tank (approximately 250 gallons) within a metal containment tub. No staining of the pavement in the area of the tank was observed. A small pipe extended from the building wall above the concrete pad. The pipe discharged condensate from an air compressor in the building. The condensate would ultimately get discharged into the drain and would get processed through the oil-water separator. The oil in the separator was periodically collected for recycling, and water from the separator effluent discharged into the sanitary sewer system.

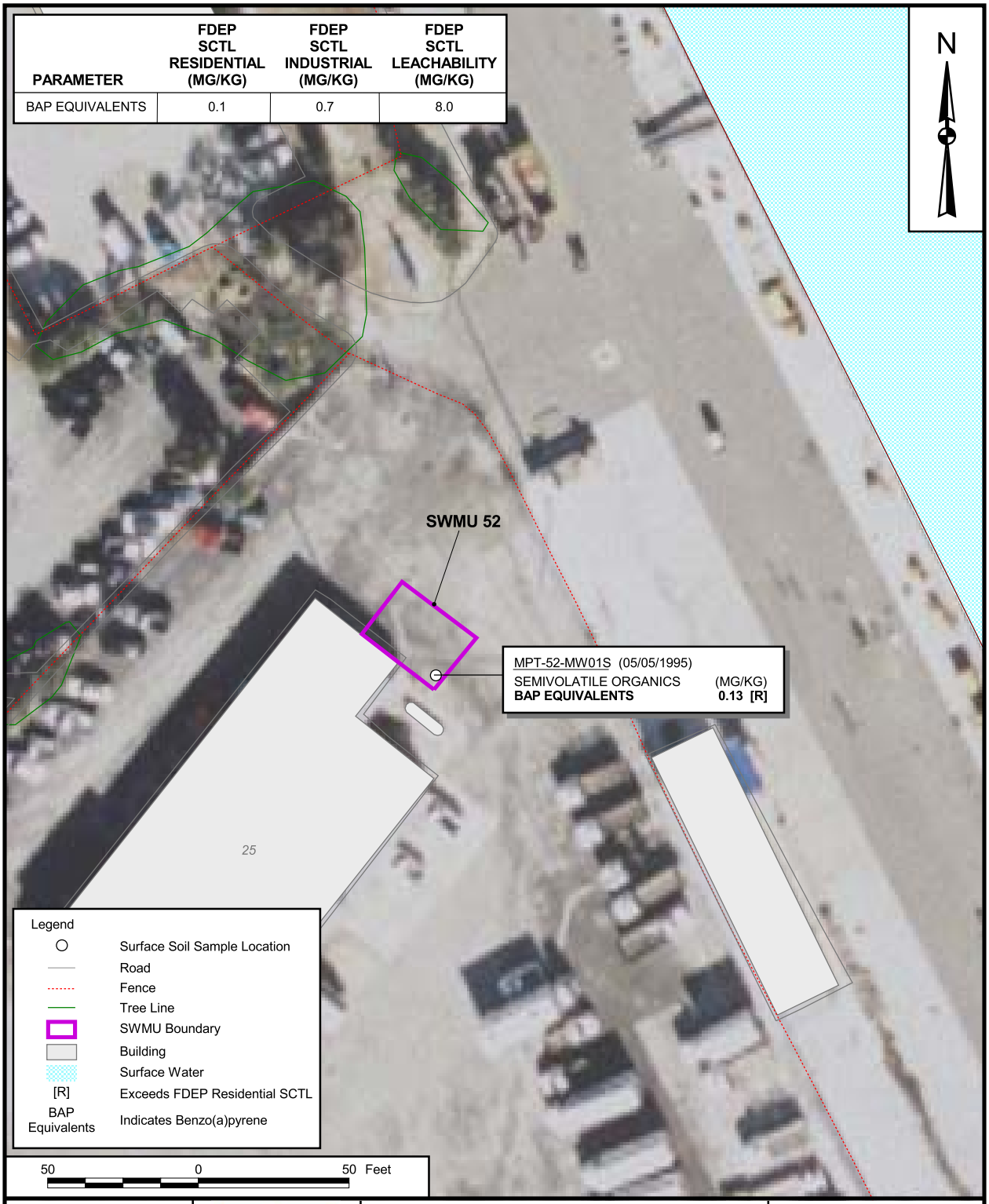
4.1.1 RFA-VSI Field Investigation

Limited confirmatory sampling was conducted by ABB-ES in May-June of 1995 at SWMU 52 as part of the RFA-VSI. Field activities included the collection of one surface and one subsurface soil samples and the installation and sampling of one shallow groundwater monitoring well (Figure 4-2). The total area of SWMU 52 is only 0.016 acres. No additional samples were collected due to the relatively small size of the SWMU footprint. Drilling and soil sampling were conducted on May 5, 1995. Groundwater sampling was conducted on June 3, 1995.

One surface soil sample (0 to 1 foot beneath the existing asphalt surfacing) and one subsurface soil sample (3 to 4 feet bgs) were collected during the drilling of the boring to install monitoring well MPT-52-MW01S.

Monitoring well MPT-52-MW01S was installed in the water table zone of the surficial aquifer (well screen interval 3 to 13 feet bgs). This location was selected to assess whether or not a release has occurred to surface soil (beneath the pavement), subsurface soil, and groundwater in the immediate area of the SWMU. A groundwater sample was collected from the monitoring well.

Information regarding the investigation methods and sampling procedures are provided in the NAVSTA Mayport GIR (ABB-ES, 1995b) and in the NAVSTA Mayport RFI Work Plan (ABB-ES, 1991). The groundwater samples were collected using low-flow purging and sampling techniques. The soil and groundwater samples were analyzed for VOCs, SVOCs, pesticides, inorganics, TPH (groundwater only), and miscellaneous parameters (groundwater only) (Table 4-1). Figure 4-2 depicts the locations of environmental samples collected during the RFA-VSI.



DRAWN BY S. PAXTON	DATE 3/16/07	SURFACE SOIL EXCEEDANCE MAP SWMU 52 NAVAL AIR STATION MAYPORT MAYPORT, FLORIDA	CONTRACT NUMBER CTO 0033
CHECKED BY K. WIMBLE	DATE 3/29/07		APPROVED BY — DATE —
COST/SCHEDULE-AREA			APPROVED BY — DATE —
SCALE AS NOTED			DRAWING NO. FIGURE 4 - 2 / REV 0

P:\GIS\MAYPORT_NS\MAPDOCS\APR\SWMU18_20_21_52.APR SWMU 52 SURFACE SOIL EXCEEDANCE LAYOUT 3/29/07 SP

TABLE 4-1

**SWMU 52, SOIL AND GROUNDWATER SAMPLE IDENTIFICATION
NAVSTA MAYPORT, FLORIDA**

Sample Location	Sample ID	Sample Date	Volatile Organics	Semivolatile Organics	Inorganics	Miscellaneous	Pesticides	TPH
SURFACE SOIL								
MPT-52-MW01S	52S00101	5/5/1995	✔	✔	✔		✔	
SUBSURFACE SOIL								
MPT-52-MW01S	52B00104	5/5/1995	✔	✔	✔		✔	
GROUNDWATER								
MPT-52-MW01S	52G00101	6/3/1995	✔	✔	✔	✔	✔	✔

4.1.1.1 RFA-VSI Evaluation

The target analytes detected in the surface and subsurface soil samples were compared to BSVs computed from stationwide surface and subsurface soil samples (ABB-ES, 1995a), benchmark values from USEPA Region III RBCs (USEPA, 1995), and the state of Florida cleanup goals (residential) (FDEP, 1995).

The target analytes detected in the groundwater samples were also compared to BSVs computed from stationwide background groundwater samples (ABB-ES, 1995b), benchmark values consisting of USEPA Region III RBCs (USEPA, 1995), and Florida groundwater guidance concentrations (FDEP, 1994).

Surface Soil

One VOC (xylenes), nine SVOCs (fluoranthene, pyrene, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(l,2,3-cd)pyrene, and benzo(g,h,i)perylene), two pesticides (4,4'-DDE and 4,4'-DDT), and six inorganic analytes (arsenic, barium, chromium, lead, vanadium, and zinc) were detected in the surface soil sample.

Subsurface Soil

Two VOCs (2-butanone and xylenes) and five inorganic analytes (arsenic, barium, beryllium, chromium, and vanadium) were detected in subsurface soil samples. No SVOCs or pesticides were detected in the subsurface soil samples.

Groundwater

Water quality parameters for the SWMU 52 groundwater monitoring well sample were compared to the state of Florida secondary water quality criteria (Chapter 62-550.320, F.A.C.). The value determined for color was equal to but did not exceed the state of Florida secondary water quality criterion for the groundwater sample collected from monitoring well MPT-52-MW01S. The value determined for hardness, expressed as $CaCO_3$, suggested that the groundwater would be considered hard [greater than 180 milligrams per liter (mg/L); Durfor and Becker, 1964].

Target analytes detected in the groundwater sample consisted of three inorganic analytes (barium, manganese, and vanadium). The inorganic groundwater samples were not filtered and represent total concentrations. No organic analytes were detected in the groundwater sample collected from SWMU 52.

4.1.1.2 RFA-VSI Preliminary Assessment of Human Health Impacts

A preliminary risk characterization for SWMU 52 was conducted for potential exposures to current and future land-use scenarios. The soil and groundwater samples used in the assessment were collected in May 1995 during the RFA-VSI field investigations described above.

Surface Soil

None of the VOCs or pesticides detected in the surface soil sample exceeded the benchmark values. One SVOC (benzo(a)pyrene) and one inorganic analyte (arsenic) were detected in the surface soil sample at a concentration that exceeds benchmark values based on values for a ELCR of 1×10^{-6}.

Benzo(a)pyrene was detected in the surface soil sample at a concentration [100 micrograms per kilogram (µg/kg)] that exceeded the USEPA Region III RBC (88 µg/kg) and was equal to, but did not exceed, the FDEP residential soil cleanup goal (100 µg/kg). However, the benzo(a)pyrene equivalents value was calculated to be 0.14 mg/kg, which exceeds the FDEP Residential Direct Exposure SCTL of 0.1 mg/kg. The exceedance of benzo(a)pyrene equivalents in surface soil at SWMU 52 was detected in asphalt-covered parking lots areas. Based upon site inspections and aerial photographs, the FDEP

regulator concurred that the occurrence of benzo(a)pyrene equivalents was anthropogenic, and not due to a release from SWMU 52. Therefore, benzo(a)pyrene equivalent is not considered a COC in the surface soil at SWMU 52.

The surface soil sample also contained arsenic at a concentration (0.51 mg/kg) that exceeded the USEPA Region III RBC (0.37 mg/kg), but not the FDEP residential soil cleanup goals (2.1 mg/kg). The difference between the USEPA and FDEP residential benchmark values was a result of variations in assumptions used in the computations. Arsenic was not detected in background surface soil samples.

The excess lifetime carcinogenic human health risk (surface soil) was estimated for the analytes that exceeded the benchmarks (benzo(a)pyrene and arsenic) by comparing the maximum detected value with the estimated 1×10^{-6} ELCR values from the USEPA Region III RBCs (residential exposure) and the FDEP soil cleanup goals (residential and industrial exposure). This assessment suggested that hypothetical residential and industrial exposures are likely to be within or less than the risk management range of 1×10^{-4} to 1×10^{-6} that is acceptable to the USEPA and the FDEP risk management goal of 1×10^{-6}.

Subsurface Soil

None of the organic analytes detected in the subsurface soil sample exceeded the benchmark values. One inorganic analyte, arsenic, was detected in the subsurface soil sample at a concentration that exceeded the benchmark value based on value for an ELCR of 1×10^{-6}. The arsenic was detected at a concentration (0.43 mg/kg) that was less than the BSV (0.9 mg/kg) (ABB-ES, 1995a).

The subsurface soil sample contained arsenic at a concentration that exceeds the USEPA Region III RBC (0.37 mg/kg), but not the FDEP Residential Direct Exposure SCTL. The BSV for arsenic exceeds the USEPA Region III RBC, but was less than the FDEP Residential Direct Exposure SCTL (2.1 mg/kg).

The excess lifetime carcinogenic human health risk (subsurface soil) was estimated for arsenic by comparing the maximum detected value with the estimated 1×10^{-6} ELCR values from the USEPA Region III RBCs (residential exposure) and the FDEP soil cleanup goals (residential and industrial exposure). This assessment suggested that hypothetical residential exposures are less than the risk management range that is acceptable to the USEPA and the FDEP risk management goal.

Groundwater

No organics were detected in the groundwater sample collected from SWMU 52. One inorganic analyte (manganese) was detected at a concentration that exceeds a benchmark value.

Manganese was detected in the SWMU 52 groundwater sample at a concentration (106 mg/kg) that exceeds both the USEPA Region III RBC (18 µg/L) and the Florida guidance concentration (50 µg/L). However, the detected concentration was less than the BSV for manganese of 141 µg/L (ABB-ES, 1995a).

Based on the detection of manganese at concentrations less than the background screening concentrations, it is likely that the concentration detected was related to natural and/or anthropogenic conditions and not a release from SWMU 52.

4.1.1.3 RFA-VSI Assessment of Ecological Impacts

An assessment of ecological impacts was not performed for SWMU 52 in the RFA-VSI Report.

4.1.1.4 RFA-VSI Recommendations

The RFA-VSI Report concluded that based on the evaluation of the surface soil, subsurface soil, and groundwater sample analytical results and comparison to residential and industrial risk benchmarks, and the assumption that land use at the site would remain industrial for the foreseeable future, additional investigation of soil was deemed unwarranted at that time. However, the report recognized that the recommendation should be reevaluated if use of the site changes in the future.

4.1.2 Post-Draft CMS Evaluation

LUCs, which were approved as an additional IM and implemented at SWMU 52, restrict current and future land use to other than residential. By a separate MOA, effective August 31, 1998, he Navy agreed with the USEPA and FDEP to implement facility-wide periodic site inspections, designed to ensure the maintenance by Navy personnel of any site-specific LUCs deemed necessary for future protection of human health and the environment.

4.1.3 CMS Data Set

The results of environmental samples collected during the RFA investigation were used to evaluate COPCs and to select COCs in this CMS. Table 4-1 provides a list of all samples, for each medium that

was used in the CMS. Tables listing the complete analytical results of all sampling events per medium are included in Appendix A.

