



**Final**  
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# Annual Landfill Monitoring Report, September 2004

## Operable Unit A

### **Former Naval Complex**

Adak, Alaska

**Department of the Navy**  
**Naval Facilities Engineering Command**  
**Engineering Field Activity, Northwest**  
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## EXECUTIVE SUMMARY

The U.S. Navy (Navy), through Engineering Field Activity, Northwest (EFA NW), has tasked URS Group, Inc. (URS), with reporting the results of the annual groundwater, sediment, and surface water monitoring at four landfills located at the Former Adak Naval Complex, Adak Island, Alaska. This report includes results from the monitoring that was performed by the sample collection contractor, Integrated Concepts and Research Corporation (ICRC), in September 2004. Monitoring results were compared to endpoint criteria established in Appendix F of the Final Comprehensive Monitoring Plan (CMP), Revision 1 (U.S. Navy 2004), and background concentrations established for inorganic analytes in sediment and groundwater on Adak.

### PALISADES LANDFILL

During the 2004 landfill monitoring event, surface water and sediment samples were collected at the Palisades Landfill as specified in the Final CMP, Revision 1. Sediment samples were collected at three locations (101, 102, and 103) and surface water samples were collected at two locations (101 and 102). All samples were sent to the laboratory for analysis. A summary of the sediment and surface water sampling results is provided below.

#### Sediments

Sediment samples were analyzed for semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), total inorganics (TIN), total organic carbon (TOC), and grain-size distribution.

Two SVOCs were detected in all three sediment samples (locations 101, 102, and 103) collected at the Palisades Landfill during the 2004 sampling event. Both of the detected SVOCs are included on the target analyte list for the Palisades Landfill: benzo(a)pyrene and indeno(1,2,3-c,d)pyrene. Benzo(a)pyrene was detected above the endpoint criterion at all three locations. Indeno(1,2,3-c,d)pyrene was not detected at concentrations that exceeded the endpoint criterion. In addition, the reporting limits for 11 SVOCs on the target analyte list (acenaphthene, anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, bis[2-ethylhexyl]phthalate, chrysene, fluoranthene, fluorene, phenanthrene, and pyrene) in one or more of the sediment samples collected at the Palisades Landfill were greater than the endpoint criteria.

One PCB, Aroclor 1260, was detected in the sediment sample collected from location 102 during the September 2004 sampling event. This PCB, which is included on the target analyte list, was detected at a concentration above the endpoint criteria. In addition, in the samples collected from locations 101 and 102, the reporting limit for Aroclor 1260, was greater than the endpoint criteria. The remaining six Aroclors were not detected in any of the three sediment samples collected at the Palisades Landfill during the September 2004 sampling event. However, the reporting limits for four of these six Aroclors (Aroclors 1016, 1232, 1248, and 1254) in all three the sediment samples (locations 101, 102, and 103) were greater than the endpoint criteria.

Three of the four total inorganic analytes included on the target analyte list for the Palisades Landfill were detected above the Adak background concentrations, the endpoint criteria, or both in one or more of the three sediment samples. Arsenic was detected at concentrations above the endpoint criterion in all three samples. In addition, the concentration of arsenic in the sediment sample from location 102 was above the Adak freshwater sediment background concentration. Chromium was detected in the sediment sample from location 102 at a concentration greater than the Adak freshwater sediment background concentration. Chromium was detected in the sediment sample from location 103 at a concentration greater than the Adak marine sediment background concentration. Nickel was detected in the sediment sample collected from location 102 at a concentration greater than the Adak freshwater sediment background concentration and the endpoint criterion of 30 mg/kg. Nickel was detected in the sediment sample from location 103 at a concentration greater than the Adak marine sediment background concentration. In addition to the inorganic analytes included on the target analyte list, beryllium, copper, lead, mercury, and zinc were detected above endpoint criteria in the sediment samples collected from one or more of the sediment sampling locations. Also, the concentrations of lead, mercury, and zinc in the sediment sample from location 102 exceeded the Adak freshwater sediment background concentrations.

### **Surface Water**

Surface water samples were analyzed for PCBs, TIN, dissolved inorganics (DIN), and water quality parameters (WQPs). PCBs were not detected in either of the two surface water samples collected at the Palisades Landfill during the September 2004 sampling event. However, the reporting limits for all of the PCBs (0.5 and 1 µg/L) were greater than their endpoint criteria (0.0045 µg/L). No dissolved inorganic analytes or total inorganic analytes included on the target analyte list for the Palisades Landfill were detected above the endpoint criteria. All inorganics not on the target analyte list were either not detected or detected at concentrations less than the endpoint criteria.

## **Recommendations**

Based on the September 2004 sampling results, it is recommended that sampling of sediments for SVOCs, TIN, TOC, and grain size be continued at the Palisades Landfill, in accordance with the Final CMP, Revision 1 (U.S. Navy 2004). SVOCs, PCBs, and TIN continue to be detected at concentrations above the endpoint criteria. Therefore, continued sampling is warranted.

The Aroclors 1016, 1221, 1232, 1242, and 1248 have not been detected in sediment samples collected from locations 101, 102, and 103 since 1996. Aroclor 1254 was detected in one sample since 1996. Aroclor 1260 was detected 12 times in the 34 sediment samples collected from this site at concentrations ranging from 4.8 to 110  $\mu\text{g}/\text{kg}$  since 1996. The average detection was approximately 39  $\mu\text{g}/\text{kg}$ . The endpoint criterion for Aroclor 1260 is 8.3  $\mu\text{g}/\text{kg}$ . Due to the low detection frequency of PCBs in sediment samples from Palisades Landfill at concentrations above the reporting limits, the presence of PCBs in the upgradient sediment sample (location 101), and the lack of partitioning of PCBs to surface water (discussed below), the Navy recommends that PCB monitoring in sediment samples at this site be reduced to once every other year with the next scheduled sampling to occur in 2006.

Based on the September 2004 sampling results, it is recommended that surface water sampling continue at the Palisades Landfill for TIN and DIN, in accordance with the Final CMP, Revision 1 (U.S. Navy 2004). TIN and DIN were not detected at concentrations above the endpoint criteria during the 2004 sampling event. However, exceedances of endpoint criteria did occur during the 2003 sampling event for analytes not on the target analyte list. Therefore, continued sampling is warranted.

Due to the lack of detected PCBs in surface water, the low solubility of PCBs, and the low concentrations of PCBs that have been infrequently measured in sediments at the site, the Navy recommends that PCB monitoring in surface water at Palisades Landfill be discontinued.

## **METALS LANDFILL**

During the 2004 landfill monitoring event, groundwater samples were collected at the Metals Landfill as specified in the Final CMP, Revision 1. Groundwater samples were collected at eight monitoring wells: MW13-1 (location 401), MW13-2 (location 402), MW13-3 (location 403), MW13-4 (location 404), MW13-5 (location 405), MW-603 (location 603), MW-604 (location 604), and MW-605 (location 605). All samples were sent to the laboratory for analysis. A summary of the groundwater sampling results is provided below.

## **Groundwater**

Groundwater samples were analyzed for volatile organic compounds (VOCs), SVOCs, TIN, DIN, and WQPs.

Bis(2-ethylhexyl)phthalate, the only SVOC included on the target analyte list for the Metals Landfill, was not detected in any of the groundwater samples collected at the Metals Landfill during the 2004 sampling event. Two SVOCs, not included in the target analyte list, were detected in groundwater samples collected at the Metals Landfill during the September 2004 sampling event. Fluoranthene and pyrene were detected at concentrations less than the endpoint criteria.

VOCs were detected in seven of the eight groundwater samples collected at the Metals Landfill during the 2004 sampling event. A total of 13 VOCs were detected in groundwater samples collected from MW13-1, MW13-2, MW13-3, MW13-4, MW-603, MW-604, and MW-605. Of these, six of the detected VOCs are included on the target analyte list for the Metals Landfill: 1,3-dichlorobenzene, 1,4-dichlorobenzene, chlorobenzene, cis-1,2-dichloroethene, tetrachloroethene, and trichloroethene. None of the detected target analytes exceeded the endpoint criteria. 1,1,1-Trichloroethane, 1,1-dichloroethane, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, benzene, chloroethane, and dichlorodifluoromethane were the VOCs not on the target analyte list that were detected in the groundwater samples collected at the site. For those nontarget analytes with endpoint criteria, the endpoint criteria were not exceeded in any of the samples collected at the Metals Landfill.