4.2 CHEMICALS OF CONCERN – HUMAN HEALTH

The determination of COCs for surface and subsurface soil at SWMU 52 involved a three-step process as described in Section 1.4.3:

- Determination of COIs
- Identification of the COPCs
- Selection of COCs

COIs and COPCs were determined in the RFI or the RFA; however, since the RFA and RFI Reports were issued, new soil CTLs have been promulgated. The COIs and COPCs for SWMU 52 are independently evaluated in the following sections to select the COCs to be carried forward in the CMS remedy selection process.

4.3 CONTAMINANTS OF INTEREST – HUMAN HEALTH

The COIs included any contaminant detected at least once in validated analytical results for environmental samples in any medium collected at SWMU 52. The soil sampling location at SWMU 52 is shown in Figure 4-2. The revised list of COIs for soil only at SWMU 52 is provided in Table 4-2.

4.3.1 Contaminants of Potential Concern – Human Health

The maximum concentration of the COIs for each environmental medium was compared to the Florida CTLs (Chapter 62-777, F.A.C.) for surface soil, subsurface soil, and groundwater, as appropriate. Section 1.4.3.2 provides a detailed description of the process for the identification of COPCs.

Calcium, magnesium, potassium, iron, and sodium are considered to be essential human nutrients and were not considered in the COPC selection process. In addition, several water quality parameters that were measured during the groundwater analyses were not evaluated, including alkalinity, hardness, sulfide, TDS, TKN, TOC, and total phosphorus.

TABLE 4-2

**SWMU 52, CONTAMINANTS OF INTEREST IN SOIL
NAVSTA MAYPORT, FLORIDA**

List of COIs	Surface Soil	Subsurface Soil	Groundwater
Volatile Organics			
2-Butanone		X	
Xylenes, Total	X	X	
Semivolatile Organics			
Benzo(a)anthracene	X		
Benzo(a)pyrene	X		
Benzo(b)fluoranthene	X		
Benzo(g,h,i)perylene	X		
Benzo(k)fluoranthene	X		
Chrysene	X		
Fluoranthene	X		
Indeno(1,2,3-cd)pyrene	X		
Pyrene	X		
Pesticides/PCBs			
4,4'-DDE	X	X	
4,4'-DDT	X	X	
Inorganics			
Arsenic	X	X	
Barium	X	X	X
Beryllium		X	
Chromium	X	X	
Lead	X		
Manganese			X
Vanadium	X	X	X
Zinc	X		

4.3.1.1 Selection of Surface Soil COPCs – Human Health

The COPC screening evaluation for soil involves an evaluation of COIs for direct exposure and leaching to groundwater. Because less than 20 surface soil samples were collected at SWMU 52; none of the COIs were eliminated based on frequency of detection. The direct exposure COPC screening process, Table 4-3, for surface soil identified no additional contaminants, other than the benzo(a)pyrene equivalents, that exceeded the FDEP Residential Direct Exposure SCTLs.

TABLE 4-3

SWMU 52, SURFACE SOIL COPCs - RESIDENTIAL DIRECT EXPOSURE
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Residential[1] (mg/kg)	Target Organ/System or Effect	Exceeds Residential SCTL[2]
Volatile Organics						
Xylenes, Total	1330-20-7	1/1	0.008	130	Neurological	No
Semivolatile Organics						
Benzo(a)anthracene	56-55-3	1/1	0.087	0.1 [4]	Carcinogen	Yes
Benzo(a)pyrene	50-32-8	1/1	0.1	0.1 [4]	Carcinogen	Yes
Benzo(b)fluoranthene	205-99-2	1/1	0.14	0.1 [4]	Carcinogen	Yes
Benzo(g,h,i)perylene	191-24-2	1/1	0.091	2,500	Neurological	No
Benzo(k)fluoranthene	207-08-9	1/1	0.1	0.1 [4]	Carcinogen	Yes
Chrysene	218-01-9	1/1	0.13	0.1 [4]	Carcinogen	Yes
Fluoranthene	206-44-0	1/1	0.15	3.200	Blood -Kidney -Liver	No
Indeno(1,2,3-cd)pyrene	193-39-5	1/1	0.075	0.1 [4]	Carcinogen	Yes
Pyrene	129-00-0	1/1	0.11	2,400	Kidney	No
Pesticides/PCBs						
4,4'-DDE	72-55-9	1/1	0.38	2.9	Carcinogen	No
4,4'-DDT	50-29-3	1/1	0.79	2.9	Carcinogen -Liver	No
Inorganics						
Arsenic	7440-38-2	1/1	0.51	2.1	Carcinogen -Cardiovascular -Skin	No
Barium	7440-39-3	1/1	4.8	120	Cardiovascular	No
Chromium[3]	7440-47-3	1/1	4.2	120	Carcinogen -Respiratory	No
Lead	7439-92-1	1/1	3.6	400	Neurological	No
Vanadium	7440-62-2	1/1	6.3	67	Hair Loss	No
Zinc	7440-66-6	1/1	5.4	26,000	Blood	No

Notes:
1 - SCTL - Soil Cleanup Target Level for Residential - Chapter 62-777 F.A.C., April 2005.
2 - Comparison of the Residential SCTL with the Maximum Concentration.
3 - SCTL Residential screening values used for Chromium (Hexavalent).
4 - Refer to the table below for the Total Benzo(a)pyrene Equivalent calculation which shows that the equivalent concentration exceeds the residential SCTL of 0.1 mg/kg.

Contaminant	Concentration (mg/kg	Toxic Equivalency Factor	Benzo(a)pyrene Equivalents
Benzo(a)anthracene	0.087	0.1	0.0087
Benzo(a)pyrene	0.10	1.0	0.1
Benzo(b)fluoranthene	0.14	0.1	0.014
Benzo(k)fluoranthene	0.1	0.1	0.01
Chrysene	0.13	0.001	0.00013
Dibenzo(a,h)anthracene	0.00	1.0	0.000
Indeno(1,2,3-cd)pyrene	0.075	0.1	0.0075

Direct Exposure Residential SCTL = 0.1 mg/kg; Total Benzo(a)pyrene Equivalents = **0.14**

Because surface water (i.e., St. Johns River) is located within 300 feet of SWMU 52, leaching of soil to marine surface water and groundwater was evaluated. The leaching to surface water and groundwater evaluation involves a direct comparison to the leaching result to surface water and groundwater CTLs. Table 4-4 shows the leaching to surface water and groundwater evaluation. The leaching to groundwater evaluation determined that no contaminants have the potential to leach from the soil and impact groundwater. Therefore, two contaminants, 4,4'-dichlorodiphenyldichoroethylene (DDE) and 4,4'-dichlorodiphenyltrichoroethane (DDT), were selected as COPCs for surface soil based on the surface water evaluation.

4.3.1.2 Selection of Subsurface Soil COPCs – Human Health

The COPC screening evaluation for subsurface soil involves an evaluation of COIs for Residential Direct Exposure and leaching to surface water and groundwater. Less than 20 subsurface soil samples were collected at SWMU 52; therefore, none of the COIs were eliminated based on frequency of detection. As shown in Table 4-5, the direct exposure COPC screening process for subsurface soil identified no contaminants that exceeded the SCTLs for Residential Direct Exposure.

Because surface water (i.e., St. Johns River) is located within 300 feet of SWMU 52, leaching of soil to marine surface water and groundwater was evaluated. The leaching to surface water and groundwater evaluation involves a direct comparison to the leaching to surface water and groundwater CTLs. Table 4-6 shows the leaching to surface water and groundwater evaluation. The leaching to surface water and groundwater evaluation determined that no contaminants have the potential to leach from the soil and impact groundwater/surface water. Therefore, no contaminants were selected as a COPC for subsurface soil.

4.3.1.3 Selection of Groundwater COPCs – Human Health

The COPC screening process is performed by comparing the maximum groundwater concentrations directly to the GCTLs to determine COPCs. Because the SWMU is located less than 300 feet away from the nearest surface water body, the discharge of groundwater into surface water was evaluated as a pathway of concern. The COPC screening process identified one contaminant, manganese, which exceeded the GCTLs as shown in Table 4-7.

TABLE 4-4

SWMU 52, SURFACE SOIL COPCs - LEACHING
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Leaching to Groundwater [1] (mg/kg)	SCTL Leaching to Surface Water [2] (mg/kg)	Leaching Target Criteria [3] (mg/kg)	COPC Based on Leaching[4] (Yes/No)
Volatile Organics							
Xylenes, Total	1330-20-7	1/1	0.008	0.2	3.9	0.2	No
Semivolatile Organics							
Benzo(a)anthracene	56-55-3	1/1	0.087	0.8	No Criteria	0.8	No
Benzo(a)pyrene	50-32-8	1/1	0.1	8	No Criteria	8	No
Benzo(b)fluoranthene	205-99-2	1/1	0.14	10	No Criteria	10	No
Benzo(g,h,i)perylene	191-24-2	1/1	0.091	32,000	No Criteria	32,000	No
Benzo(k)fluoranthene	207-08-9	1/1	0.1	25	No Criteria	25	No
Chrysene	218-01-9	1/1	0.13	77	No Criteria	77	No
Fluoranthene	206-44-0	1/1	0.15	1,200	1.3	1.3	No
Indeno(1,2,3-cd)pyrene	193-39-5	1/1	0.075	28	No Criteria	28	No
Pyrene	129-00-0	1/1	0.11	880	1.3	1.3	No
Pesticides/PCBs							
4,4'-DDE	72-55-9	1/1	0.38	18	0.04	0.04	Yes
4,4'-DDT	50-29-3	1/1	0.79	11	0.06	0.06	Yes
Inorganics							
Arsenic	7440-38-2	1/1	0.51	29 [6]	No Criteria	29 [6]	No
Barium	7440-39-3	1/1	4.8	1,600	No Criteria	1,600	No
Chromium[5]	7440-47-3	1/1	4.2	38	19	19	No
Lead	7439-92-1	1/1	3.6	No Criteria	No Criteria	No Criteria	No
Vanadium	7440-62-2	1/1	6.3	980	No Criteria	980	No
Zinc	7440-66-6	1/1	5.4	6,000 [6]	No Criteria	6,000 [6]	No

Notes:
1 - SCTL - Soil Cleanup Target Level for Soil leaching to groundwater - Chapter 62-777 F.A.C., April 2005.
2 - SCTL - Soil Cleanup Target Level for Soil leaching to surface water - Chapter 62-777 F.A.C., April 2005.
3 - Minimum SCTL based to soil leaching to groundwater and soil leaching to surface water (if applicable).
4 - A COI is selected as a COPC if the maximum concentration of that chemical exceeds the leaching target criteria.
5 - SCTL screening value used for Chromium (Total).
6 - SCTL - Soil Cleanup Target Level for Residential - Chapter 62-777 F.A.C., May 1999, because no value provided in April 2005 tables.

TABLE 4-5

SWMU 52, SUBSURFACE SOIL INITIAL COPCs - RESIDENTIAL DIRECT EXPOSURE
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Residential[1] (mg/kg)	Target Organ/System or Effect	Exceeds Residential SCTL[2]
Volatile Organics						
2-Butanone	78-93-3	1/1	0.007	16,000	Developmental	No
Xylenes, Total	1330-20-7	1/1	0.002	130	Neurological	No
Pesticides/PCBs						
4,4'-DDE	72-55-9	1/1	0.0014	2.9	Carcinogen	No
4,4'-DDT	50-29-3	1/1	0.0023	2.9	Carcinogen –Liver	No
Inorganics						
Arsenic	7440-38-2	1/1	0.43	2.1	Carcinogen -Cardiovascular -Skin	No
Barium	7440-39-3	1/1	2.6	120	Cardiovascular	No
Beryllium	7440-41-7	1/1	0.08	120	Carcinogen -Gastrointestinal -Respiratory	No
Chromium[3]	7440-47-3	1/1	1.6	210	Carcinogen -Respiratory	No
Vanadium	7440-62-2	1/1	1.1	67	Hair Loss	No

Notes:
1 - SCTL - Soil Cleanup Target Level for Residential - Chapter 62-777 F.A.C., April 2005.
2 - Comparison of the Residential SCTL with the Maximum Concentration.
5 - SCTL screening value used for Chromium (Hexavalent).

TABLE 4-6

SWMU 52, SUBSURFACE SOIL COPCs - LEACHING
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (mg/kg)	SCTL Leaching to Groundwater [1] (mg/kg)	SCTL Leaching to Surface Water [2] (mg/kg)	Leaching Target Criteria [3] (mg/kg)	COPC Based on Leaching[4] (Yes/No)
Volatile Organics							
2-Butanone	78-93-3	1/1	0.007	17	490	17	No
Xylenes, Total	1330-20-7	1/1	0.002	0.2	3.9	0.2	No
Pesticides/PCBs							
4,4'-DDE	72-55-9	1/1	0.0014	18	0.04	0.04	No
4,4'-DDT	50-29-3	1/1	0.0023	11	0.06	0.06	No
Inorganics							
Arsenic	7440-38-2	1/1	0.43	29 [6]	No Criteria	29 [6]	No
Barium	7440-39-3	1/1	2.6	1600	No Criteria	1600	No
Beryllium	7440-41-7	1/1	0.08	63	2.1	2.1	No
Chromium[6]	7440-47-3	1/1	1.6	38	No Criteria	38	No
Vanadium	7440-62-2	1/1	1.1	980	No Criteria	980	No

Notes:
1 - SCTL - Soil Cleanup Target Level for Soil leaching to groundwater – Chapter 62-777 F.A.C., April 2005.
2 - SCTL - Soil Cleanup Target Level for Soil leaching to surface water – Chapter 62-777 F.A.C., April 1999.
3 - Minimum SCTL based to soil leaching to groundwater and soil leaching to surface water (if applicable).
4 - A COI is selected as a COPC if the maximum concentration of that chemical exceeds the leaching target criteria.
5 - SCTL screening value used for Chromium (Total).
6 - SCTL - Soil Cleanup Target Level for Residential - Chapter 62-777 F.A.C., May 1999 because no value provided in April 2005 tables.