No dissolved inorganic analytes or total inorganic analytes included on the target analyte list for the Metals Landfill were detected above the endpoint criteria. However, dissolved arsenic and total and dissolved barium were detected in groundwater samples at concentrations above the Adak background concentrations. Dissolved arsenic exceeded the Adak background concentration in samples collected from MW13-1, MW13-2, and MW-605. Total and dissolved barium were detected at concentrations greater than the Adak background concentrations in the sample from MW-605. All inorganics not on the target analyte list were either not detected or detected at concentrations less than the endpoint criteria.

## **Recommendations**

Based on the September 2004 sampling results, it is recommended that annual sampling be continued at the Metals Landfill for total arsenic and barium and dissolved arsenic and barium.

Since bis(2-ethylhexyl)phthalate has not been detected above the endpoint criterion since 2000, the Navy recommends that SVOC monitoring at Metals Landfill be reduced to once every other year with the next scheduled sampling to occur in 2006.

Since target analytes 1,1-dichloroethene, 1,4-dichlorobenzene, chlorobenzene, cis-1,2-dichloroethene, and tetrachloroethene have not been detected in groundwater samples at concentrations above their respective endpoint criteria, and trichloroethene and trans-1,2-dichloroethene have not been detected above their respective endpoint criteria since 1998, the Navy recommends that groundwater monitoring for VOCs be reduced to once every other year with the next scheduled sampling to occur in 2006.

There are no MBAS cleanup criteria specified in the Alaska Administrative Code or Federal Regulations. Given the difficulty and expense of analyzing methylene blue active substance (MBAS) within the 48-hour holding time, the Navy recommends that MBAS monitoring be discontinued at this site.

## **WHITE ALICE LANDFILL**

During the 2004 landfill monitoring event, surface water and groundwater samples were collected at the White Alice Landfill as specified in the Final CMP, Revision 1. Surface water samples were collected from three locations (WASW01, WASW02, and WASW03), and groundwater samples were collected from two monitoring wells (MW 21-3 and MW 21-4). All samples were sent to the laboratory for analysis. A summary of the surface water and groundwater sampling results is provided below.

### **Surface Water**

Surface water samples were analyzed for VOCs, TIN, DIN, and WQPs. VOCs are not identified in the CMP, Revision 1 (U.S. Navy 2004) as target analytes in surface water at White Alice Landfill. However, 1,1,2,2-tetrachloroethane and trichloroethene were detected in the surface water sample collected from WASW02. Neither of these VOCs exceeded the endpoint criteria. No dissolved inorganic analytes or total inorganic analytes included on the target analyte list for the White Alice Landfill were detected above the endpoint criteria. All inorganics not on the target analyte list were either not detected or detected at concentrations less than the endpoint criteria.

## **Groundwater**

Groundwater samples were analyzed for VOCs, TIN, DIN, and WQPs. VOCs are not identified in the CMP, Revision 1 (U.S. Navy 2004) as target analytes in groundwater at White Alice Landfill. However, cis-1,2-dichloroethene and toluene were detected in the groundwater sample collected from MW21-3. Neither of these VOCs exceeded the endpoint criteria. No dissolved inorganic analytes or total inorganic analytes included on the target analyte list for the White Alice Landfill were detected above the endpoint criteria or the Adak background concentrations in the groundwater samples collected at the site. In addition, the concentrations of inorganic analytes not on the target analyte list were all below the endpoint criteria.

## **Recommendations**

Since none of the surface water target analytes has been detected above endpoint criteria in any of the samples collected since 1996, the Navy recommends decreasing the surface water monitoring frequency at White Alice Landfill to once every other year with the next scheduled sampling to occur in 2006.

Since none of the groundwater target analytes has been detected above endpoint criteria in any of the samples collected since 1996, the Navy recommends decreasing the groundwater monitoring frequency at White Alice Landfill to once every other year with the next scheduled sampling to occur in 2006.

There are no MBAS cleanup criteria in the Alaska Administrative Code or Federal Regulations. Given the difficulties and expense of analyzing surface water and groundwater samples for MBAS within the 48-hour holding time, the Navy recommends that MBAS monitoring in groundwater be discontinued at this site.

## **ROBERTS LANDFILL**

During the 2004 landfill monitoring event, surface water and groundwater samples were collected at the Roberts Landfill as specified in the Final CMP, Revision 1. Surface water samples were collected from five locations (RLSW01, RLSW02, RLSW03, RLSW04, and RLSW05), and groundwater samples were collected from four monitoring wells (A-2, A-3, A-5, and B-1). All samples were sent to the laboratory for analysis. A discussion of the surface water and groundwater sampling results is provided below.

## **Surface Water**

Surface water samples were analyzed for VOCs, TIN, DIN, and WQPs. No VOCs included on the target analyte list for the Roberts Landfill were detected in the samples collected in September of 2004. However, naphthalene was detected in the surface water sample collected from RLSW01. There is no established endpoint criterion for this compound in surface water. One inorganic analyte on the target analyte list for the Roberts Landfill was detected at a concentration greater than the endpoint criterion. Total copper was detected at RLSW03 and RLSW05 at concentrations above the endpoint criterion. In addition, the reporting limits for total silver and dissolved and total mercury exceeded the endpoint criteria.

## **Groundwater**

Groundwater samples were analyzed for VOCs, TIN, DIN, and WQPs. None of the VOCs included on the target analyte list for the Roberts Landfill were detected in the four groundwater samples collected at the site. However, naphthalene was detected in the groundwater sample collected from well A-2 and trichlorofluoromethane was detected in the groundwater sample collected from well B-1. There is no endpoint criterion established for trichlorofluoromethane, and the estimated concentration of naphthalene did not exceed the endpoint criterion. No dissolved inorganic analytes or total inorganic analytes included on the target analyte list for the Roberts Landfill were detected above the endpoint criteria. One of the 13 total inorganic analytes included on the target analyte list was detected at a concentration above the Adak background concentration in the groundwater sample collected from well A-3. Total copper was detected at a concentration above the Adak background concentration.

## **Recommendations**

Although VOCs have not been detected at concentrations above endpoint criteria in surface water samples collected at Roberts Landfill from 2000 through 2004, the Navy recommends that surface water monitoring for VOCs be continued on an annual basis because only two years of post-closure monitoring data have been collected.

Based on 2000 through 2004 sampling results for TIN and DIN in surface water samples collected at Roberts Landfill, the Navy recommends that surface water monitoring for inorganics continue on an annual basis.

Because only two years of post-closure monitoring data have been collected at Roberts Landfill, the Navy recommends that groundwater monitoring for VOCs and inorganics (including aluminum) be continued on an annual basis.

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There are no MBAS cleanup criteria in the Alaska Administrative Code or Federal Regulations. Given the difficulty and expense of analyzing surface water and groundwater samples for MBAS within the 48-hour holding time, the Navy recommends that MBAS monitoring be discontinued at this site.

**FINAL  
ANNUAL LANDFILL MONITORING REPORT  
SEPTEMBER 2004  
OPERABLE UNIT A**

**FORMER ADAK NAVAL COMPLEX  
ADAK ISLAND, ALASKA**

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## ABBREVIATIONS AND ACRONYMS

AAC	Alaska Administrative Code
Analytica	Analytica Alaska, Inc.
ASTM	American Society for Testing and Materials
BTEX	benzene, toluene, ethylbenzene, and xylenes
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CMP	comprehensive monitoring plan
DEC	Department of Environmental Conservation (State of Alaska)
DIN	dissolved inorganics
DQO	data quality objective
EFA NW	Engineering Field Activity, Northwest
EPA	U.S. Environmental Protection Agency
FFA	Federal Facilities Agreement
FFCA	Federal Facilities Compliance Agreement
FS	feasibility study
ICMP	institutional control management plan
ICRC	Integrated Concepts and Research Corporation
IRA	interim remedial action
µg/kg	microgram per kilogram
µg/L	microgram per liter
MBAS	methylene blue active substance
MDL	method detection limit
mg/kg	milligram per kilogram
MS/MSD	matrix spike/matrix spike duplicate
MW	monitoring well
Navy	U.S. Navy
NCA	North Creek Analytical
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
OU	operable unit
OSWER	Office of Solid Waste and Emergency Response
PAHs	polycyclic aromatic hydrocarbon
PCBs	polychlorinated biphenyls
PQL	practical quantitation limit
PR	percent recovery
PSE-2	preliminary source evaluation 2
QA	quality assurance

### ABBREVIATIONS AND ACRONYMS (Continued)

QC	quality control
QAPP	quality assurance project plan
RBSC	risk-based screening criteria
RCRA	Resource Conservation And Recovery Act
RI	remedial investigation
ROD	Record of Decision
RPD	relative percent difference
SARA	Superfund Amendments and Reauthorization Act
SAERA	State-Adak Environmental Restoration Agreement
SIM	selected ion monitoring
SOP	standard operating procedure
SVOCs	semivolatile organic compound
SWMU	solid waste management unit
TIN	total inorganics
TOC	total organic carbon
URS	URS Group, Inc.
USEPA	U.S. Environmental Protection Agency
VOC	volatile organic compound
WQPs	water quality parameters

## 1.0 INTRODUCTION

This document has been prepared under contract with Engineering Field Activity, Northwest (EFA NW) of the Naval Facilities Engineering Command for the annual monitoring at four landfills (Metals, Palisades, Roberts, and White Alice) located at the former Adak Naval Complex, Adak Island, Alaska. Adak Island is located approximately 1,300 air miles southwest of Anchorage and 350 miles west of Unalaska/Dutch Harbor on the Aleutian Island chain (Figure 1-1). The locations of the four landfills addressed in this report are shown on Figure 1-2. The results of the September 2004 sampling activities at the four landfills are reported in this document. Sampling activities were performed by Integrated Concepts and Research Corporation (ICRC), contracted directly to EFA NW under a separate delivery order.