TABLE 4-7

SWMU 52, GROUNDWATER COPCS – GCTLs
NAVSTA MAYPORT, FLORIDA

Chemical of Interest	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (µg/L)	GCTL[1] (µg/L)	Target Criteria[2] (P/S, HH)	Target Organ/System or Effect	Exceeds GCTL[3]
Inorganics							
Barium	7440-39-3	1/1	5.2	2,000	P/S	Cardiovascular	No
Manganese	7439-96-5	1/1	106	50	P/S	Neurological	Yes
Vanadium	7440-62-2	1/1	3.7	49	HH	Hair Loss	No

Notes:
1 - GCTL - Groundwater Cleanup Target Levels - Chapter 62-777 F.A.C., April 2005.
2 - P/S - Primary Standard/Secondary Standard - F.A.C. 62-550 and Chapter 62-777, Table 1, dated April 2005. HH - Human Health Criteria.
3 - Comparison of the Initial Target Levels with the Maximum Concentration.

4.3.2 Contaminants of Concern – Human Health

The maximum concentration of the COPCs for each environmental medium was compared to the state of Florida SCTLs (Chapter 62-777, F.A.C.) for surface soil, subsurface soil, and groundwater, as appropriate. Section 1.4.3.3 provides a detailed description of the process for the identification of COCs.

4.3.2.1 Selection of Surface Soil COCs – Human Health

For surface soil at SWMU 52, COPCs were identified for leaching. The maximum concentration for both COPCs exceeded the SCTLs for leaching into the soil (Table 4-8). The concentrations of 4,4'-DDE and 4,4'-DDT only exceeded the SCTL for leaching to surface water and did not exceed the SCTL for leaching to groundwater. Neither of the COPCs were detected in groundwater and, therefore, it is unlikely that the leaching of these COPCs is of concern for SWMU 52. For these reasons, 4,4'-DDE and 4,4'-DDT were not selected as COCs for SWMU 52.

4.3.2.2 Selection of Subsurface Soil COCs – Human Health

There were no subsurface soil COPCs, therefore, a subsurface soil COC evaluation is not required and there are no subsurface soil COCs for SWMU 52.

4.3.2.3 Selection of Groundwater COCs – Human Health

One contaminant, shown in Table 4-7, was identified as a COPC in groundwater at SWMU 52. Table 4-9 shows that manganese did not exceed the site-specific GCTL and is not a COC for SWMU 52. Therefore, there are no groundwater COCs for SWMU 52.

4.4 CONTAMINANTS OF CONCERN IN SOIL – ECOLOGICAL

Based on the RFA-VSI findings, no risk to terrestrial wildlife populations was determined to be likely due to exposure to surface soil. No pathway for ecological exposure to subsurface soil was identified in the RFA-VSI. Additionally, the RFA-VSI found groundwater discharge into St. Johns River did not pose a risk to aquatic receptors including fish, amphibians, plants, and invertebrates. This is based on the assumption that the groundwater concentration at the surface water discharge point will be lower than the concentration measured in the well, due to advection, dispersion, mixing, and retardation.

TABLE 4-8

SWMU 52, SURFACE SOIL COCs - LEACHING
NAVSTA MAYPORT, FLORIDA

COPC	Chemical Abstract Number	Maximum Concentration (mg/kg)	Representative Concentration[1] (mg/kg)	SCTL Leaching to Groundwater[2] (mg/kg)	SCTL Leaching to Surface Water[3] (mg/kg)	Background Concentration[4] (mg/kg)	Media Cleanup Standard Objective Leaching[5] (mg/kg)	Leaching COC[6]
Pesticides/PCBs								
4,4'-DDE	72-55-9	0.38	0.38	18	0.04	NA	0.04	No[7]
4,4'-DDT	50-29-3	0.79	0.79	11	0.06	NA	0.06	No[7]

Notes:
1 - The representative concentration is the 95% UCL (where appropriate) or the maximum detected concentration, whichever is less.
2 - SCTL - Soil Cleanup Target Level for Leaching to Groundwater - Chapter 62-777 F.A.C., April 2005.
3 - SCTL - Soil Cleanup Target Level for Soil leaching to surface water - Chapter 62-777 F.A.C, April 2005.
4 - Mayport background screening value (TtNUS, 2000).
5 - The Media Cleanup Standard Objective (MCO) Leaching is the Leaching to Groundwater SCTL or the background screening value, whichever is greater.
6 - A COPC is selected as a COC if the representative concentration exceeds the MCO.
7 - See Section 4.2.3.1 for explanation.
NA - Not Applicable

TABLE 4-9

SWMU 52, SELECTION OF GROUNDWATER COCs
NAVSTA MAYPORT, FLORIDA

COPC	Chemical Abstract Number	Frequency of Detection	Maximum Concentration (µg/L)	Representative Concentration[1] (µg/L)	GCTL[2] (µg/L)	Target Criteria[3]	Background Concentration[4] (µg/L)	Target Organ/System or Effect	Media Cleanup Objective – GCTL[5] (µg/L)	COCs Based on GCTLs
Inorganics										
Manganese	7439-96-5	1/1	106	106	50	P/S	141	Neurological	141	No

Notes:
1 - The representative concentration is the 95% UCL (where appropriate) or the maximum detected concentration, whichever is less.
2 - GCTL - Groundwater Cleanup Target Levels - Chapter 62-777 F.A.C., April 2005.
3 - P/S - Primary Standard/Secondary Standard - F.A.C. 62-550 and Chapter 62-777, Table 1, dated April 2005.
4 - Mayport background screening value (TtNUS, 2000).
5 - A COPC is selected as a COC if the representative concentration exceeds the MCO.

4.4.1 COC Summary

No COCs for surface soil, subsurface soil, and groundwater were identified for SWMU 52.

4.5 VOLUMES OF CONTAMINATED MEDIA

No COCs were identified for surface soil, subsurface soil, and groundwater at SWMU 52; therefore, contamination maps were not prepared.

4.6 IDENTIFICATION AND SCREENING OF CORRECTIVE MEASURES TECHNOLOGIES

Corrective measure technologies are identified and screened to address the CAOs identified for SWMU 52 (see Section 1.4.1). Soil or groundwater technologies are not required because there are no soil or groundwater COCs at SWMU 52.

4.7 RECOMMENDATION FOR A FINAL CORRECTIVE MEASURE

No Action is recommended for the soil and groundwater at SWMU 52.

REFERENCES

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APPENDIX A

CMS DATA SET

SWMU 18

TABLE 2
MONITORING WELL SAMPLE RESULTS (POSITIVE DETECTIONS)
SWMU 18
NAVAL STATION MAYPORT
MAYPORT, FLORIDA

SAMPLE ID LOCATION SAMPLE DATE sort	FDEP SCTL Residential	FDEP SCTL Industrial	FDEP SCTL Leachability	18D00201 MPT-18-SD02 19950419 c_001
Volatile Organics (mg/kg)				
2-BUTANONE	16000	110000	17	0.004 J
Inorganics (mg/kg)				
ARSENIC	2.1	12	-9999	0.54 J
BARIUM	120	130000	1600	5 J
BERYLLIUM	120	1400	63	0.09 J
CHROMIUM	210	470	38	3.2
COPPER	150	89000	-9999	10.2
LEAD	400	1400	-9999	7.6 J
VANADIUM	67	10000	980	2.2 J
ZINC	26000	630000	-9999	124 J
Miscellaneous (mg/kg)				
CYANIDE	34	11000	0.8	0.08 J

TABLE 1
SURFACE SOIL SAMPLE RESULTS (POSITIVE DETECTIONS)
SWMU 18
NAVAL STATION MAYPORT
MAYPORT, FLORIDA

sample_id	18G00101	18G00101-D	MPT-18-01S	MPT-18-GW-MW01S-00	MPT-18-MW01S-02
location_i	MPT-18-MW01S	MPT-18-MW01S	MPT-18-MW01S	MPT-18-MW01S	MPT-18-MW01S
sample_dat	19950616	19950616	20030807	20010711	20031113
sacode	ORIG	DUP	NORMAL	NORMAL	NORMAL
matrix	GW	GW	GW	GW	GW
duplicate		18G00101			
Volatile Organics (ug/L)					
4-CHLORO-3-METHYLPHENOL	10 R	140 J			
Semivolatile Organics (ug/L)					
2-CHLOROPHENOL	10 R	180 J	2 U	10 U	10 U
4-NITROPHENOL	50 R	170 J	10 U	25 U	10 U
PENTACHLOROPHENOL	50 R	210 J	0.30 U	10 U	10 U
PHENOL	10 R	170 J	2 U	10 U	10 U
Inorganics (ug/L)					
ARSENIC	3.7 J	4.1 J			
BARIUM	11.9 J	12.2 J			
CALCIUM	71000	71700			
IRON	31.6 UJ	89.9 J		15.3 U	
LEAD	0.70 UJ	5.1			
MAGNESIUM	4990 J	5080			
MANGANESE	22.6	25.9		18.6	
SELENIUM	0.81 J	0.50 U			
SODIUM	13100	13300			
VANADIUM	8.7 J	7.8 J			
Miscellaneous Parameters					
ALKALINITY (mg/L)	181				
CHLORIDE (mg/L)	15.1				
HARDNESS (mg/L)	192				
PHOSPHORUS (ELEMENTAL) (mg/L)	0.15				
SULFATE (mg/L)	26.1				
TOTAL DISSOLVED SOLIDS (mg/L)	256				
TOTAL ORGANIC CARBON (mg/L)	3.6				

SWMUs 20 & 21

LOCATION ID	MPT-20-MW01S	MPT-20-MW02S
SAMPLE ID	20B00105	20B00205
SAMPLE DATE	19950504	19950505
MATRIX	SO	SO
TOP DEPTH	5	5
BOTTOM DEPTH	5	5
DEPTH UNIT	FT	FT
SUBMATRIX	SB	SB
Volatile Organics (mg/kg)		
1,1,1,2-TETRACHLOROETHANE	0.006 U	0.006 U
1,1,1-TRICHLOROETHANE	0.006 U	0.006 U
1,1,2,2-TETRACHLOROETHANE	0.006 U	0.006 U
1,1,2-TRICHLOROETHANE	0.006 U	0.006 U
1,1-DICHLOROETHANE	0.006 U	0.006 U
1,1-DICHLOROETHENE	0.006 U	0.006 U
1,2,3-TRICHLOROPROPANE	0.006 U	0.006 U
1,2-DIBROMO-3-CHLOROPROPANE	0.012 U	0.012 U
1,2-DIBROMOETHANE	0.006 U	0.006 U
1,2-DICHLOROBENZENE	0.006 U	0.006 U
1,2-DICHLOROETHANE	0.006 U	0.006 U
1,2-DICHLOROPROPANE	0.006 U	0.006 U
1,3-DICHLOROBENZENE	0.006 U	0.006 U
1,4-DICHLOROBENZENE	0.006 U	0.006 U
1,4-DIOXANE	0.24 R	0.24 R
2-BUTANONE	0.012 U	0.004 J
2-CHLOROETHYL VINYL ETHER	0.012 U	0.012 U
2-HEXANONE	0.012 U	0.012 U
3-CHLOROPROPENE	0.006 U	0.006 U
4-CHLORO-3-METHYLPHENOL	0.81 U	0.74 U
4-METHYL-2-PENTANONE	0.012 U	0.012 U
ACETONE	0.012 U	0.015 U
ACETONITRILE	0.12 U	0.12 U
ACROLEIN	0.12 UJ	0.12 UJ
ACRYLONITRILE	0.12 U	0.12 U
BENZENE	0.006 U	0.006 U
BROMODICHLOROMETHANE	0.006 U	0.006 U
BROMOFORM	0.006 U	0.006 U
BROMOMETHANE	0.012 U	0.012 U
CARBON DISULFIDE	0.006 U	0.006 U
CARBON TETRACHLORIDE	0.006 U	0.006 U
CHLOROBENZENE	0.006 U	0.006 U
CHLORODIBROMOMETHANE	0.006 U	0.006 U
CHLOROETHANE	0.012 U	0.012 U
CHLOROFORM	0.006 U	0.006 U
CHLOROMETHANE	0.012 U	0.012 U
CHLOROPRENE	0.24 U	0.24 U
CIS-1,3-DICHLOROPROPENE	0.006 U	0.006 U
DIBROMOMETHANE	0.006 U	0.006 U
DICHLORODIFLUOROMETHANE	0.012 U	0.012 U
ETHYL METHACRYLATE	0.006 U	0.006 U
ETHYLBENZENE	0.006 U	0.006 U
ISOBUTANOL	0.24 U	0.24 U

METHACRYLONITRILE	0.006 U	0.006 U
METHYL IODIDE	0.012 U	0.012 U
METHYL METHACRYLATE	0.012 U	0.012 U
METHYLENE CHLORIDE	0.01 U	0.013 U
PENTACHLOROETHANE	0.012 U	0.012 U
PROPIONITRILE	0.12 U	0.12 U
STYRENE	0.006 U	0.006 U
TETRACHLOROETHENE	0.006 U	0.006 U
TOLUENE	0.006 U	0.006 U
TOTAL 1,2-DICHLOROETHENE	0.006 U	0.006 U
TOTAL XYLENES	0.001 J	0.006 U
TRANS-1,3-DICHLOROPROPENE	0.006 U	0.006 U
TRANS-1,4-DICHLORO-2-BUTENE	0.006 U	0.006 U
TRICHLOROETHENE	0.006 U	0.006 U
TRICHLOROFLUOROMETHANE	0.006 U	0.006 U
VINYL ACETATE	0.012 U	0.012 U
VINYL CHLORIDE	0.012 U	0.012 U

Semivolatile Organics (mg/kg)