The Palisades and Metals Landfills are regulated by the U.S. Environmental Protection Agency (EPA) under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and have undergone remedial actions in accordance with the Operable Unit A (OU A) Record of Decision (ROD) (U.S. Navy, Alaska DEC, and USEPA 2000). The White Alice and Roberts Landfills are managed under the State of Alaska's solid waste disposal regulations (18 Alaska Administrative Code [AAC] 60), and both landfills have been closed under these regulations. All four landfills are in the post-closure care period. As part of the post-closure care, annual monitoring of groundwater, sediment, and surface water in accordance with the Final Comprehensive Monitoring Plan (CMP), Revision 1 (U.S. Navy 2004) is required. The monitoring program was developed to meet the objectives specified in the OU A ROD and the landfill closure plans. In addition, visual inspections of the monitoring wells are also required annually.

This document summarizes analytical data from the September 2004 sampling event. Appendix A provides a copy of the field logbooks. Appendix B provides the groundwater monitoring well visual inspection summary. Appendix C provides completed sampling deviation forms. Appendix D provides the field sampling parameters. Appendix E provides a summary of the historical analytical laboratory data. Appendix F provides the laboratory analytical data packages for the September 2004 sampling event, and Appendix G provides the data validation report. Appendix H provides the tide chart for September 2004.

### 1.1 PURPOSE OF MONITORING

The purpose of landfill monitoring is to ensure that the environmental cleanup remedies and the landfill closure actions remain compliant with the applicable laws and regulations and are protective of human health and the environment. In addition, analytical data are being collected

at the landfill sites for comparison to historical analytical data and endpoint criteria specified in the Final CMP, Revision 1 (U.S. Navy 2004). Finally, the results of the monitoring will be used to determine if monitoring activities need to be modified in response to changing site conditions.

## 1.2 SCOPE OF MONITORING ACTIVITIES

The OU A ROD identified seven landfills requiring further action:

- Solid Waste Management Unit (SWMU) 2, Causeway Landfill
- SWMU 4, South Davis Road Landfill
- SWMU 11, Palisades Landfill
- SWMU 13, Metals Landfill
- SWMU 18/19, White Alice Landfill
- SWMU 25, Roberts Landfill
- SWMU 29, Finger Bay Landfill

Of these seven landfills, environmental media sampling is required at only four of the landfills (Palisades Landfill, Metals Landfill, White Alice Landfill, and Roberts Landfill). These four landfills are addressed in this report. The remaining three landfills (Causeway Landfill, South Davis Road Landfill, and Finger Bay Landfill) are inspected and reported separately in compliance with the Final Institutional Control Management Plan (ICMP), Revision 1 (see Appendix D of U.S. Navy 2004).

The scope of the 2004 monitoring activities was to collect samples at four landfills, Palisades Landfill (sediment and surface water), Metals Landfill (groundwater), White Alice Landfill (surface water and groundwater), and Roberts Landfill (surface water and groundwater); to summarize the analytical results for the collected samples; and to perform visual inspections of the groundwater monitoring wells as required in the Final CMP, Revision 1. Field logbooks for sample collection are provided in Appendix A. Groundwater monitoring wells visual inspection checklists are provided in Appendix B. Other visual inspections required by the OU A ROD and the Final CMP, Revision 1, for these four landfills are being performed and reported under a separate contract.

The annual monitoring program for the four landfills addressed in this report is described in the Final CMP, Revision 1. The Final CMP, Revision 1, describes the U.S. Navy's (Navy's) approach for environmental sampling activities at the landfills and includes standard operating procedures (SOPs) that were used when conducting the groundwater, surface water, and sediment sampling. For all media, sampling locations were selected to provide representative coverage of landfill operations, with an emphasis on sample collection in areas immediately

downgradient of solid waste accumulations. Findings from this monitoring event will be used to determine the scope of additional sampling to be performed at these four landfill sites as part of the long-term monitoring effort required for post-closure monitoring.

### **1.3 REGULATORY OVERVIEW**

In 1986, an initial assessment study was conducted on the former Adak Naval Complex as the first phase of the Navy Assessment and Control of Installation Pollutants Program. The former Adak Naval Complex, then known as Naval Air Facility Adak, was proposed for the National Priorities List (NPL) in October 1992 and formally listed in May 1994. For technical and administrative purposes, the former Adak Naval Complex was divided into two OUs (OU A and OU B) in 1998. In general, OU A encompasses the entire military reservation with respect to chemical contamination, while OU B encompasses the entire military reservation with respect to ordnance contamination. OU A includes 58 CERCLA sites (including the four landfills addressed in this report) and 128 petroleum sites.

The EPA, Navy, and Alaska Department of Environmental Conservation (Alaska DEC) entered into a Federal Facilities Agreement (FFA) in 1993 to ensure that environmental impacts associated with past practices were investigated and remedial actions were completed as required to protect human health and the environment. The FFA stated that the 128 petroleum-related contaminated sites would be evaluated under a two-party agreement between the Navy and the State of Alaska. This agreement, the State-Adak Environmental Restoration Agreement (SAERA), was signed in April 1994 and amended in February 2002.

The Palisades and Metals Landfills are regulated by the EPA under CERCLA. Although the White Alice and Roberts Landfills are managed under the State of Alaska's solid waste disposal regulations (18 AAC 60), these landfills were included in the ROD for OU A. The following paragraphs provide a summary of the regulatory history of the four landfills, with more detailed information following in the subsections below.

In 1995 prior to the completion of the remedial investigation (RI) and feasibility study (FS) for OU A, an interim action ROD was developed to address the potential for releases of hazardous substances from the Palisades and Metals landfills that may present an imminent and substantial endangerment to public health, welfare, and/or the environment. The selected interim remedial actions (IRAs) for Palisades and Metals landfills were developed in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA), and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). The interim action ROD for the Palisades and Metals landfills was signed in May 1995 (U.S. Navy, Alaska DEC and USEPA 1995).

In 1997, the White Alice Landfill was closed and covered per State of Alaska regulations, and closure activities began at the Roberts Landfill. In March 2002, the Navy submitted a permit renewal application to extend operations at Roberts Landfill through 2002. Following additional disposal activities in 2002, the Navy applied for and received approval for closure from Alaska DEC at the end of 2002 (U.S. Navy 2002). The closure plans for the White Alice and Roberts landfills are in compliance with 18 AAC 60.397, Post-closure Care Requirements for a Class I or Class II Municipal Solid Waste Landfill.

Final remedial actions were selected for the landfill sites at Adak Island in the OU A ROD, which was signed in April 2000. These remedies were designed to mitigate both human health and ecological risks quantified for the various environmental media impacted by chemicals. The selected remedies employ a host of remedial technologies that were applied to each site either singly or in combination. All of the selected remedies included institutional controls. An ICMP, consistent with the OU A ROD, was prepared by the Navy and approved by the EPA and Alaska DEC (U.S. Navy 2001a). Subsequent to the signing of the ROD, the CMP was developed to ensure that the environmental cleanup remedies selected in the OU A ROD remain applicable with environmental laws and regulations (U.S. Navy 2001b). The Final CMP, Revision 1, and the Final ICMP, Revision 1 (U.S. Navy 2004), are the latest versions of these documents and are the documents currently applicable to the landfill sites.

### **1.3.1 Interim Remedial Action Record of Decision**

The Palisades and Metals Landfills were included in the 1995 interim action ROD. The 1995 interim action ROD specified the following IRAs for the landfills: construction of landfill caps, construction of small interceptor ditches on the uphill side of the landfills, rerouting Palisades Creek, establishing vegetation on the new caps, inspection and removal of material that could adversely affect the marine environment, installation of monitoring wells, initiation of a monitoring program, and implementation of institutional controls. A complete assessment of potential human and ecological risks was not performed prior to a decision to take remedial action. The IRAs implemented at the Palisades and Metals landfills complied with federal and state requirements, which were legally applicable or relevant and appropriate to the remedial actions and were cost-effective.

Because the selected remedies were IRAs, a review of the remedies' protectiveness and a thorough evaluation of the remedial actions were conducted as part of the base-wide RI/FS performed for the Adak Naval Complex in 1996 (U.S. Navy 1997). The RI/FS also included a base-wide comprehensive risk assessment that included Palisades Landfill and Metals Landfill. In addition, since the selected interim remedies could have resulted in possible hazardous substances remaining on site, a review was conducted within 5 years after commencement of the

remedial actions to ensure that the remedies continued to provide adequate protection of human health and the environment (U.S. Navy 2001c).

### **1.3.2 Alaska Department of Environmental Conservation Requirements**

Two landfills, the White Alice Landfill (SWMUs 18/19) and the Roberts Landfill (SWMU 25) were operated on Adak Island under Alaska DEC solid waste regulations (18 AAC 60). The White Alice Landfill was closed and covered per State of Alaska regulations in 1997. Closure entailed placement of a soil cover over the landfill, grading and contouring, surface water/erosion controls, access restrictions, and installation of a vegetative cover per Alaska solid waste landfill closure requirements. Closure activities began at the Roberts Landfill in April 1997 and included placing a low-permeability soil cover over the landfill, grading and contouring, implementing access restrictions, installing surface water/erosion controls, placing a vegetative cover, securing adjacent bunkers filled with asbestos materials, maintaining the cover, periodic monitoring, and institutional controls for land use. In March 2002, the Navy submitted a permit renewal application to extend operations at Roberts Landfill through 2002. The application was made to accommodate operation of an inert demolition waste monofill and one cell for disposal of approximately 10 cubic yards of asbestos-containing material (U.S. Navy 2002). The fill operation was in support of the Navy's cabin demolition project, which was completed in September 2002, at which time the landfill was regraded and covered. Following that activity, the Navy applied for and received approval for closure from Alaska DEC at the end of 2002 (U.S. Navy 2002). The closure plans for the White Alice and Roberts landfills are in compliance with 18 AAC 60.397, Post-closure Care Requirements for a Class I or Class II Municipal Solid Waste Landfill.

### **1.3.3 OU A Record of Decision**

Remedial actions completed under the 1995 interim action ROD for the Palisades and Metals Landfills and the remedial actions completed under the closure plans for the White Alice and Roberts Landfills were selected as the final remedies in the OU A ROD. The ROD was accepted and signed by all parties on April 13, 2000 (U.S. Navy, Alaska DEC, and USEPA 2000).

#### ***Palisades Landfill***

The remedial action objectives for Palisades Landfill (SWMU 11) are to (a) reduce human health and ecological risks by minimizing migration of contaminants from the landfill to adjacent groundwater, surface water, and sediment; (b) prevent risk to receptors and minimize erosion by preventing landfill contents and contaminated soils from contacting surface water and human and ecological receptors; and (c) prevent landfill off-gassing from adversely affecting human and ecological receptors by maintaining vapors below the lower explosive limits. Palisades Landfill

was included in the 1995 interim action ROD that specified the placement of a cover over the landfill, monitoring, and institutional controls. The OU A ROD selected the interim actions as the final remedy for Palisades Landfill. The capping, monitoring, and institutional control actions performed under the interim action ROD were evaluated and determined to be protective. The landfill is now in the post-closure care period.

### ***Metals Landfill***

The remedial action objectives for Metals Landfill (SWMU 13) are to (a) reduce human health and ecological risks by minimizing migration of contaminants from the landfill to adjacent groundwater, surface water, and sediment; (b) prevent risk to receptors and minimize erosion by preventing landfill contents and contaminated soils from contacting surface water and human and ecological receptors; and (c) prevent landfill off-gassing from adversely affecting human and ecological receptors by maintaining vapors below the lower explosive limits. Metals Landfill was included in the 1995 interim action ROD that specified the placement of a cover over the landfill, monitoring, and institutional controls. The OU A ROD selected the interim actions as the final remedy for Metals Landfill. The capping, monitoring, and institutional control actions completed under the interim action ROD were evaluated and determined to be protective. The northern edge of Metals Landfill was found in the past to have been partially eroded by winter ocean storms. The Navy evaluated the best methods to stop the erosion and to protect this area from future storms and initiated erosion controls in 2000. The landfill is now in the post-closure care period.

### ***White Alice Landfill***

As previously stated, the White Alice Landfill (SWMUs 18 and 19) was permitted and closed under the State of Alaska solid waste regulations (18 AAC 60). The remedial action objectives for the White Alice Landfill are to meet the post-closure care requirements of Alaska Solid Waste Regulations (18 AAC 60) by maintaining the surface water/erosion controls, access restrictions, and vegetative cover and by performing periodic monitoring. These selected remedies complied with 18 AAC 60 and the permit requirements for closure of the sites. These actions were also consistent with presumptive remedies for landfills under EPA Office of Solid Waste and Emergency Response (OSWER) Directive 9355.0-67FS – 1996. The landfill is now in the post-closure care period.

### ***Roberts Landfill***

As previously stated, the Roberts Landfill (SWMU 25) was permitted and closed under State of Alaska solid waste regulations (18 AAC 60). The remedial action objectives for Roberts Landfill are to meet the post-closure care requirements of Alaska Solid Waste Regulations (18

AAC 60) by maintaining the surface water/erosion controls, access restrictions, and vegetative cover and by performing periodic monitoring. These selected remedies complied with 18 AAC 60 and the permit requirements for closure of the site. These actions were also consistent with presumptive remedies for landfills under EPA OSWER Directive 9355.0-67FS – 1996. In addition, annual site inspections for the Roberts Landfill will be performed for 5 years. Five-year site reviews are being conducted by the Navy and appropriate agencies to evaluate monitoring data and site conditions to determine the need for additional action or reduction of controls, as appropriate. The landfill is now in the post-closure care period.

#### **1.4 ANALYTICAL PROGRAM**

During the 2004 sampling program, all groundwater, surface water, and sediment samples were sent to North Creek Analytical, Inc. (NCA) located in Beaverton, Oregon, for analyses. Analytical methods performed on the groundwater, surface water, and sediment samples collected at the landfills are listed in 1-1. The historical schedule of sampling events for each landfill is shown in 1-2. This only shows the dates where groundwater, surface water, and/or sediment samples were collected. A summary of the sampling program that was performed during the 2004 annual monitoring event is shown in 1-3.

#### **1.5 EVALUATION OF ENDPOINT CRITERIA**

Analytical results for each media type were compared to the endpoint criteria presented in Appendix F of the Final CMP, Revision 1 (U.S. Navy 2004). In addition, analytical results for inorganic analytes in sediments and groundwater were compared to Adak background concentrations. Adak background concentrations were established in the final RI/FS (U.S. Navy 1997) for sediments and in the final background study report (U.S. Navy 1995) for groundwater.

#### **1.6 QUALITY ASSURANCE/QUALITY CONTROL**

Quality assurance (QA), as applied to monitoring data, is defined as the total integrated program for ensuring the reliability of such data. Quality control (QC) is defined as the application of established procedures for obtaining prescribed standards of performance in the monitoring process.

QC checks of both field sampling and laboratory sample analyses were used to assess and document data quality and to identify any discrepancies in the measurement process. QC samples were used to determine the precision of sample collection and handling procedures, the

thoroughness of the decontamination procedures, and the accuracy of field equipment and laboratory analysis.

Field duplicates were collected for at least 5 percent of all environmental samples. Sampling locations where duplicate samples were collected were identified in the field and noted in the logbook. As an additional QC measure, one matrix spike/matrix-spike duplicate (MS/MSD) was collected as a pair for every 20 environmental samples (5 percent frequency) to evaluate the accuracy and precision of the sample analysis. Trip blanks were submitted with every cooler containing samples for volatile organic compound (VOC) analysis.