1,2,4,5-TETRACHLOROBENZENE	4 U	3.6 U
1,2,4-TRICHLOROBENZENE	0.81 U	0.74 U
1,2-DIPHENYLHYDRAZINE	0.81 U	0.74 U
1,3,5-TRINITROBENZENE	0.81 U	0.74 U
1,3-DINITROBENZENE	0.81 UJ	0.74 UJ
1,4-NAPHTHOQUINONE	81 U	74 U
1,4-PHENYLENEDIAMINE	40 U	36 U
1-NAPHTHYLAMINE	4 U	3.6 U
2,2'-OXYBIS(1-CHLOROPROPANE)	0.81 U	0.74 U
2,3,4,6-TETRACHLOROPHENOL	0.81 U	0.74 U
2,4,5-TRICHLOROPHENOL	4 U	3.6 U
2,4,6-TRICHLOROPHENOL	0.81 U	0.74 U
2,4-DICHLOROPHENOL	0.81 U	0.74 U
2,4-DIMETHYLPHENOL	0.81 U	0.74 U
2,4-DINITROPHENOL	4 U	3.6 U
2,4-DINITROTOLUENE	0.81 U	0.74 U
2,6-DICHLOROPHENOL	0.81 U	0.74 U
2,6-DINITROTOLUENE	0.81 U	0.74 U
2-ACETYLAMINOFLUORENE	0.81 UJ	0.74 UJ
2-CHLORONAPHTHALENE	0.81 U	0.74 U
2-CHLOROPHENOL	0.81 U	0.74 U
2-METHYLNAPHTHALENE	0.81 U	0.74 U
2-METHYLPHENOL	0.81 U	0.74 U
2-NAPHTHYLAMINE	4 U	3.6 U
2-NITROANILINE	4 U	3.6 U
2-NITROPHENOL	0.81 U	0.74 U
2-PICOLINE	4 U	3.6 U
3&4-METHYLPHENOL	0.81 U	0.74 U
3,3'-DICHLOROBENZIDINE	1.6 U	1.5 U
3,3'-DIMETHYLBENZIDINE	0.81 U	0.74 U
3-METHYLCHOLANTHRENE	0.81 U	0.74 U
3-NITROANILINE	4 U	3.6 U
4,6-DINITRO-2-METHYLPHENOL	4 U	3.6 U
4-AMINOBIPHENYL	4 U	3.6 U

4-BROMOPHENYL PHENYL ETHER	0.81 U	0.74 U
4-CHLOROANILINE	0.81 U	0.74 U
4-CHLOROPHENYL PHENYL ETHER	0.81 U	0.74 U
4-NITROANILINE	4 U	3.6 U
4-NITROPHENOL	4 UJ	3.6 UJ
4-NITROQUINOLINE-1-OXIDE	40 U	36 U
5-NITRO-O-TOLUIDINE	0.81 U	0.74 U
7,12-DIMETHYLBENZ(A)ANTHRACENE	0.81 U	0.74 U
A,A-DIMETHYLPHENETHYLAMINE	4 U	3.6 U
ACENAPHTHENE	0.81 U	0.74 U
ACENAPHTHYLENE	0.81 U	0.74 U
ACETOPHENONE	0.81 U	0.74 U
ANILINE	0.81 U	0.74 U
ANTHRACENE	0.81 U	0.74 U
ARAMITE	4 U	3.6 U
BENZIDINE	4 U	3.6 U
BENZO(A)ANTHRACENE	0.81 U	0.74 U
BENZO(A)PYRENE	0.81 U	0.74 U
BENZO(B)FLUORANTHENE	0.81 U	0.74 U
BENZO(G,H,I)PERYLENE	0.81 U	0.74 U
BENZO(K)FLUORANTHENE	0.81 U	0.74 U
BENZOIC ACID	4 U	3.6 U
BENZYL ALCOHOL	0.81 U	0.74 U
BIS(2-CHLOROETHOXY)METHANE	0.81 U	0.74 U
BIS(2-CHLOROETHYL)ETHER	0.81 U	0.74 U
BIS(2-ETHYLHEXYL)PHTHALATE	0.81 U	0.74 U
BUTYL BENZYL PHTHALATE	0.086 J	0.74 U
CHLOROBENZILATE	0.025 U	0.022 UJ
CHRYSENE	0.81 U	0.74 U
DI-N-BUTYL PHTHALATE	0.81 U	0.74 U
DI-N-OCTYL PHTHALATE	0.81 U	0.74 U
DIALLATE	0.049 U	0.045 UJ
DIBENZO(A,H)ANTHRACENE	0.81 U	0.74 U
DIBENZOFURAN	0.81 U	0.74 U
DIETHYL PHTHALATE	0.81 U	0.74 U
DIMETHYL PHTHALATE	0.81 U	0.74 U
ETHYL METHANE SULFONATE	0.81 U	0.74 U
FLUORANTHENE	0.81 U	0.74 U
FLUORENE	0.81 U	0.74 U
HEXACHLOROBENZENE	0.81 U	0.74 U
HEXACHLOROBUTADIENE	0.81 U	0.74 U
HEXACHLOROCYCLOPENTADIENE	0.81 U	0.74 U
HEXACHLOROETHANE	0.81 U	0.74 U
HEXACHLOROPHENE	40 U	36 U
HEXACHLOROPROPENE	4 U	3.6 U
INDENO(1,2,3-CD)PYRENE	0.81 U	0.74 U
ISODRIN	0.00083 U	0.00075 UJ
ISOPHORONE	0.81 U	0.74 U
ISOSAFROLE	4 U	3.6 U
METHAPYRILENE	4 U	3.6 U
METHYL METHANE SULFONATE	0.81 U	0.74 U
N-NITROSO-DI-N-BUTYLAMINE	0.81 U	0.74 U

N-NITROSO-DI-N-PROPYLAMINE	0.81 U	0.74 U
N-NITROSODIETHYLAMINE	0.81 UJ	0.74 UJ
N-NITROSODIMETHYLAMINE	0.81 U	0.74 U
N-NITROSODIPHENYLAMINE	0.81 U	0.74 U
N-NITROSOMETHYLETHYLAMINE	0.81 U	0.74 U
N-NITROSOMORPHOLINE	0.81 U	0.74 U
N-NITROSOPIPERIDINE	0.81 U	0.74 U
N-NITROSOPYRROLIDINE	0.81 U	0.74 U
NAPHTHALENE	0.81 U	0.74 U
NITROBENZENE	0.81 U	0.74 U
O-TOLUIDINE	0.81 U	0.74 U
P-(DIMETHYLAMINO)AZOBENZENE	0.81 U	0.74 U
PENTACHLOROBENZENE	4 U	3.6 U
PENTACHLORONITROBENZENE	4 U	3.6 U
PENTACHLOROPHENOL	4 U	3.6 U
PHENACETIN	0.81 U	0.74 U
PHENANTHRENE	0.81 U	0.74 U
PHENOL	0.81 U	0.74 U
PRONAMIDE	0.81 U	0.74 U
PYRENE	0.81 U	0.74 U
PYRIDINE	4 UJ	3.6 UJ
SAFROLE	4 U	3.6 U

Pesticides/PCBs (mg/kg)

4,4'-DDD	0.0016 U	0.0015 UJ
4,4'-DDE	0.00083 U	0.00075 UJ
4,4'-DDT	0.0016 U	0.0015 UJ
ALDRIN	0.00083 U	0.00075 UJ
ALPHA-BHC	0.00083 U	0.00075 UJ
AROCLOR-1016	0.041 U	0.037 UJ
AROCLOR-1221	0.083 U	0.075 UJ
AROCLOR-1232	0.083 U	0.075 UJ
AROCLOR-1242	0.041 U	0.037 UJ
AROCLOR-1248	0.041 U	0.037 UJ
AROCLOR-1254	0.02 U	0.018 UJ
AROCLOR-1260	0.02 U	0.018 UJ
BETA-BHC	0.0016 U	0.0015 UJ
CHLORDANE	0.0083 U	0.0075 UJ
DELTA-BHC	0.00083 U	0.00075 UJ
DIELDRIN	0.00083 U	0.00075 UJ
ENDOSULFAN I	0.00083 U	0.00075 UJ
ENDOSULFAN II	0.0016 U	0.0015 UJ
ENDOSULFAN SULFATE	0.0016 U	0.0015 UJ
ENDRIN	0.0016 U	0.0015 UJ
ENDRIN ALDEHYDE	0.0016 U	0.0015 UJ
ENDRIN KETONE	0.0016 U	0.0015 UJ
GAMMA-BHC (LINDANE)	0.00083 U	0.00075 UJ
HEPTACHLOR	0.00083 U	0.00075 UJ
HEPTACHLOR EPOXIDE	0.00083 U	0.00075 UJ
KEPONE	0.049 UJ	0.045 UJ
METHOXYCHLOR	0.0033 U	0.003 UJ
TOXAPHENE	0.041 U	0.037 UJ

Inorganics (mg/kg)

ANTIMONY	1.2 U	1.1 U
ARSENIC	0.49 J	0.63 J
BARIUM	2.8 J	3 J
BERYLLIUM	0.07 U	0.07 U
CADMIUM	0.30 U	0.27 U
CHROMIUM	1.6 J	1.6 J
COBALT	0.76 U	0.69 U
COPPER	0.73 UJ	0.72 UJ
LEAD	1.6 J	2.7 J
MERCURY	0.03 U	0.03 U
NICKEL	1.4 U	1.3 U
SELENIUM	0.12 U	0.11 U
SILVER	0.61 UJ	0.61 UJ
THALLIUM	0.15 U	0.13 U
TIN	3.3 U	3 U
VANADIUM	2 J	1.8 J
ZINC	5.6	4.2 J
Miscellaneous (mg/kg)		
CYANIDE	0.06 U	0.06 U

MPT-20-MW02S	MPT-20-MW02S	MPT-20-MW03S	MPT-21-MW01S	MPT-21-MW02S
20B00205-AVG	20B00205-D	20B00305	21B00104	21B00203
19950505	19950505	19950505	19950504	19950504
SO	SO	SO	SO	SO
5	5	5	4	3
5	5	5	4	3
FT	FT	FT	FT	FT
SB	SB	SB	SB	SB
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.235 R	0.23 R	0.24 R	0.23 R	0.22 R
0.004 J	0.012 U	0.012 U	0.012 U	0.011 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.0145 U	0.014 U	0.012 U	0.012 U	0.011 U
0.12 U	0.12 U	0.12 U	0.12 U	0.11 U
0.12 UJ	0.12 UJ	0.12 UJ	0.12 UJ	0.11 UJ
0.12 U	0.12 U	0.12 U	0.12 U	0.11 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.235 U	0.23 U	0.24 U	0.23 U	0.22 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.235 U	0.23 U	0.24 U	0.23 U	0.22 U

0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.0135 U	0.014 U	0.01 U	0.008 U	0.006 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.12 U	0.12 U	0.12 U	0.12 U	0.11 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.001 J	0.003 J
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.006 U	0.006 U	0.006 U	0.006 U	0.006 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U
0.012 U	0.012 U	0.012 U	0.012 U	0.011 U

3.6 U	3.6 U	4 U	3.6 U	3.6 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 UJ	0.74 U	0.82 UJ	0.75 UJ	0.73 U
74 U	74 U	82 U	75 U	73 U
36 U	36 U	40 U	36 U	36 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 UJ	0.74 U	0.82 UJ	0.75 UJ	0.73 UJ
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 UJ	3.6 UJ	4 U	3.6 U	3.6 U
0.74 UJ	0.74 UJ	0.82 U	0.75 U	0.73 U
1.5 U	1.5 U	1.6 U	1.5 U	1.5 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U

0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
3.6 UJ	3.6 U	4 UJ	3.6 UJ	3.6 U
36 U	36 U	40 U	36 U	36 UJ
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
3.6 U	3.6 U	4 U	3.6 U	3.6 UJ
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 U	3.6 U	4 U	3.6 U	3.6 UJ
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.022 UJ	0.022 UJ	0.025 UJ	0.023 U	0.022 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.045 UJ	0.045 UJ	0.05 UJ	0.045 U	0.044 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
36 U	36 U	40 U	36 U	36 UJ
3.6 U	3.6 U	4 U	3.6 U	3.6 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.00075 UJ	0.00075 UJ	0.00084 UJ	0.00076 U	0.00074 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U

0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 UJ	0.74 UJ	0.82 UJ	0.75 UJ	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
0.74 U	0.74 U	0.82 U	0.75 U	0.73 U
3.6 UJ	3.6 UJ	4 UJ	3.6 UJ	3.6 U
3.6 U	3.6 U	4 U	3.6 U	3.6 U

0.0015 UJ	0.0015 UJ	0.0016 UJ	0.0015 U	0.0014 U
0.00075 UJ	0.00075 UJ	0.00084 UJ	0.00076 U	0.00074 U
0.0015 UJ	0.0015 UJ	0.0016 UJ	0.0015 U	0.0014 U
0.00075 UJ	0.00075 UJ	0.00084 UJ	0.00076 U	0.00074 U
0.00075 UJ	0.00075 UJ	0.00084 UJ	0.00076 U	0.00074 U
0.037 UJ	0.037 UJ	0.041 UJ	0.038 U	0.036 U
0.075 UJ	0.075 UJ	0.084 UJ	0.076 U	0.074 U
0.075 UJ	0.075 UJ	0.084 UJ	0.076 U	0.074 U
0.037 UJ	0.037 UJ	0.041 UJ	0.038 U	0.036 U
0.037 UJ	0.037 UJ	0.041 UJ	0.038 U	0.036 U
0.018 UJ	0.018 UJ	0.02 UJ	0.018 U	0.018 U
0.018 UJ	0.018 UJ	0.02 UJ	0.018 U	0.018 U
0.0015 UJ	0.0015 UJ	0.0016 UJ	0.0015 U	0.0014 U
0.0075 UJ	0.0075 UJ	0.0084 UJ	**0.031**	0.0074 U
0.00075 UJ	0.00075 UJ	0.00084 UJ	0.00076 U	0.00074 U
0.00075 UJ	0.00075 UJ	0.00084 UJ	0.00076 U	0.00074 U
0.00075 UJ	0.00075 UJ	0.00084 UJ	0.00076 U	0.00074 U
0.0015 UJ	0.0015 UJ	0.0016 UJ	0.0015 U	0.0014 U
0.0015 UJ	0.0015 UJ	0.0016 UJ	0.0015 U	0.0014 U
0.0015 UJ	0.0015 UJ	0.0016 UJ	0.0015 U	0.0014 U
0.0015 UJ	0.0015 UJ	0.0016 UJ	0.0015 U	0.0014 U
0.0015 UJ	0.0015 UJ	0.0016 UJ	0.0015 U	0.0014 U
0.00075 UJ	0.00075 UJ	0.00084 UJ	0.00076 U	0.00074 U
0.00075 UJ	0.00075 UJ	0.00084 UJ	0.00076 U	0.00074 U
0.00075 UJ	0.00075 UJ	0.00084 UJ	0.00076 U	0.00074 U
0.045 UJ	0.045 UJ	0.05 UJ	0.045 UJ	0.044 U
0.003 UJ	0.003 UJ	0.0034 UJ	0.0031 U	0.003 U
0.037 UJ	0.037 UJ	0.041 UJ	0.038 U	0.036 U

1.1 U	1.1 U	1.3 U	1.1 U	1.1 U
0.66 J	0.69 J	0.50 J	0.77 J	0.64 J
3.15 J	3.3 J	2.5 J	4.2 J	4.6 J
0.07 U	0.07 U	0.11 J	0.07 U	0.07 U
0.27 U	0.27 U	0.30 U	0.27 U	0.27 U
1.4 J	1.2 J	1.6 J	0.66 J	1.8 J
0.69 U	0.69 U	0.78 U	0.70 U	0.69 U
0.72 UJ	0.72 UJ	0.75 UJ	0.93 UJ	2.7 UJ
2.95 J	3.2 J	1.4 J	3.6 J	16.4 J
0.03 U	0.03 U	0.04 U	0.03 U	0.03 U
1.3 U	1.3 U	1.4 U	1.3 U	1.3 U
0.11 U	0.11 U	0.13 U	0.11 UJ	0.11 U
0.61 UJ	0.61 UJ	0.61 UJ	0.61 UJ	0.61 UJ
0.13 U	0.13 U	0.15 U	0.14 U	0.13 U
3.1 UJ	3.2 UJ	3.4 U	3.1 U	3 U
1.95 J	2.1 J	1.2 J	2.2 J	2.8 J
4.15 J	4.1 J	3.8 J	2.8 UJ	13.2

0.06 U	0.06 U	0.06 U	0.14 J	0.06 U

MPT-21-MW03S
21B00303
19950504
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SB

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0.73 J
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0.07 U
0.27 U
0.57 J
0.71 U
1.1 UJ
0.77 UJ
0.03 U
1.3 U
0.11 UJ
0.61 UJ
0.14 U
3.1 U
1.9 J
2.1 UJ

0.06 U

LOCATION	MPT-20-MW01S	MPT-20-MW02S	MPT-20-MW03S
SAMPLE ID	20G00101	20G00201	20G00301
SAMPLE DATE	19950601	19950603	19950601
MATRIX	GW	GW	GW
Volatile Organics (ug/L)			
1,1,1,2-TETRACHLOROETHANE	5 U	5 U	5 U
1,1,1-TRICHLOROETHANE	5 U	5 U	5 U
1,1,2,2-TETRACHLOROETHANE	5 U	5 U	5 U
1,1,2-TRICHLOROETHANE	5 U	5 U	5 U
1,1-DICHLOROETHANE	5 U	5 U	5 U
1,1-DICHLOROETHENE	5 U	5 U	5 U
1,2,3-TRICHLOROPROPANE	5 U	5 U	5 U
1,2-DIBROMO-3-CHLOROPROPANE	10 U	10 U	10 U
1,2-DIBROMOETHANE	5 U	5 U	5 U
1,2-DICHLOROBENZENE	5 U	5 U	5 U
1,2-DICHLOROETHANE	5 U	5 U	5 U
1,2-DICHLOROPROPANE	5 U	5 U	5 U
1,3-DICHLOROBENZENE	5 U	5 U	5 U
1,4-DICHLOROBENZENE	5 U	5 U	5 U
1,4-DIOXANE	200 R	200 R	200 R
2-BUTANONE	10 R	10 R	10 R
2-CHLOROETHYL VINYL ETHER	10 U	10 U	10 U
2-HEXANONE	10 U	10 U	10 U
3-CHLOROPROPENE	5 U	5 U	5 U
4-CHLORO-3-METHYLPHENOL	10 U	10 U	10 U
4-METHYL-2-PENTANONE	10 U	10 U	10 U
ACETONE	10 UJ	10 U	10 UJ
ACETONITRILE	100 U	100 U	100 U
ACROLEIN	100 U	100 UJ	100 U
ACRYLONITRILE	100 U	100 U	100 U
BENZENE	5 U	5 U	5 U
BROMODICHLOROMETHANE	5 U	5 U	5 U
BROMOFORM	5 U	5 U	5 U
BROMOMETHANE	10 U	10 U	10 U
CARBON DISULFIDE	5 U	5 U	5 U
CARBON TETRACHLORIDE	5 U	5 U	5 U
CHLOROBENZENE	5 U	5 U	5 U
CHLORODIBROMOMETHANE	5 U	5 U	5 U
CHLOROETHANE	10 U	10 U	10 U
CHLOROFORM	5 U	5 U	5 U
CHLOROMETHANE	10 U	10 U	10 U
CHLOROPRENE	200 U	200 U	200 U
CIS-1,3-DICHLOROPROPENE	5 U	5 U	5 U
DIBROMOMETHANE	5 U	5 U	5 U
DICHLORODIFLUOROMETHANE	10 U	10 U	10 U
ETHYL METHACRYLATE	5 U	5 U	5 U
ETHYLBENZENE	5 U	5 U	5 U
ISOBUTANOL	200 R	200 R	200 R
METHACRYLONITRILE	5 U	5 U	5 U
METHYL IODIDE	10 U	10 U	10 U
METHYL METHACRYLATE	10 U	10 U	10 U

METHYLENE CHLORIDE	5 U	5 U	5 U
PENTACHLOROETHANE	10 U	10 U	10 U
PROPIONITRILE	100 U	100 U	100 U
STYRENE	5 U	5 U	5 U
TETRACHLOROETHENE	5 U	5 U	5 U
TOLUENE	5 U	5 U	5 U
TOTAL 1,2-DICHLOROETHENE	5 U	5 U	5 U
TOTAL XYLENES	5 U	5 U	5 U
TRANS-1,3-DICHLOROPROPENE	5 U	5 U	5 U
TRANS-1,4-DICHLORO-2-BUTENE	5 U	5 U	5 U
TRICHLOROETHENE	5 U	5 U	5 U
TRICHLOROFLUOROMETHANE	5 U	5 U	5 U
VINYL ACETATE	10 U	10 U	10 U
VINYL CHLORIDE	10 U	10 U	10 U
Semivolatile Organics (ug/L)			
1,2,4,5-TETRACHLOROBENZENE	50 U	50 U	50 U
1,2,4-TRICHLOROBENZENE	10 U	10 U	10 U
1,2-DIPHENYLHYDRAZINE	10 U	10 U	10 U
1,3,5-TRINITROBENZENE	10 U	10 U	10 U
1,3-DINITROBENZENE	10 U	10 U	10 U
1,4-NAPHTHOQUINONE	1000 R	1000 R	1000 R
1,4-PHENYLENEDIAMINE	500 UJ	500 UJ	500 UJ
1-NAPHTHYLAMINE	50 U	50 U	50 UJ
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U	10 U	10 U
2,3,4,6-TETRACHLOROPHENOL	10 U	10 U	10 U
2,4,5-TRICHLOROPHENOL	50 U	50 U	50 U
2,4,6-TRICHLOROPHENOL	10 U	10 U	10 U
2,4-DICHLOROPHENOL	10 U	10 U	10 U
2,4-DIMETHYLPHENOL	10 U	10 U	10 U
2,4-DINITROPHENOL	50 U	50 U	50 U
2,4-DINITROTOLUENE	10 U	10 U	10 U
2,6-DICHLOROPHENOL	10 U	10 U	10 UJ
2,6-DINITROTOLUENE	10 U	10 U	10 U
2-ACETYLAMINOFLUORENE	10 UJ	10 UJ	10 UJ
2-CHLORONAPHTHALENE	10 U	10 U	10 U
2-CHLOROPHENOL	10 U	10 U	10 U
2-METHYLNAPHTHALENE	10 U	10 U	10 U
2-METHYLPHENOL	10 U	10 U	10 U
2-NAPHTHYLAMINE	50 U	50 U	50 UJ
2-NITROANILINE	50 U	50 U	50 U
2-NITROPHENOL	10 U	10 U	10 U
2-PICOLINE	50 U	50 U	50 U
3&4-METHYLPHENOL	10 U	10 U	10 U
3,3'-DICHLOROBENZIDINE	20 U	20 U	20 U
3,3'-DIMETHYLBENZIDINE	10 UJ	10 UJ	10 UJ
3-METHYLCHOLANTHRENE	10 U	10 U	10 U
3-NITROANILINE	50 U	50 U	50 U
4,6-DINITRO-2-METHYLPHENOL	50 U	50 U	50 U
4-AMINOBIPHENYL	50 U	50 U	50 UJ
4-BROMOPHENYL PHENYL ETHER	10 U	10 U	10 U
4-CHLOROANILINE	10 U	10 U	10 U

4-CHLOROPHENYL PHENYL ETHER	10 U	10 U	10 U
4-NITROANILINE	50 U	50 U	50 U
4-NITROPHENOL	50 U	50 U	50 U
4-NITROQUINOLINE-1-OXIDE	500 UJ	500 UJ	500 U
5-NITRO-O-TOLUIDINE	10 U	10 U	10 U
7,12-DIMETHYLBENZ(A)ANTHRACENE	10 U	10 U	10 U
A,A-DIMETHYLPHENETHYLAMINE	50 UJ	50 UJ	50 UJ
ACENAPHTHENE	10 U	10 U	10 U
ACENAPHTHYLENE	10 U	10 U	10 U
ACETOPHENONE	10 U	10 U	10 U
ANILINE	10 U	10 U	10 U
ANTHRACENE	10 U	10 U	10 U
ARAMITE	50 U	50 U	50 U
BENZIDINE	50 UJ	50 UJ	50 U
BENZO(A)ANTHRACENE	10 U	10 U	10 U
BENZO(A)PYRENE	10 U	10 U	10 U
BENZO(B)FLUORANTHENE	10 U	10 U	10 U
BENZO(G,H,I)PERYLENE	10 U	10 U	10 UJ
BENZO(K)FLUORANTHENE	10 U	10 U	10 U
BENZOIC ACID	50 U	50 U	50 U
BENZYL ALCOHOL	10 U	10 U	10 U
BIS(2-CHLOROETHOXY)METHANE	10 U	10 U	10 U
BIS(2-CHLOROETHYL)ETHER	10 U	10 U	10 U
BIS(2-ETHYLHEXYL)PHTHALATE	2 J	10 U	10 U
BUTYL BENZYL PHTHALATE	10 U	10 U	10 U
CHLOROBENZILATE	0.50 U	0.50 U	0.50 U
CHRYSENE	10 U	10 U	10 U
DI-N-BUTYL PHTHALATE	10 U	10 U	10 U
DI-N-OCTYL PHTHALATE	10 U	10 U	10 U
DIALLATE	1 U	1 U	1 U
DIBENZO(A,H)ANTHRACENE	10 U	10 U	10 UJ
DIBENZOFURAN	10 U	10 U	10 U
DIETHYL PHTHALATE	10 U	10 U	10 U
DIMETHYL PHTHALATE	10 U	10 U	10 U
ETHYL METHANE SULFONATE	10 U	10 U	10 U
FLUORANTHENE	10 U	10 U	10 U
FLUORENE	10 U	10 U	10 U
HEXACHLOROBENZENE	10 U	10 U	10 U
HEXACHLOROBUTADIENE	10 U	10 U	10 U
HEXACHLOROCYCLOPENTADIENE	10 U	10 U	10 U
HEXACHLOROETHANE	10 U	10 U	10 U
HEXACHLOROPHENE	500 R	500 R	500 UJ
HEXACHLOROPROPENE	50 U	50 U	50 U
INDENO(1,2,3-CD)PYRENE	10 U	10 U	10 UJ
ISODRIN	0.02 U	0.02 U	0.02 U
ISOPHORONE	10 U	10 U	10 U
ISOSAFROLE	50 U	50 U	50 U
METHAPYRILENE	50 UJ	50 UJ	50 UJ
METHYL METHANE SULFONATE	10 UJ	10 UJ	10 UJ
N-NITROSO-DI-N-BUTYLAMINE	10 U	10 U	10 U
N-NITROSO-DI-N-PROPYLAMINE	10 U	10 U	10 U

N-NITROSODIETHYLAMINE	10 U	10 U	10 U
N-NITROSODIMETHYLAMINE	10 U	10 U	10 U
N-NITROSODIPHENYLAMINE	10 U	10 U	10 U
N-NITROSOMETHYLETHYLAMINE	10 U	10 U	10 U
N-NITROSOMORPHOLINE	10 U	10 U	10 U
N-NITROSOPIPERIDINE	10 U	10 U	10 U
N-NITROSOPYRROLIDINE	10 U	10 U	10 U
NAPHTHALENE	10 U	10 U	10 U
NITROBENZENE	10 U	10 U	10 U
O-TOLUIDINE	10 U	10 U	10 U
P-(DIMETHYLAMINO)AZOBENZENE	10 U	10 U	10 U
PENTACHLOROBENZENE	50 U	50 U	50 U
PENTACHLORONITROBENZENE	50 U	50 U	50 U
PENTACHLOROPHENOL	50 U	50 U	50 U
PHENACETIN	10 U	10 U	10 U
PHENANTHRENE	10 U	10 U	10 U
PHENOL	10 U	10 U	10 U
PRONAMIDE	10 U	10 U	10 U
PYRENE	10 U	10 U	10 U
PYRIDINE	50 U	50 U	50 U
SAFROLE	50 U	50 U	50 UJ
Pesticides/PCBs (ug/L)			
4,4'-DDD	0.04 U	0.04 U	0.04 U
4,4'-DDE	0.02 U	0.02 U	0.02 U
4,4'-DDT	0.04 U	0.04 U	0.04 U
ALDRIN	0.02 U	0.02 U	0.02 U
ALPHA-BHC	0.02 U	0.02 U	0.02 U
AROCLOR-1016	1 U	1 U	1 U
AROCLOR-1221	2 U	2 U	2 U
AROCLOR-1232	2 U	2 U	2 U
AROCLOR-1242	1 U	1 U	1 U
AROCLOR-1248	1 U	1 U	1 U
AROCLOR-1254	0.50 U	0.50 U	0.50 U
AROCLOR-1260	0.50 U	0.50 U	0.50 U
BETA-BHC	0.04 U	0.04 U	0.04 U
CHLORDANE	0.20 U	0.20 U	0.20 U
DELTA-BHC	0.02 U	0.02 U	0.02 U
DIELDRIN	0.02 U	0.02 U	0.02 U
ENDOSULFAN I	0.02 U	0.02 U	0.02 U
ENDOSULFAN II	0.04 U	0.04 U	0.04 U
ENDOSULFAN SULFATE	0.04 U	0.04 U	0.04 U
ENDRIN	0.04 U	0.04 U	0.04 U
ENDRIN ALDEHYDE	0.04 U	0.04 U	0.04 U
ENDRIN KETONE	0.04 U	0.04 U	0.04 U
GAMMA-BHC (LINDANE)	0.02 U	0.02 U	0.02 U
HEPTACHLOR	0.02 U	0.02 U	0.02 U
HEPTACHLOR EPOXIDE	0.02 U	0.02 U	0.02 U
KEPONE	1 UJ	1 UJ	1 UJ
METHOXYCHLOR	0.08 U	0.08 U	0.08 U
TOXAPHENE	1 U	1 U	1 U
Inorganics (ug/L)			