### **1.6.1 Data Quality Objectives**

The objectives of the QA program were to ensure:

- The procedures used would not detract from the quality of the results; and
- All activities, findings, and results were documented, defensible, and consistent with the data quality objectives.

The data quality objectives (DQOs) were based on those requirements outlined in the State of Alaska guidelines and the Final CMP, Revision 1 (U.S. Navy, Alaska DEC, and USEPA 2004). This project's QA program included the following provisions:

- Project personnel received adequate indoctrination and training on all project plans prior to initiation of project activities.
- Established procedures and protocols from the Final CMP, Revision 1, were followed for sample collection, chain-of-custody process, sample shipment, laboratory analysis, data review, and final reporting.
- Changes to the QA program followed project procedures, which required significant changes to be noted in the final document with appropriate justification and assessment of the potential or real impacts on the results. Data quality objectives applicable to this project for water, sediment, water quality parameters, and field measurements are presented in Tables 1-4 through 1-7, respectively.

### 1.6.2 QA Objectives for Chemical Data Measurement

The QA objective for measurement of data is that environmental data of known and acceptability are provided. Specifically, QA objectives for this project were designed to ensure the following:

- Sample acquisition, chemical analysis, and chemical parameter measurements were performed so that the resulting data met and supported data use requirements.
- The chemical data were acquired, documented, verified, and reported to ensure that the precision, accuracy, representativeness, comparability, completeness, and sensitivity requirements specified in the work plan were achieved.

The DQOs of field screening were to obtain immediate reasonably accurate field data sufficient to make field decisions.

Based on the above objectives, all data collected in the field (including on-site or in situ measurements) met EPA screening level criteria. All samples sent off site to a fixed base laboratory met the requirements of the work plan. The QA objectives for laboratory analytical data are defined as follows.

#### ***Precision***

Precision measures the reproducibility of measurements under a given set of conditions. Precision is expressed in terms of relative percent difference (RPD). RPD is calculated as follows:

Where:      S = Sample Result  
                D = Duplicate Sample Result

$$RPD = \frac{(S - D)}{[(S + D)/2]} \times 100$$

The laboratory objective for precision is to equal or exceed the precision demonstrated for similar samples (laboratory specific control limits). In general, the matrix spike (sample result) and matrix duplicate (duplicate sample result) were used to determine the precision, in accordance with typical laboratory SOPs.

### ***Accuracy***

Accuracy is a measure of the bias or error in a measurement. Examples of bias include contamination and errors made in sample collection, preservation, handling, and analysis. Accuracy was assessed by the collection of field/trip blanks and in the laboratory by the use of known and unknown QC samples and matrix spikes. Accuracy was measured as the percent recovery based on matrix spike or surrogate recoveries. Percent recovery (PR) is calculated as follows:

Where:       SSR = spike sample result  
              SR = sample (unspiked) result  
              SA = spike added

$$PR = \frac{SSR - SR}{SA} \times 100$$

The laboratory objective for accuracy is to equal or exceed the accuracy demonstrated for the analytical methods on similar samples (laboratory specific control limits) and will fall within the established EPA control limits.

### ***Representativeness***

Representativeness is the degree to which the sample data accurately and precisely represent an environmental condition. Sampling locations were selected to represent the range of environmental conditions observed. An adequate number of samples were collected, as determined in the Final CMP, Revision 1 (U.S. Navy 2004).

### ***Completeness***

Completeness is measured as the percent of results that are judged to be valid. Complete data means that a sufficient number of the planned samples were taken and requisite analyses performed to generate an adequate database. Completeness is determined by comparing the number of analyses planned to the number of subsequent data points judged to be usable for the designated purpose(s).

### ***Comparability***

Comparability expresses the confidence with which one data set can be compared to another. The objective for the QA program is to produce data with the greatest possible degree of comparability. The number of matrices that are sampled and the range of field conditions

encountered are considered in determining comparability. Comparability is achieved by using standard methods for sampling and analysis, reporting data in standard units, normalizing results to standard conditions, and using standard and comprehensive reporting formats. Complete field data collection documentation supports the assessment of comparability. Historical comparability is achieved through consistent use of methods and documentation procedures throughout the project.

### *Sensitivity*

Sensitivity expresses the degree of response that a given analytical method has to a given target analyte. It is usually defined in terms of a method detection limit (MDL), or practical quantitation limit (PQL), for a given matrix.

### **1.6.3 Field Measurement Quality Assurance**

The following procedures were implemented as part of QA for field measurements.

- All field instruments were calibrated in accordance with manufacturer's instructions.
- Precision was based on replicate measurements taken and compared to the manufacturer's specifications for the individual instrument.
- Representativeness was based on professional judgment.

### **1.6.4 Quality Control Samples**

QC samples are necessary to evaluate the precision, accuracy, representativeness, and comparability of the data. Three types of QC samples analyzed for this project were field duplicates, trip blanks, and MS/MSDs. The field duplicate and MS/MSD were collected in the field at the same time the environmental sample was collected, while the analytical laboratory provided the trip blank.

For every 20 samples taken, one duplicate sample was collected and submitted for laboratory analysis. The duplicate samples were intended to be identical to the original sample and were submitted to gain precision information on homogeneity, handling, shipping, storage, preparation, and analysis. Duplicate sampling was used to identify possible field variations or errors. The duplicate sample was collected at the same time and location as the environmental sample.

For every 20 samples taken, one MS/MSD sample was collected and submitted to the laboratory. The MS/MSD samples were intended to evaluate the calibration of the analytical methods.

Trip blanks were prepared with analyte-free water and taken from the laboratory to the sampling site and returned to the laboratory with the VOC samples. One trip blank accompanied each cooler containing samples that were submitted for EPA Method 8260 analysis. The trip blanks are used to assess the adequacy of sample preservation, packing, shipping, and storage.

### **1.6.5 Sampling Locations and Procedures**

The specific sampling locations at each landfill are identified in Tables 4-2 and 4-3 of Appendix B of the Final CMP, Revision 1 (U.S. Navy 2004). Appendix B, Landfill Monitoring Plan, describes sampling locations, design, and sampling techniques; decontamination procedures; sampling equipment; and calibration procedures. The methods and techniques to be used while performing sampling in accordance with the QC protocols to meet the requirements for QA are specified in the SOPs found in the Final CMP, Revision 1, Appendix I.

### **1.6.6 Sample Handling and Preservation**

To maintain the integrity of the samples from the time they were collected until the analyses were completed, the samples were preserved at the time of collection to prevent or retard chemical degradation or modification while samples were in transit to the laboratory. The handling techniques and type of preservation for each analytical method was established in the Appendix B of the Final CMP, Revision 1, Tables 4-4 and 4-5 (U.S. Navy 2004).

### **1.6.7 Sample Custody and Holding Time Requirements**

The history of each sample was documented from the time the sample was collected through all transfers of custody until it was received at the analytical laboratory. Sample custody procedures specified in the SOPs found in the Final CMP, Revision 1, Appendix I (U.S. Navy 2004) were followed.

Due to the remote nature and limited accessibility to and from the site, holding time requirements were considered when collecting analytical samples. The holding time requirements followed EPA or state method guidance, except as noted below. Tables 4-4 and 4-5 in Appendix B of the Final CMP, Revision 1 summarizes these requirements. During this sampling event, holding times were met on all primary sample analysis, with the exception of the VOC samples collected on September 18, 2004, at the Metals Landfill. The holding times for the VOC samples collected at all locations at the Metals Landfill were missed by one or two days. Since the holding times were missed by only one or two days, impacts on sampling results should be

minimal. Although there is a chance that the concentrations are biased slightly low, all detected concentrations of VOCs at the Metals Landfill were an order of magnitude less than endpoint criteria. Because of the missed holding time, the data reviewer labeled the analytical data for the VOC samples collected on September 18, 2004, as estimated (“J” qualified).

## **1.7 DATA QUALITY REVIEW**

As specified in the Landfill Monitoring Plan, Appendix B of the Final CMP, Revision 1 (U.S. Navy 2004), all quantitative laboratory data were validated at Level 3. Level 3 validation (also referred to as data review) consists of a review of the data summary forms that are generated for a set of data. At a minimum, chain-of-custody records, the case narrative, and the summary results for samples and QC analyses are reviewed. Data were reviewed based on method performance criteria and QC criteria documented in the quality assurance project plan (QAPP) (see Attachment B-1 of the Landfill Monitoring Plan [U.S. Navy 2004]). The data validation report is provided in Appendix G.