ANTIMONY	5 U	5 U	5 U
ARSENIC	2.3 UJ	3.4 UJ	5.4 J
BARIUM	9.9 J	13.1 J	28 J
BERYLLIUM	0.30 U	0.30 U	0.30 U
CADMIUM	1.2 U	1.2 U	1.2 U
CALCIUM	61400	90800	86900
CHROMIUM	1.7 U	1.7 U	1.7 U
COBALT	3.1 U	3.1 U	3.1 U
COPPER	1 U	1 U	1 U
IRON	136	1250 [G]	474 [G]
LEAD	0.90 UJ	0.40 U	1.2 UJ
MAGNESIUM	9110	5130	24500
MANGANESE	81.6 [G]	107 [G]	129 [G]
MERCURY	0.10 U	0.10 U	0.10 U
NICKEL	5.7 U	5.7 U	6 J
SELENIUM	0.50 U	0.50 U	0.91 J
SILVER	1.4 U	1.4 U	1.4 U
SODIUM	17800	10400	29400
THALLIUM	0.60 U	0.60 U	0.60 U
TIN	13.6 U	13.6 U	13.6 U
VANADIUM	4 J	3.6 J	1.8 J
ZINC	5.37 UJ	5.37 UJ	5.37 UJ

Miscellaneous

ALKALINITY	201 MG/L	221 MG/L	282 MG/L
AMMONIA	800 UG/L	800 UG/L	1100 UG/L
CHLORIDE	14000 UG/L	16800 UG/L	22300 UG/L
CYANIDE	2.7 UG/L UJ	1.5 UG/L U	2.7 UG/L UJ
HARDNESS	190 MG/L	257 MG/L	329 MG/L
OIL & GREASE	5 MG/L U	5 MG/L U	5 MG/L U
PHOSPHORUS (ELEMENTAL)	390 UG/L [G]	330 UG/L [G]	330 UG/L [G]
SULFATE	14400 UG/L	30900 UG/L	80300 UG/L
SULFIDE	1 MG/L U	1 MG/L U	1.6 MG/L
TOTAL DISSOLVED SOLIDS	292000 UG/L	311000 UG/L	463000 UG/L
TOTAL KJELDAHL NITROGEN	1 MG/L	1 MG/L	1.3 MG/L
TOTAL ORGANIC CARBON	7.6 MG/L	10.3 MG/L	7.5 MG/L

MPT-20-MW03S 20G00301-AVG 19950601 GW	MPT-20-MW03S 20G00301-D 19950601 GW	MPT-21-MW01S 21G00101 19950602 GW	MPT-21-MW02S 21G00201 19950602 GW	MPT-21-MW03S 21G00301 19950602 GW
5 U	5 U	5 U	5 U	5 U
5 U	5 U	5 U	5 U	5 U
5 U	5 U	5 U	5 U	5 U
5 U	5 U	5 U	5 U	5 U
5 U	5 U	5 U	5 U	5 U
5 U	5 U	5 U	5 U	5 U
5 U	5 U	5 U	5 U	5 U
10 U	10 U	10 U	10 U	10 U
5 U	5 U	5 U	5 U	5 U
5 U	5 U	5 U	5 U	5 U
5 U	5 U	5 U	5 U	5 U
5 U	5 U	5 U	5 U	5 U
5 U	5 U	5 U	5 U	5 U
200 R	200 R	200 R	200 R	200 R
10 R	10 R	10 R	10 R	10 R
10 U	10 U	10 U	10 U	10 U
10 U	10 U	10 U	10 U	10 U
5 U	5 U	5 U	5 U	5 U
10 U	10 U	10 U	10 U	10 U
10 U	10 U	10 U	10 U	10 U
10 UJ	10 UJ	4 J	4 J	10 U
100 U	100 U	100 U	100 U	100 U
100 U	100 U	100 UJ	100 UJ	100 UJ
100 U	100 U	100 U	100 U	100 U
5 U	5 U	5 U	5 U	5 U
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200 R	200 R	200 R	200 R	200 R
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1000 R	1000 R	1000 R	1000 R	1000 R
500 UJ	500 UJ	500 UJ	500 UJ	500 UJ
50 UJ	50 UJ	50 U	50 U	50 U
10 U	10 U	10 U	10 U	10 U
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50 UJ	50 UJ	50 U	50 U	50 U
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500 U	500 U	500 UJ	500 UJ	500 UJ
10 U	10 U	10 U	10 U	10 U
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50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
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10 UJ	10 UJ	10 U	10 U	10 U
10 U	10 U	10 U	10 U	10 U
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10 U	10 U	10 U	10 U	10 U
10 U	10 U	10 U	10 U	10 U
10 U	10 U	10 U	10 U	10 U
10 U	10 U	10 U	10 U	10 U
500 UJ	500 UJ	500 R	500 R	500 R
50 U	50 U	50 U	50 U	50 U
10 UJ	10 UJ	10 U	10 U	10 U
0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
10 U	10 U	10 U	10 U	10 U
50 U	50 U	50 U	50 U	50 U
50 UJ	50 UJ	50 UJ	50 UJ	50 UJ
10 UJ	10 UJ	10 UJ	10 UJ	10 UJ
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10 U	10 U	10 U	10 U	10 U
10 U	10 U	10 U	10 U	10 U
50 U	50 U	50 U	50 U	50 U
50 UJ	50 UJ	50 U	50 U	50 U

0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
1 U	1 U	1 U	1 U	1 U
2 U	2 U	2 U	2 U	2 U
2 U	2 U	2 U	2 U	2 U
1 U	1 U	1 U	1 U	1 U
1 U	1 U	1 U	1 U	1 U
0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
0.50 U	0.50 U	0.50 U	0.50 U	0.50 U
0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
0.20 U	0.20 U	0.20 U	0.20 U	0.20 U
0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
0.04 U	0.04 U	0.04 U	0.04 U	0.04 U
0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
1 UJ	1 UJ	1 UJ	1 UJ	1 UJ
0.08 U	0.08 U	0.08 U	0.08 U	0.08 U
1 U	1 U	1 U	1 U	1 U

5 U	5 U	5 U	5 U	5 U
5.45 J	5.5 J	1.8 UJ	1.2 UJ	3 UJ
28.9 J	29.8 J	2.9 J	3.2 J	1.8 J
0.30 U	0.30 U	0.30 U	0.30 U	0.30 U
1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
88250	89600	54900	66900	38000
1.7 U	1.7 U	1.7 U	1.7 U	1.7 U
3.1 U	3.1 U	3.1 U	3.1 U	3.1 U
1 U	1 U	1 U	1 U	1 U
475.5 [G]	477 [G]	102	125	54.6 J
0.80 UJ	0.40 U	0.90 UJ	0.40 U	0.90 UJ
24400	24300	16100	6130	1430 J
134.5 [G]	140 [G]	47.9	50.5 [G]	15.3
0.10 U	0.10 U	0.10 U	0.10 U	0.10 U
6.2 J	6.4 J	5.7 U	5.7 U	5.7 U
0.58 J	0.50 U	0.50 U	0.50 U	0.50 U
1.4 U	1.4 U	1.4 U	1.4 U	1.4 U
28250	27100	13100	13100	5160
0.60 U	0.60 U	0.60 U	0.60 U	0.60 U
13.6 U	13.6 U	13.6 U	13.6 U	13.6 U
1.9 J	2 J	1.8 J	2.1 J	1.8 J
5.37 UJ	5.37 UJ	5.37 UJ	5.8 UJ	5.37 UJ

282 MG/L		209 MG/L	198 MG/L	108 MG/L
1100 UG/L		1000 UG/L	1000 UG/L	300 UG/L U
22300 UG/L		11000 UG/L	16200 UG/L	3660 UG/L
3.35 UG/L UJ	4 UG/L UJ	1.5 UG/L U	1.5 UG/L U	1.5 UG/L U
329 MG/L		206 MG/L	194 MG/L	102 MG/L
5 MG/L U		5 MG/L U	5 MG/L U	5 MG/L U
330 UG/L [G]		180 UG/L [G]	170 UG/L [G]	100 UG/L U
80300 UG/L		22200 UG/L	9560 UG/L	8860 UG/L
1.6 MG/L		1 MG/L U	1 MG/L U	1 MG/L U
463000 UG/L		283000 UG/L	275000 UG/L	145000 UG/L
1.3 MG/L		1 MG/L	1.1 MG/L	0.30 MG/L U
7.5 MG/L		6.6 MG/L	6 MG/L	3.5 MG/L

SWMU 52

LOCATION ID	MPT-52-MW01S
SAMPLE ID	52S00101
SAMPLE DATE	19950505
MATRIX	SO
TOP DEPTH	1
BOTTOM DEPTH	1
DEPTH UNITS	FT
SUBMATRIX	SS
Volatile Organics (mg/kg)	
1,1,1,2-TETRACHLOROETHANE	0.005 U
1,1,1-TRICHLOROETHANE	0.005 U
1,1,2,2-TETRACHLOROETHANE	0.005 U
1,1,2-TRICHLOROETHANE	0.005 U
1,1-DICHLOROETHANE	0.005 U
1,1-DICHLOROETHENE	0.005 U
1,2,3-TRICHLOROPROPANE	0.005 U
1,2-DIBROMO-3-CHLOROPROPANE	0.01 U
1,2-DIBROMOETHANE	0.005 U
1,2-DICHLOROBENZENE	0.005 U
1,2-DICHLOROETHANE	0.005 U
1,2-DICHLOROPROPANE	0.005 U
1,3-DICHLOROBENZENE	0.005 U
1,4-DICHLOROBENZENE	0.005 U
1,4-DIOXANE	0.21 R
2-BUTANONE	0.01 U
2-CHLOROETHYL VINYL ETHER	0.01 U
2-HEXANONE	0.01 U
3-CHLOROPROPENE	0.005 U
4-CHLORO-3-METHYLPHENOL	0.70 U
4-METHYL-2-PENTANONE	0.01 U
ACETONE	0.018 U
ACETONITRILE	0.10 U
ACROLEIN	0.10 UJ
ACRYLONITRILE	0.10 U
BENZENE	0.005 U
BROMODICHLOROMETHANE	0.005 U
BROMOFORM	0.005 U
BROMOMETHANE	0.01 U
CARBON DISULFIDE	0.005 U
CARBON TETRACHLORIDE	0.005 U
CHLOROBENZENE	0.005 U
CHLORODIBROMOMETHANE	0.005 U
CHLOROETHANE	0.01 U
CHLOROFORM	0.005 U
CHLOROMETHANE	0.01 U
CHLOROPRENE	0.21 U
CIS-1,3-DICHLOROPROPENE	0.005 U
DIBROMOMETHANE	0.005 U
DICHLORODIFLUOROMETHANE	0.01 U
ETHYL METHACRYLATE	0.005 U
ETHYLBENZENE	0.005 U

ISOBUTANOL	0.21 UJ
METHACRYLONITRILE	0.005 U
METHYL IODIDE	0.01 U
METHYL METHACRYLATE	0.01 U
METHYLENE CHLORIDE	0.018 U
PENTACHLOROETHANE	0.01 U
PROPIONITRILE	0.10 U
STYRENE	0.005 U
TETRACHLOROETHENE	0.005 U
TOLUENE	0.005 U
TOTAL 1,2-DICHLOROETHENE	0.005 U
TOTAL XYLENES	0.008
TRANS-1,3-DICHLOROPROPENE	0.005 U
TRANS-1,4-DICHLORO-2-BUTENE	0.005 U
TRICHLOROETHENE	0.005 U
TRICHLOROFLUOROMETHANE	0.005 U
VINYL ACETATE	0.01 U
VINYL CHLORIDE	0.01 U

Semivolatile Organics (mg/kg)

1,2,4,5-TETRACHLOROBENZENE	3.4 U
1,2,4-TRICHLOROBENZENE	0.70 U
1,2-DIPHENYLHYDRAZINE	0.70 U
1,3,5-TRINITROBENZENE	0.70 U
1,3-DINITROBENZENE	0.70 U
1,4-NAPHTHOQUINONE	70 U
1,4-PHENYLENEDIAMINE	34 U
1-NAPHTHYLAMINE	3.4 U
2,2'-OXYBIS(1-CHLOROPROPANE)	0.70 U
2,3,4,6-TETRACHLOROPHENOL	0.70 U
2,4,5-TRICHLOROPHENOL	3.4 U
2,4,6-TRICHLOROPHENOL	0.70 U
2,4-DICHLOROPHENOL	0.70 U
2,4-DIMETHYLPHENOL	0.70 U
2,4-DINITROPHENOL	3.4 U
2,4-DINITROTOLUENE	0.70 U
2,6-DICHLOROPHENOL	0.70 U
2,6-DINITROTOLUENE	0.70 U
2-ACETYLAMINOFLUORENE	0.70 U
2-CHLORONAPHTHALENE	0.70 U
2-CHLOROPHENOL	0.70 U
2-METHYLNAPHTHALENE	0.70 U
2-METHYLPHENOL	0.70 U
2-NAPHTHYLAMINE	3.4 U
2-NITROANILINE	3.4 U
2-NITROPHENOL	0.70 U
2-PICOLINE	3.4 UJ
3&4-METHYLPHENOL	0.70 UJ
3,3'-DICHLOROBENZIDINE	1.4 U
3,3'-DIMETHYLBENZIDINE	0.70 U
3-METHYLCHOLANTHRENE	0.70 U
3-NITROANILINE	3.4 U

4,6-DINITRO-2-METHYLPHENOL	3.4 U
4-AMINOBIPHENYL	3.4 U
4-BROMOPHENYL PHENYL ETHER	0.70 U
4-CHLOROANILINE	0.70 U
4-CHLOROPHENYL PHENYL ETHER	0.70 U
4-NITROANILINE	3.4 U
4-NITROPHENOL	3.4 U
4-NITROQUINOLINE-1-OXIDE	34 U
5-NITRO-O-TOLUIDINE	0.70 U
7,12-DIMETHYLBENZ(A)ANTHRACENE	0.70 U
A,A-DIMETHYLPHENETHYLAMINE	3.4 U
ACENAPHTHENE	0.70 U
ACENAPHTHYLENE	0.70 U
ACETOPHENONE	0.70 U
ANILINE	0.70 U
ANTHRACENE	0.70 U
ARAMITE	3.4 U
BAP EQUIVALENT	0.48124
BENZIDINE	3.4 U
BENZO(A)ANTHRACENE	0.087 J
BENZO(A)PYRENE	0.10 J
BENZO(B)FLUORANTHENE	0.14 J
BENZO(G,H,I)PERYLENE	0.091 J
BENZO(K)FLUORANTHENE	0.10 J
BENZOIC ACID	3.4 U
BENZYL ALCOHOL	0.70 U
BIS(2-CHLOROETHOXY)METHANE	0.70 U
BIS(2-CHLOROETHYL)ETHER	0.70 U
BIS(2-ETHYLHEXYL)PHTHALATE	0.70 U
BUTYL BENZYL PHTHALATE	0.70 U
CHLOROBENZILATE	0.21 U
CHRYSENE	0.13 J
DI-N-BUTYL PHTHALATE	0.70 U
DI-N-OCTYL PHTHALATE	0.70 U
DIALLATE	0.43 U
DIBENZO(A,H)ANTHRACENE	0.70 U
DIBENZOFURAN	0.70 U
DIETHYL PHTHALATE	0.70 U
DIMETHYL PHTHALATE	0.70 U
ETHYL METHANE SULFONATE	0.70 U
FLUORANTHENE	0.15 J
FLUORENE	0.70 U
HEXACHLOROBENZENE	0.70 U
HEXACHLOROBUTADIENE	0.70 U
HEXACHLOROCYCLOPENTADIENE	0.70 U
HEXACHLOROETHANE	0.70 U
HEXACHLOROPHENE	34 U
HEXACHLOROPROPENE	3.4 U
INDENO(1,2,3-CD)PYRENE	0.075 J
ISODRIN	0.0071 U
ISOPHORONE	0.70 U

ISOSAFROLE	3.4 U
METHAPYRILENE	3.4 U
METHYL METHANE SULFONATE	0.70 U
N-NITROSO-DI-N-BUTYLAMINE	0.70 U
N-NITROSO-DI-N-PROPYLAMINE	0.70 U
N-NITROSODIETHYLAMINE	0.70 UJ
N-NITROSODIMETHYLAMINE	0.70 U
N-NITROSODIPHENYLAMINE	0.70 U
N-NITROSOMETHYLETHYLAMINE	0.70 U
N-NITROSOMORPHOLINE	0.70 U
N-NITROSOPIPERIDINE	0.70 U
N-NITROSOPYRROLIDINE	0.70 U
NAPHTHALENE	0.70 U
NITROBENZENE	0.70 U
O-TOLUIDINE	0.70 U
P-(DIMETHYLAMINO)AZOBENZENE	0.70 U
PENTACHLOROBENZENE	3.4 U
PENTACHLORONITROBENZENE	3.4 U
PENTACHLOROPHENOL	3.4 U
PHENACETIN	0.70 U
PHENANTHRENE	0.70 U
PHENOL	0.70 U
PRONAMIDE	0.70 U
PYRENE	0.11 J
PYRIDINE	3.4 UJ
SAFROLE	3.4 U

Pesticides/PCBs (mg/kg)

4,4'-DDD	0.014 U
4,4'-DDE	0.38
4,4'-DDT	0.79
ALDRIN	0.0071 U
ALPHA-BHC	0.0071 U
AROCLOR-1016	0.35 U
AROCLOR-1221	0.71 U
AROCLOR-1232	0.71 U
AROCLOR-1242	0.35 U
AROCLOR-1248	0.35 U
AROCLOR-1254	0.17 U
AROCLOR-1260	0.17 U
BETA-BHC	0.014 U
CHLORDANE	0.071 U
DELTA-BHC	0.0071 U
DIELDRIN	0.0071 U
ENDOSULFAN I	0.0071 U
ENDOSULFAN II	0.014 U
ENDOSULFAN SULFATE	0.014 U
ENDRIN	0.014 U
ENDRIN ALDEHYDE	0.014 U
ENDRIN KETONE	0.014 U
GAMMA-BHC (LINDANE)	0.0071 U
HEPTACHLOR	0.0071 U

HEPTACHLOR EPOXIDE	0.0071 U
KEPONE	0.043 U
METHOXYCHLOR	0.029 U
TOXAPHENE	0.35 U

Inorganics (mg/kg)

ANTIMONY	1.1 U
ARSENIC	0.51 J
BARIUM	4.8 J
BERYLLIUM	0.06 U
CADMIUM	0.26 U
CHROMIUM	4.2
COBALT	0.66 U
COPPER	1.4 UJ
LEAD	3.6 J
MERCURY	0.03 U
NICKEL	1.2 U
SELENIUM	0.11 UJ
SILVER	0.61 UJ
THALLIUM	0.13 U
TIN	2.9 U
VANADIUM	6.3 J
ZINC	5.4

Miscellaneous (mg/kg)

CYANIDE	0.05 U

LOCATION ID	MPT-52-MW01S
SAMPLE ID	52B00104
SAMPLE DATE	19950505
MATRIX	SO
TOP DEPTH	4
BOTTOM DEPTH	4
DEPTH UNIT	FT
SUBMATRIX	SB
Volatile Organics (mg/kg)	
1,1,1,2-TETRACHLOROETHANE	0.006 U
1,1,1-TRICHLOROETHANE	0.006 U
1,1,2,2-TETRACHLOROETHANE	0.006 U
1,1,2-TRICHLOROETHANE	0.006 U
1,1-DICHLOROETHANE	0.006 U
1,1-DICHLOROETHENE	0.006 U
1,2,3-TRICHLOROPROPANE	0.006 U
1,2-DIBROMO-3-CHLOROPROPANE	0.013 U
1,2-DIBROMOETHANE	0.006 U
1,2-DICHLOROBENZENE	0.006 U
1,2-DICHLOROETHANE	0.006 U
1,2-DICHLOROPROPANE	0.006 U
1,3-DICHLOROBENZENE	0.006 U
1,4-DICHLOROBENZENE	0.006 U
1,4-DIOXANE	0.26 R
2-BUTANONE	0.007 J
2-CHLOROETHYL VINYL ETHER	0.013 U
2-HEXANONE	0.013 U
3-CHLOROPROPENE	0.006 U
4-CHLORO-3-METHYLPHENOL	0.84 U
4-METHYL-2-PENTANONE	0.013 U
ACETONE	0.019 U
ACETONITRILE	0.13 U
ACROLEIN	0.13 UJ
ACRYLONITRILE	0.13 U
BENZENE	0.006 U
BROMODICHLOROMETHANE	0.006 U
BROMOFORM	0.006 U
BROMOMETHANE	0.013 U
CARBON DISULFIDE	0.006 U
CARBON TETRACHLORIDE	0.006 U
CHLOROBENZENE	0.006 U
CHLORODIBROMOMETHANE	0.006 U
CHLOROETHANE	0.013 U
CHLOROFORM	0.006 U
CHLOROMETHANE	0.013 U
CHLOROPRENE	0.26 U
CIS-1,3-DICHLOROPROPENE	0.006 U
DIBROMOMETHANE	0.006 U
DICHLORODIFLUOROMETHANE	0.013 U
ETHYL METHACRYLATE	0.006 U
ETHYLBENZENE	0.006 U

ISOBUTANOL	0.26 UJ
METHACRYLONITRILE	0.006 U
METHYL IODIDE	0.013 U
METHYL METHACRYLATE	0.013 U
METHYLENE CHLORIDE	0.03 U
PENTACHLOROETHANE	0.013 U
PROPIONITRILE	0.13 U
STYRENE	0.006 U
TETRACHLOROETHENE	0.006 U
TOLUENE	0.006 U
TOTAL 1,2-DICHLOROETHENE	0.006 U
TOTAL XYLENES	0.002 J
TRANS-1,3-DICHLOROPROPENE	0.006 U
TRANS-1,4-DICHLORO-2-BUTENE	0.006 U
TRICHLOROETHENE	0.006 U
TRICHLOROFLUOROMETHANE	0.006 U
VINYL ACETATE	0.013 U
VINYL CHLORIDE	0.013 U

Semivolatile Organics (mg/kg)

1,2,4,5-TETRACHLOROBENZENE	4.1 U
1,2,4-TRICHLOROBENZENE	0.84 U
1,2-DIPHENYLHYDRAZINE	0.84 U
1,3,5-TRINITROBENZENE	0.84 U
1,3-DINITROBENZENE	0.84 U
1,4-NAPHTHOQUINONE	84 U
1,4-PHENYLENEDIAMINE	41 U
1-NAPHTHYLAMINE	4.1 U
2,2'-OXYBIS(1-CHLOROPROPANE)	0.84 U
2,3,4,6-TETRACHLOROPHENOL	0.84 U
2,4,5-TRICHLOROPHENOL	4.1 U
2,4,6-TRICHLOROPHENOL	0.84 U
2,4-DICHLOROPHENOL	0.84 U
2,4-DIMETHYLPHENOL	0.84 U
2,4-DINITROPHENOL	4.1 U
2,4-DINITROTOLUENE	0.84 U
2,6-DICHLOROPHENOL	0.84 U
2,6-DINITROTOLUENE	0.84 U
2-ACETYLAMINOFLUORENE	0.84 U
2-CHLORONAPHTHALENE	0.84 U
2-CHLOROPHENOL	0.84 U
2-METHYLNAPHTHALENE	0.84 U
2-METHYLPHENOL	0.84 U
2-NAPHTHYLAMINE	4.1 U
2-NITROANILINE	4.1 U
2-NITROPHENOL	0.84 U
2-PICOLINE	4.1 UJ
3&4-METHYLPHENOL	0.84 UJ
3,3'-DICHLOROBENZIDINE	1.7 U
3,3'-DIMETHYLBENZIDINE	0.84 U
3-METHYLCHOLANTHRENE	0.84 U
3-NITROANILINE	4.1 U

4,6-DINITRO-2-METHYLPHENOL	4.1 U
4-AMINOBIPHENYL	4.1 U
4-BROMOPHENYL PHENYL ETHER	0.84 U
4-CHLOROANILINE	0.84 U
4-CHLOROPHENYL PHENYL ETHER	0.84 U
4-NITROANILINE	4.1 U
4-NITROPHENOL	4.1 U
4-NITROQUINOLINE-1-OXIDE	41 U
5-NITRO-O-TOLUIDINE	0.84 U
7,12-DIMETHYLBENZ(A)ANTHRACENE	0.84 U
A,A-DIMETHYLPHENETHYLAMINE	4.1 U
ACENAPHTHENE	0.84 U
ACENAPHTHYLENE	0.84 U
ACETOPHENONE	0.84 U
ANILINE	0.84 U
ANTHRACENE	0.84 U
ARAMITE	4.1 U
BENZIDINE	4.1 U
BENZO(A)ANTHRACENE	0.84 U
BENZO(A)PYRENE	0.84 U
BENZO(B)FLUORANTHENE	0.84 U
BENZO(G,H,I)PERYLENE	0.84 U
BENZO(K)FLUORANTHENE	0.84 U
BENZOIC ACID	4.1 U
BENZYL ALCOHOL	0.84 U
BIS(2-CHLOROETHOXY)METHANE	0.84 U
BIS(2-CHLOROETHYL)ETHER	0.84 U
BIS(2-ETHYLHEXYL)PHTHALATE	0.84 U
BUTYL BENZYL PHTHALATE	0.84 U
CHLOROBENZILATE	0.025 R
CHRYSENE	0.84 U
DI-N-BUTYL PHTHALATE	0.84 U
DI-N-OCTYL PHTHALATE	0.84 U
DIALLATE	0.051 R
DIBENZO(A,H)ANTHRACENE	0.84 U
DIBENZOFURAN	0.84 U
DIETHYL PHTHALATE	0.84 U
DIMETHYL PHTHALATE	0.84 U
ETHYL METHANE SULFONATE	0.84 U
FLUORANTHENE	0.84 U
FLUORENE	0.84 U
HEXACHLOROBENZENE	0.84 U
HEXACHLOROBUTADIENE	0.84 U
HEXACHLOROCYCLOPENTADIENE	0.84 U
HEXACHLOROETHANE	0.84 U
HEXACHLOROPHENE	41 U
HEXACHLOROPROPENE	4.1 U
INDENO(1,2,3-CD)PYRENE	0.84 U
ISODRIN	0.00085 R
ISOPHORONE	0.84 U
ISOSAFROLE	4.1 U

METHAPYRILENE	4.1 U
METHYL METHANE SULFONATE	0.84 U
N-NITROSO-DI-N-BUTYLAMINE	0.84 U
N-NITROSO-DI-N-PROPYLAMINE	0.84 U
N-NITROSODIETHYLAMINE	0.84 UJ
N-NITROSODIMETHYLAMINE	0.84 U
N-NITROSODIPHENYLAMINE	0.84 U
N-NITROSOMETHYLETHYLAMINE	0.84 U
N-NITROSOMORPHOLINE	0.84 U
N-NITROSOPIPERIDINE	0.84 U
N-NITROSOPYRROLIDINE	0.84 U
NAPHTHALENE	0.84 U
NITROBENZENE	0.84 U
O-TOLUIDINE	0.84 U
P-(DIMETHYLAMINO)AZOBENZENE	0.84 U
PENTACHLOROBENZENE	4.1 U
PENTACHLORONITROBENZENE	4.1 U
PENTACHLOROPHENOL	4.1 U
PHENACETIN	0.84 U
PHENANTHRENE	0.84 U
PHENOL	0.84 U
PRONAMIDE	0.84 U
PYRENE	0.84 U
PYRIDINE	4.1 UJ
SAFROLE	4.1 U