## **1.8 DEVIATIONS FROM THE COMPREHENSIVE MONITORING PLAN**

Based on the requirements of the Final CMP, Revision 1 (U.S. Navy 2004), the following deviations from the CMP occurred during the 2004 sampling event. Sampling deviation forms are provided in Appendix C.

The holding times for the VOC samples collected at all locations at the Metals Landfill were missed by one or two days as a result of a laboratory oversight. Since the holding times were missed by only one or two days, impacts on sampling results should be minimal. Although there is a chance that the concentrations are biased slightly low, all detected concentrations of VOCs at the Metals Landfill were an order of magnitude less than endpoint criteria. Because of the missed holding time, the data reviewer labeled the analytical data for the VOC samples collected on September 18, 2004, as estimated.

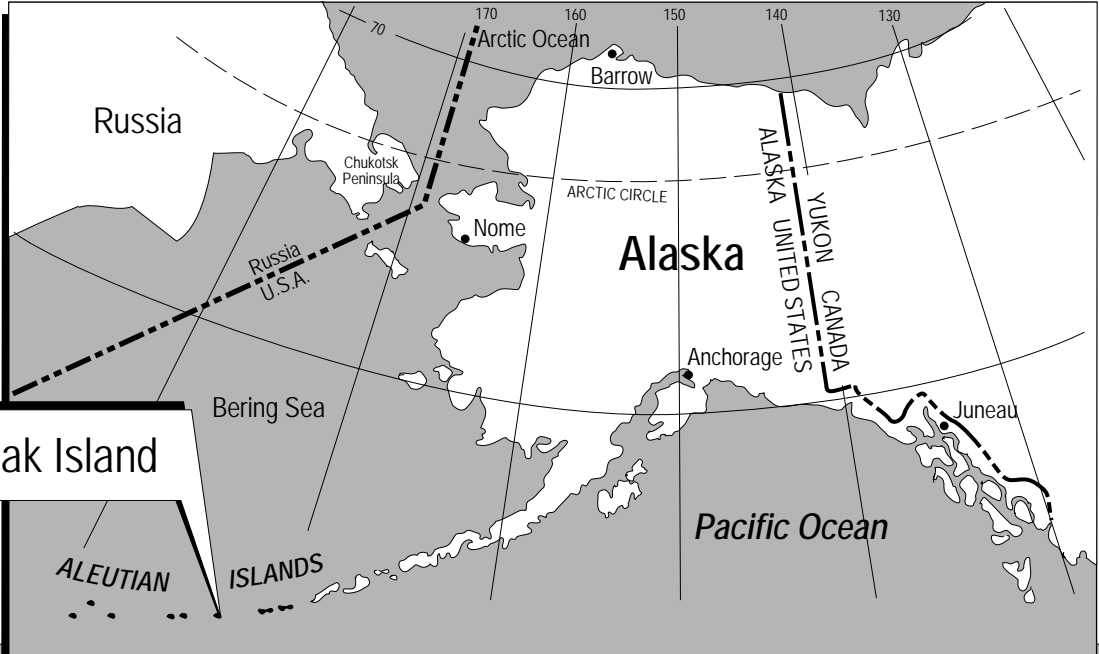
Several wells were resampled for methylene blue active substance (MBAS) because of missed holding times. The holding time for MBAS is 48 hours. Special shipping and schedule provisions were made to minimize the potential for missed MBAS holding times. Seventeen of the 22 locations that were sampled for MBAS had to be resampled because of missed holding times. MBAS holding times were met for the resampled locations. The primary reason for missed holding times was shipping difficulties from the island to the laboratory. MBAS has been analyzed for in 73 groundwater and 69 surface water samples since 1996. MBAS has been detected in 14 surface water samples during this time at concentrations ranging from 9.5 to

7,400 µg/L. The average MBAS detection in surface water samples since 1996 is approximately 1,400 µg/L across all four landfill sites. MBAS has been detected in 21 groundwater samples during this time at concentrations ranging from 9.5 to 6,400 µg/L. The average MBAS detection in groundwater samples since 1996 is approximately 540 µg/L. There are no MBAS cleanup criteria specified in the Alaska Administrative Code or federal regulations. The MBAS detection frequencies in groundwater and surface water are 28 and 20 percent, respectively. Given the low detection frequencies and the difficulty and expense of getting samples off of the island and analyzed in 48 hours, the Navy will recommend that MBAS monitoring at these sites be discontinued.

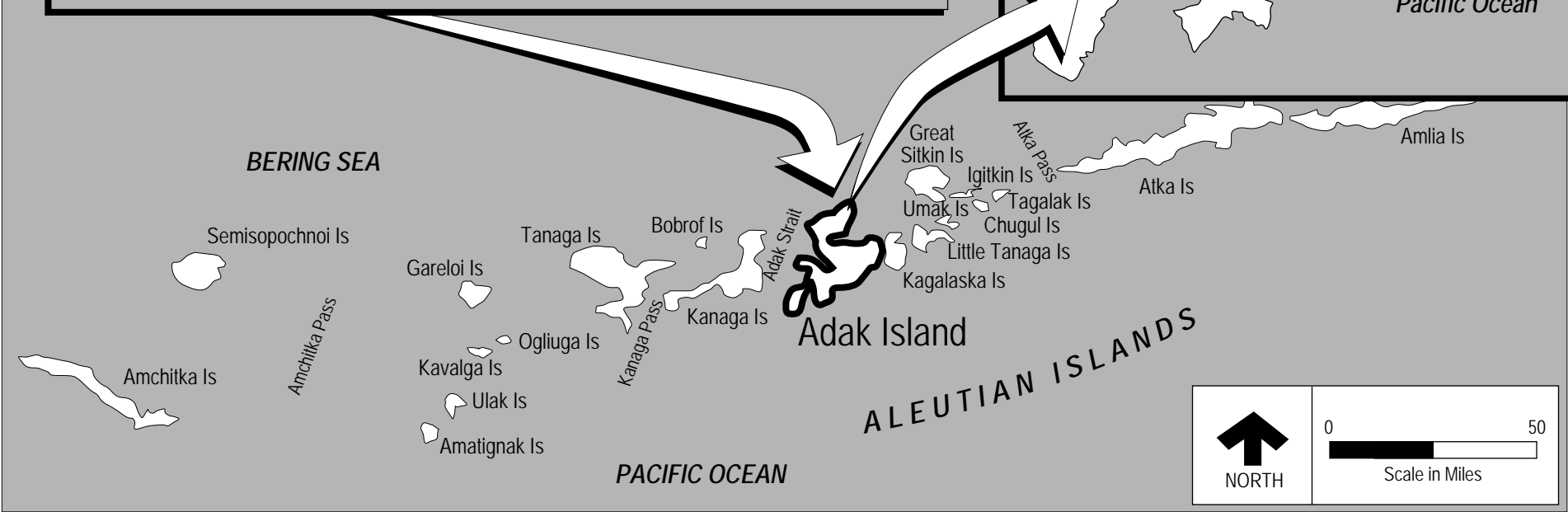
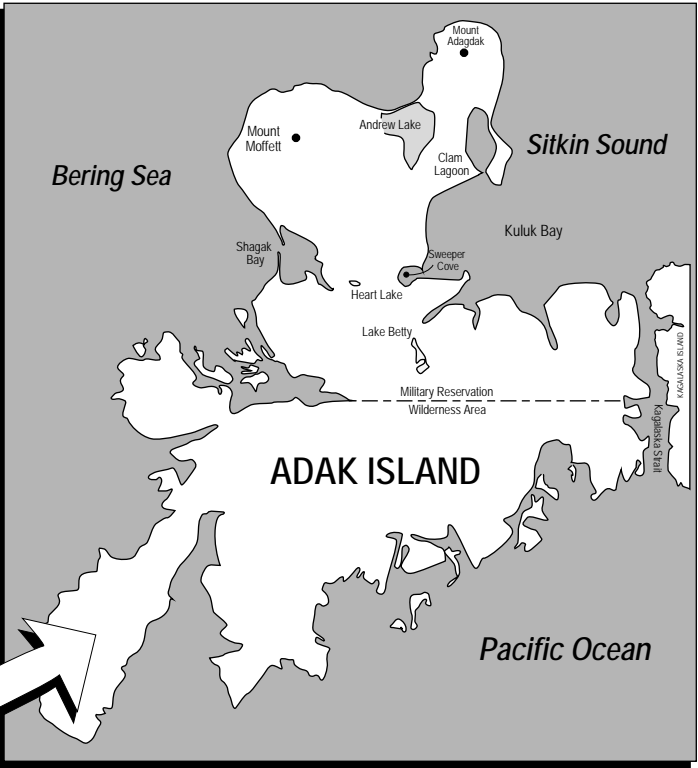
The Final CMP, Revision 1 (U.S. Navy 2004) specified total organic carbon (TOC) analysis of sediments at Palisades Landfill locations 101, 102, and 103, using EPA Method 415.1. These analyses were performed using EPA Method 9060, which is identical to EPA Method 415.1 and augmented by adding supplemental QA procedures. This deviation meets the DQOs.

The CMP specified locations for collection of field duplicates and MS/MSD samples. In several cases, groundwater production within a pre-selected well was insufficient for field duplicate and/or MS/MSD sample collection. When this occurred, the collection of these samples were transferred to wells that produce sufficient groundwater recharge, and the requisite number of field duplicate and MS/MSD samples were collected. These deviations do not adversely impact the DQOs for the 2004 monitoring event.

33755530-1



Adak Island



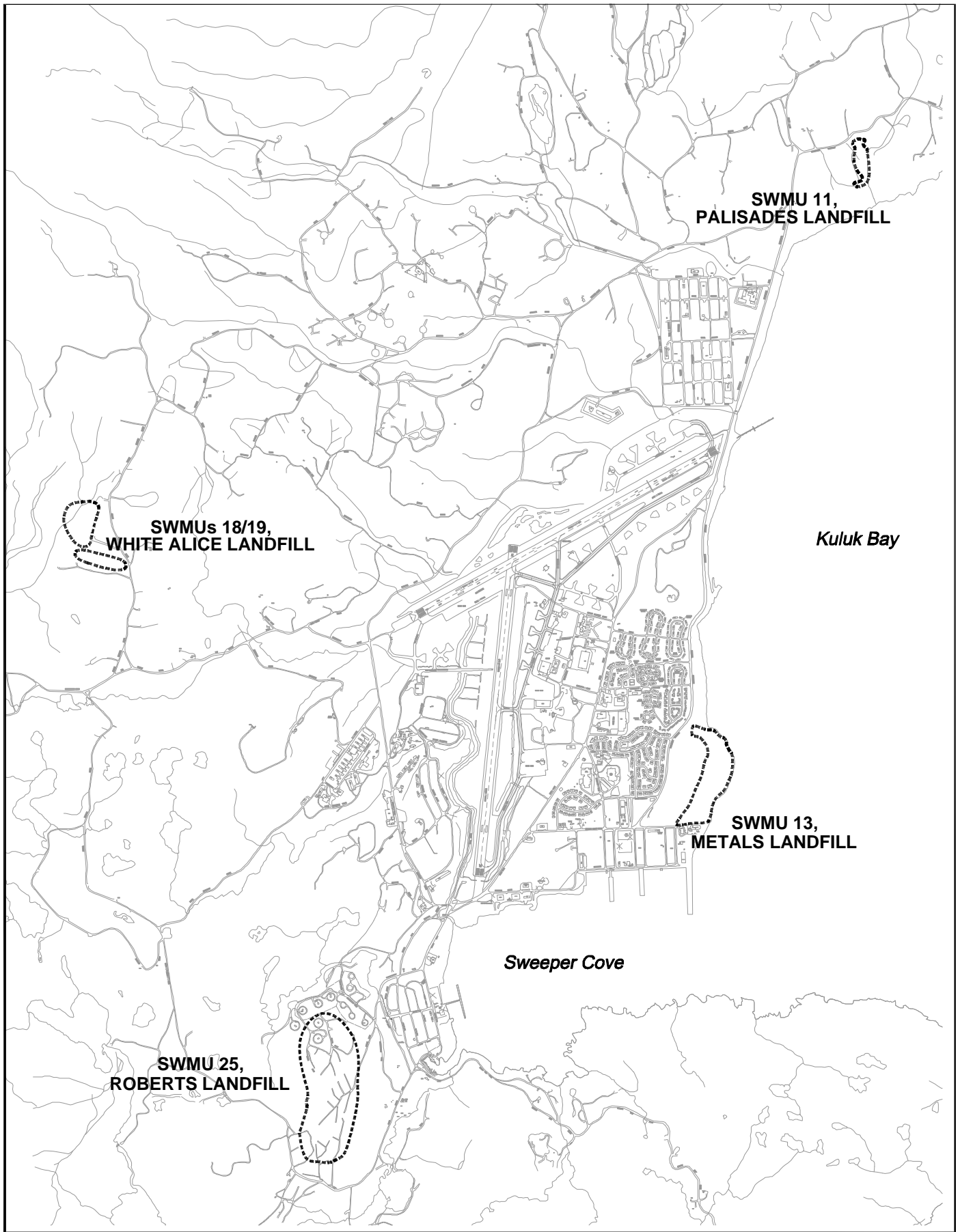
**NORTH**

0 50  
Scale in Miles

**U.S.NAVY**

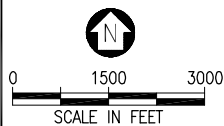
**Figure 1-1**  
**Location Map, Adak Island, Alaska**

Delivery Order 0030  
Adak Island, AK  
2003 ANNUAL LANDFILL  
MONITORING REPORT



FILENAME: T:\ADAK\IDIQ\Sub-Tasks\DO 48\ALMR\FIG 1-2 LANDFILLS.dwg  
 EDIT DATE: 05/13/05  
 AT: 11:11

**U.S. NAVY**



**Figure 1-2  
 Landfills Vicinity**

Delivery Order 0048  
 Adak Island, AK  
 2004 ANNUAL LANDFILL  
 MONITORING REPORT

**Table 1-1  
 Analytical Methods**

Parameter	Analytical Method	
	Water	Soil/Sediment
Volatile organic compounds (VOCs)	EPA 8260B	NA
Semivolatile organic compounds (SVOCs)	EPA 8270C/8270 SIM	EPA 8270C/8270 SIM
Polychlorinated biphenyls (PCBs)	EPA 8082	EPA 8082
Total inorganics (TIN)	EPA 6020/7470A	EPA 6020/7471A
Dissolved Inorganics (DIN)	EPA 6020/7470A	NA
Water Quality Parameters (WQP)		
- Inorganic ions (chloride, nitrate/nitrite, sulfate)	EPA 300.0	NA
- Methylene blue active substance (MBAS)	EPA 425.1	NA
- Total Kjeldahl nitrogen (TKN)	EPA 351.2	NA
- Ammonia	EPA 350.1	NA
- Alkalinity	EPA SM 2320B	NA
- Chemical oxygen demand (COD)	EPA 410.1	NA
- Total dissolved solids (TDS)	EPA 160.1	NA
Total organic carbon (TOC)	NA	EPA 9060 modified
Percent Moisture	NA	NCA SOP
Grain-size distribution	NA	ASTM D422

Notes:

ASTM - American Society for Testing and Materials  
 EPA - U.S. Environmental Protection Agency  
 NA - not applicable  
 NCA – North Creek Analytical  
 SIM – selective ion monitoring  
 SOP – standard operating procedure

**Table 1-2  
 Landfill Monitoring Schedule to Date**

Site Name	Dates of Sampling <sup>a</sup>																	
	March 1996	May 1996	June 1996	July 1996	Aug 1996	Sept 1996	Oct 1996	Nov 1996	Feb 1997	May 1997	Dec 1997	June 1998	Sept 1999	Nov 2000	Sept 2001	Oct 2002	Oct 2003	Sept 2004
Palisades Landfill	-	•	-	-	•	-	-	•	•	• <sup>b</sup>	-	•	•	•	•	•	•	•
Metals Landfill	-	-	-	•	-	-	-	•	-	•	•	•	•	•	•	•	•	•
White Alice Landfill	•	-	•	-	-	•	•	-	-	-	•	•	•	•	•	•	•	•
Roberts Landfill	•	-	•	-	-	•	•	-	-	-	•	•	•	•	•	•	•	•

<sup>a</sup>Sampling dates included on this include only those dates where groundwater, surface water, and sediment samples were obtained. Dates where only marine tissue sampling was performed are not shown.

<sup>b</sup>The full suite of chemicals that constitute the annual sampling at Palisades Landfill for calendar year 1997 was completed in May 1997.