Pesticides/PCBs (mg/kg)

4,4'-DDD	0.0016 R
4,4'-DDE	0.0048 R
4,4'-DDT	0.0082 R
ALDRIN	0.00085 R
ALPHA-BHC	0.00085 R
AROCLOR-1016	0.042 R
AROCLOR-1221	0.085 R
AROCLOR-1232	0.085 R
AROCLOR-1242	0.042 R
AROCLOR-1248	0.042 R
AROCLOR-1254	0.02 R
AROCLOR-1260	0.02 R
BETA-BHC	0.0016 R
CHLORDANE	0.0085 R
DELTA-BHC	0.00085 R
DIELDRIN	0.00085 R
ENDOSULFAN I	0.00085 R
ENDOSULFAN II	0.0016 R
ENDOSULFAN SULFATE	0.0016 R
ENDRIN	0.0016 R
ENDRIN ALDEHYDE	0.0016 R
ENDRIN KETONE	0.0016 R
GAMMA-BHC (LINDANE)	0.00085 R
HEPTACHLOR	0.00085 R
HEPTACHLOR EPOXIDE	0.00085 R

KEPONE	0.051 R
METHOXYCHLOR	0.0034 R
TOXAPHENE	0.042 R

Inorganics (mg/kg)

ANTIMONY	1.3 U
ARSENIC	0.43 J
BARIUM	2.6 J
BERYLLIUM	0.08 J
CADMIUM	0.30 U
CHROMIUM	1.6 J
COBALT	0.78 U
COPPER	0.72 UJ
LEAD	0.76 UJ
MERCURY	0.04 U
NICKEL	1.4 U
SELENIUM	0.13 U
SILVER	0.61 UJ
THALLIUM	0.15 U
TIN	3.4 U
VANADIUM	1.1 J
ZINC	2.3 UJ

Miscellaneous (mg/kg)

CYANIDE	0.06 U

LOCATION ID	MPT-52-MW01S
SAMPLE ID	52G00101
SAMPLE DATE	19950603
MATRIX	GW
Volatile Organics (ug/L)	
1,1,1,2-TETRACHLOROETHANE	5 U
1,1,1-TRICHLOROETHANE	5 U
1,1,2,2-TETRACHLOROETHANE	5 U
1,1,2-TRICHLOROETHANE	5 U
1,1-DICHLOROETHANE	5 U
1,1-DICHLOROETHENE	5 U
1,2,3-TRICHLOROPROPANE	5 U
1,2-DIBROMO-3-CHLOROPROPANE	10 U
1,2-DIBROMOETHANE	5 U
1,2-DICHLOROBENZENE	5 U
1,2-DICHLOROETHANE	5 U
1,2-DICHLOROPROPANE	5 U
1,3-DICHLOROBENZENE	5 U
1,4-DICHLOROBENZENE	5 U
1,4-DIOXANE	200 R
2-BUTANONE	10 R
2-CHLOROETHYL VINYL ETHER	10 U
2-HEXANONE	10 U
3-CHLOROPROPENE	5 U
4-CHLORO-3-METHYLPHENOL	10 U
4-METHYL-2-PENTANONE	10 U
ACETONE	10 U
ACETONITRILE	100 U
ACROLEIN	100 UJ
ACRYLONITRILE	100 U
BENZENE	5 U
BROMODICHLOROMETHANE	5 U
BROMOFORM	5 U
BROMOMETHANE	10 U
CARBON DISULFIDE	5 U
CARBON TETRACHLORIDE	5 U
CHLOROBENZENE	5 U
CHLORODIBROMOMETHANE	5 U
CHLOROETHANE	10 U
CHLOROFORM	5 U
CHLOROMETHANE	10 U
CHLOROPRENE	200 U
CIS-1,3-DICHLOROPROPENE	5 U
DIBROMOMETHANE	5 U
DICHLORODIFLUOROMETHANE	10 U
ETHYL METHACRYLATE	5 U
ETHYLBENZENE	5 U
ISOBUTANOL	200 R
METHACRYLONITRILE	5 U
METHYL IODIDE	10 U
METHYL METHACRYLATE	10 U

METHYLENE CHLORIDE	5 U
PENTACHLOROETHANE	10 U
PROPIONITRILE	100 U
STYRENE	5 U
TETRACHLOROETHENE	5 U
TOLUENE	5 U
TOTAL 1,2-DICHLOROETHENE	5 U
TOTAL XYLENES	5 U
TRANS-1,3-DICHLOROPROPENE	5 U
TRANS-1,4-DICHLORO-2-BUTENE	5 U
TRICHLOROETHENE	5 U
TRICHLOROFLUOROMETHANE	5 U
VINYL ACETATE	10 U
VINYL CHLORIDE	10 U

Semivolatile Organics (ug/L)

1,2,4,5-TETRACHLOROBENZENE	50 U
1,2,4-TRICHLOROBENZENE	10 U
1,2-DIPHENYLHYDRAZINE	10 U
1,3,5-TRINITROBENZENE	10 U
1,3-DINITROBENZENE	10 U
1,4-NAPHTHOQUINONE	1000 R
1,4-PHENYLENEDIAMINE	500 UJ
1-NAPHTHYLAMINE	50 U
2,2'-OXYBIS(1-CHLOROPROPANE)	10 U
2,3,4,6-TETRACHLOROPHENOL	10 U
2,4,5-TRICHLOROPHENOL	50 U
2,4,6-TRICHLOROPHENOL	10 U
2,4-DICHLOROPHENOL	10 U
2,4-DIMETHYLPHENOL	10 U
2,4-DINITROPHENOL	50 U
2,4-DINITROTOLUENE	10 U
2,6-DICHLOROPHENOL	10 U
2,6-DINITROTOLUENE	10 U
2-ACETYLAMINOFLUORENE	10 UJ
2-CHLORONAPHTHALENE	10 U
2-CHLOROPHENOL	10 U
2-METHYLNAPHTHALENE	10 U
2-METHYLPHENOL	10 U
2-NAPHTHYLAMINE	50 U
2-NITROANILINE	50 U
2-NITROPHENOL	10 U
2-PICOLINE	50 U
3&4-METHYLPHENOL	10 U
3,3'-DICHLOROBENZIDINE	20 U
3,3'-DIMETHYLBENZIDINE	10 UJ
3-METHYLCHOLANTHRENE	10 U
3-NITROANILINE	50 U
4,6-DINITRO-2-METHYLPHENOL	50 U
4-AMINOBIPHENYL	50 U
4-BROMOPHENYL PHENYL ETHER	10 U
4-CHLOROANILINE	10 U

4-CHLOROPHENYL PHENYL ETHER	10	U
4-NITROANILINE	50	U
4-NITROPHENOL	50	U
4-NITROQUINOLINE-1-OXIDE	500	UJ
5-NITRO-O-TOLUIDINE	10	U
7,12-DIMETHYLBENZ(A)ANTHRACENE	10	U
A,A-DIMETHYLPHENETHYLAMINE	50	UJ
ACENAPHTHENE	10	U
ACENAPHTHYLENE	10	U
ACETOPHENONE	10	U
ANILINE	10	U
ANTHRACENE	10	U
ARAMITE	50	U
BENZIDINE	50	UJ
BENZO(A)ANTHRACENE	10	U
BENZO(A)PYRENE	10	U
BENZO(B)FLUORANTHENE	10	U
BENZO(G,H,I)PERYLENE	10	U
BENZO(K)FLUORANTHENE	10	U
BENZOIC ACID	50	U
BENZYL ALCOHOL	10	U
BIS(2-CHLOROETHOXY)METHANE	10	U
BIS(2-CHLOROETHYL)ETHER	10	U
BIS(2-ETHYLHEXYL)PHTHALATE	10	U
BUTYL BENZYL PHTHALATE	10	U
CHLOROBENZILATE	0.50	U
CHRYSENE	10	U
DI-N-BUTYL PHTHALATE	10	U
DI-N-OCTYL PHTHALATE	10	U
DIALLATE	1	U
DIBENZO(A,H)ANTHRACENE	10	U
DIBENZOFURAN	10	U
DIETHYL PHTHALATE	10	U
DIMETHYL PHTHALATE	10	U
ETHYL METHANE SULFONATE	10	U
FLUORANTHENE	10	U
FLUORENE	10	U
HEXACHLOROBENZENE	10	U
HEXACHLOROBUTADIENE	10	U
HEXACHLOROCYCLOPENTADIENE	10	U
HEXACHLOROETHANE	10	U
HEXACHLOROPHENE	500	R
HEXACHLOROPROPENE	50	U
INDENO(1,2,3-CD)PYRENE	10	U
ISODRIN	0.02	U
ISOPHORONE	10	U
ISOSAFROLE	50	U
METHAPYRILENE	50	UJ
METHYL METHANE SULFONATE	10	UJ
N-NITROSO-DI-N-BUTYLAMINE	10	U
N-NITROSO-DI-N-PROPYLAMINE	10	U

N-NITROSODIETHYLAMINE	10 U
N-NITROSODIMETHYLAMINE	10 U
N-NITROSODIPHENYLAMINE	10 U
N-NITROSOMETHYLETHYLAMINE	10 U
N-NITROSOMORPHOLINE	10 U
N-NITROSOPIPERIDINE	10 U
N-NITROSOPYRROLIDINE	10 U
NAPHTHALENE	10 U
NITROBENZENE	10 U
O-TOLUIDINE	10 U
P-(DIMETHYLAMINO)AZOBENZENE	10 U
PENTACHLOROBENZENE	50 U
PENTACHLORONITROBENZENE	50 U
PENTACHLOROPHENOL	50 U
PHENACETIN	10 U
PHENANTHRENE	10 U
PHENOL	10 U
PRONAMIDE	10 U
PYRENE	10 U
PYRIDINE	50 U
SAFROLE	50 U

Pesticides/PCBs (ug/L)

4,4'-DDD	0.04 U
4,4'-DDE	0.02 U
4,4'-DDT	0.04 U
ALDRIN	0.02 U
ALPHA-BHC	0.02 U
AROCLOR-1016	1 U
AROCLOR-1221	2 U
AROCLOR-1232	2 U
AROCLOR-1242	1 U
AROCLOR-1248	1 U
AROCLOR-1254	0.50 U
AROCLOR-1260	0.50 U
BETA-BHC	0.04 U
CHLORDANE	0.20 U
DELTA-BHC	0.02 U
DIELDRIN	0.02 U
ENDOSULFAN I	0.02 U
ENDOSULFAN II	0.04 U
ENDOSULFAN SULFATE	0.04 U
ENDRIN	0.04 U
ENDRIN ALDEHYDE	0.04 U
ENDRIN KETONE	0.04 U
GAMMA-BHC (LINDANE)	0.02 U
HEPTACHLOR	0.02 U
HEPTACHLOR EPOXIDE	0.02 U
KEPONE	1 UJ
METHOXYCHLOR	0.08 U
TOXAPHENE	1 U

Inorganics (ug/L)

ANTIMONY	5 U
ARSENIC	2.5 UJ
BARIUM	5.2 J
BERYLLIUM	0.30 U
CADMIUM	1.2 U
CALCIUM	98700
CHROMIUM	1.7 U
COBALT	3.1 U
COPPER	1 U
IRON	223
LEAD	0.40 U
MAGNESIUM	21200
MANGANESE	106 [G]
MERCURY	0.10 U
NICKEL	5.7 U
SELENIUM	0.50 U
SILVER	1.4 U
SODIUM	15000
THALLIUM	0.60 U
TIN	13.6 U
VANADIUM	3.7 J
ZINC	5.37 UJ

Miscellaneous

ALKALINITY	266 MG/L
AMMONIA	500 UG/L
CHLORIDE	23300 UG/L
CYANIDE	1.5 UG/L U
HARDNESS	341 MG/L
OIL & GREASE	5 MG/L U
PHOSPHORUS (ELEMENTAL)	130 UG/L [G]
SULFATE	76900 UG/L
SULFIDE	1 MG/L U
TOTAL DISSOLVED SOLIDS	440000 UG/L
TOTAL KJELDAHL NITROGEN	0.90 MG/L
TOTAL ORGANIC CARBON	9.7 MG/L

APPENDIX B

REPRESENTATIVE CONCENTRATION CALCULATIONS

FDEP UCL Calculator Version 1.0 5/17/07

Summary Statistics for	
Number of Samples	14
Number of Censored Data	0
Minimum	0.3
Maximum	2.2
Mean	0.810714
Median	0.71
Standard Deviation	0.488821
Variance	0.238946
Coefficient of Variation	0.602951
Skewness	1.905008

95% UCL (Assuming Normal Data)	
Student's-t	1.042074

95% UCL (Adjusted for Skewness)	
Adjusted-CLT	1.096704
Modified-t	1.05316

95% Non-parametric UCL	
CLT	1.025622
Jackknife	NA
Standard Bootstrap	1.037229
Bootstrap-t	1.147421
Chebyshev (Mean, Std)	1.380186

Summary Statistics for ln()	
Minimum	-1.203972816
Maximum	0.788457394
Mean	-0.348451954
Standard Deviation	0.534786533
Variance	0.285996636

Goodness-of-Fit Results	
Distribution Recommended	Lognormal
Distribution Used	Lognormal

Estimates Assuming Lognormal Distribution	
MLE Mean	0.814277847
MLE Standard Deviation	0.468537467
MLE Median	0.705779824
MLE Coefficient of Variation	0.575402448
MVUE Estimate of Mean	0.805075288
MVUE Estimate of Std. Dev.	0.44562782
MVUE Estimate of SE	0.118716905
MVUE Coefficient of Variation	0.553523164

UCL Assuming Lognormal Distribution	
95% H-UCL	1.13086164
95% Chebyshev (MVUE) UCL	1.322550416
99% Chebyshev (MVUE) UCL	1.986296654

FDEP Recommended UCL to Use:
1.13 mg/kg