Notes:

- completed sampling event
- sampling event not scheduled or performed

**Table 1-3  
 Summary of Landfill Analytical Samples Collected in September 2004**

Site Name	Location ID	Location Cross-Reference	Sample Number	Sample Date	Sample Matrix	Analytical Testing								
						VOCs	SVOCs	PCBs (Aroclors)	TIN	DIN	WQP <sup>a</sup>	TOC	TDS	Grain Size
SWMU 11, Palisades Landfill	101	101	229015 (229017)	9/24/04	SW			•	•	•				
	101	101	229019	9/24/04	SD		•	•	•			•		•
	102	102	228856	9/24/04	SW			•	•	•				
	102	102	228858	9/24/04	SD		•	•	•			•		•
	103	103	229011 (229013)	9/24/04	SD		•	•	•			•		•
SWMU 13, Metals Landfill	401	MW13-1	228830	9/18/04	GW	•	•		•	•	•		•	
	401	MW13-1	228846	9/22/04	GW						• <sup>b</sup>			
	402	MW13-2	228832	9/18/04	GW	•	•		•	•	•		•	
	402	MW13-2	228848	9/22/04	GW						• <sup>b</sup>			
	403	MW13-3	228857	9/18/04	GW	•	•		•	•	•		•	
	403	MW13-3	228899	9/22/04	GW						• <sup>b</sup>			
	404	MW13-4	228855	9/18/04	GW	•	•		•	•	•		•	
	404	MW13-4	228897	9/22/04	GW						• <sup>b</sup>			
	405	MW13-5	228853	9/18/04	GW	•	•		•	•	•		•	
405	MW13-5	228895	9/22/04	GW						• <sup>b</sup>				

**Table 1-3 (Continued)**  
**Summary of Landfill Analytical Samples Collected in September 2004**

Site Name	Location ID	Location Cross-Reference	Sample Number	Sample Date	Sample Matrix	Analytical Testing								
						VOCs	SVOCs	PCBs (Aroclors)	TIN	DIN	WQP <sup>a</sup>	TOC	TDS	Grain Size
SWMU 13, Metals Landfill (cont.)	603	MW-603	228826	9/18/04	GW	•	•		•	•	•		•	
	603	MW-603	228842	9/22/04	GW						• <sup>b</sup>			
	604	MW-604	228828	9/18/04	GW	•	•		•	•	•		•	
	604	MW-604	228844	9/22/04	GW						• <sup>b</sup>			
	605	MW-605	228849 (228851)	9/18/04	GW	•	•		•	•	•		•	
	605	MW-605	228893 (228891)	9/22/04	GW						• <sup>b</sup>			
SWMUs 18/19, White Alice Landfill	200	21-3	228993 (228995)	9/22/04	GW	•			•	•	•		•	
	204	21-4	229486	9/22/04	GW	•			•	•	•		•	
	201	WAS W01	228997 (228999)	9/22/04	SW	•			•	•	•		•	
	202	WAS W02	229001	9/22/04	SW	•			•	•	•		•	
	203	WAS W03	228850	9/22/04	SW	•			•	•	•		•	
SWMU 25, Roberts Landfill	320	A-2	228763	9/11/04	GW	•			•	•	•		•	
	320	A-2	228803 (228805)	9/11/04	GW						• <sup>b</sup>			

**Table 1-3 (Continued)**  
**Summary of Landfill Analytical Samples Collected in September 2004**

Site Name	Location ID	Location Cross-Reference	Sample Number	Sample Date	Sample Matrix	Analytical Testing								
						VOCs	SVOCs	PCBs (Aroclors)	TIN	DIN	WQP <sup>a</sup>	TOC	TDS	Grain Size
SWMU 25, Roberts Landfill (cont.)	307	A-3	228764	9/11/04	GW	•			•	•	•		•	
	307	A-3	228883	9/22/04	GW						• <sup>b</sup>			
	308	A-5	228761	9/11/04	GW	•			•	•	•		•	
	308	A-5	228989	9/22/04	GW						• <sup>b</sup>			
	306	B-1	228760 (228762)	9/11/04	GW	•			•	•	•		•	
	306	B-1	228809	9/15/04	GW						• <sup>b</sup>			
	301	RLS W01	228765	9/11/04	SW	•			•	•	•		•	
	301	RLS W01	228807	9/15/04	SW						• <sup>b</sup>			
	302	RLS W02	228766	9/11/04	SW	•			•	•	•		•	
	302	RLS W02	228794	9/15/04	SW						• <sup>b</sup>			
	303	RLS W03	228767 (228769)	9/11/04	SW	•			•	•	•		•	
	303	RLS W03	228985 (228987)	9/22/04	SW						• <sup>b</sup>			
	304	RLS W04	228771	9/11/04	SW	•			•	•	•		•	
304	RLS W04	228799	9/15/04	SW						• <sup>b</sup>				

**Table 1-3 (Continued)**  
**Summary of Landfill Analytical Samples Collected in September 2004**

Site Name	Location ID	Location Cross-Reference	Sample Number	Sample Date	Sample Matrix	Analytical Testing								
						VOCs	SVOCs	PCBs (Aroclors)	TIN	DIN	WQP <sup>a</sup>	TOC	TDS	Grain Size
SWMU 25, Roberts Landfill (cont.)	305	RLS W05	228768	9/11/04	SW	•			•	•	•		•	
	305	RLS W05	228796	9/15/04	SW						• <sup>b</sup>			

<sup>a</sup>Water quality parameters (WQPs): sulfate (EPA 300.0), methyl blue active substance (MBAS) (EPA 425.1), total Kjeldahl nitrogen (TKN) (EPA 351.2), ammonia (EPA 350.1), alkalinity (total, bicarbonate, carbonate, hydroxide) (SM 2320B), chemical oxygen demand (COD) (EPA 410.4), total dissolved solids (TDS) (EPA 160.1)

<sup>b</sup>Only methylene blue active substances (MBAS) (EPA 425.1) analyzed for in this sample.

Notes:

- Sample number in ( ) is a duplicate sample.
- DIN - dissolved inorganics (EPA 6020/7470A)
- GW - groundwater
- Grain size - ASTM D422
- PCBs (Aroclors) - polychlorinated biphenyls (EPA 8082)
- SD - sediment
- SVOCs - semivolatile organic compounds (EPA 8270C/8270 SIM)
- SW - surface water
- TIN -total inorganics (EPA 6020/7470A for surface water and EPA 6020/7471A for sediment)
- TOC - total organic carbon (EPA 9060 modified)
- TDS - total dissolved solids
- VOCs - volatile organic compounds (EPA 8260B)

**Table 1-4  
 Data Quality Objectives for Water Samples**

Analysis	Analytical Method	Method Detection Limit (µg/L)	Practical Quantitation Limit (µg/L)	Cleanup Level GW (SW) <sup>a</sup> (µg/L)	Laboratory Control Limits for Accuracy (% Recovery)		Laboratory Control Limits for Precision (RPD)
					LCS	MS/MSD	
<b>Volatile Organic Compounds</b>							
1,1-Dichloroethene	8260B	0.4	2.0	7	74-140	74-140	0-20%
1,3-Dichlorobenzene	8260B	0.4	2.0	NE	76-124	76-124	0-20%
1,4-Dichlorobenzene	8260B	0.4	2.0	75	78-119	78-119	0-20%
Benzene	8260B	0.2	1	5.0 (710)	80-120	80-120	0-30%
Chlorobenzene	8260B	0.2	2.0	100	80-120	80-120	0-20%
Cis-1,2-dichloroethene	8260B	0.4	2.0	70	82-128	82-128	0-20%
Ethylbenzene	8260B	0.2	1	700 (29,000)	75-125	75-125	0-30%
Tetrachloroethene	8260B	0.2	2.0	5	75-125	75-125	0-20%
Toluene	8260B	0.2	1	1,000 (200,000)	75-120	75-120	0-30%
Total xylenes	8260B	1	5	10,000 (NE)	75-130	75-130	0-30%
Trans-1,2-dichloroethene	8260B	0.4	2.0	100	76-123	76-123	0-20%
Trichloroethene	8260B	0.4	2.0	5	74-127	74-127	0-20%
<b>Semivolatile Organic Compounds</b>							
Bis(2-ethylhexyl)phthalate	8270 SIM	0.1	0.5	6 (59)	40-125	40-125	0-40%
<b>Polychlorinated Biphenyls (Aroclors)</b>							
Aroclor-1016	8082	0.1	0.5	0.5 (NE)	60-120	30-130	0-20%
Aroclor-1221	8082	0.1	0.5	0.5 (NE)	60-120	30-130	0-20%
Aroclor-1232	8082	0.1	0.5	0.5 (NE)	60-120	30-130	0-20%
Aroclor-1248	8082	0.1	0.5	0.5 (NE)	60-120	30-130	0-20%
Aroclor-1254	8082	0.1	0.5	0.5 (NE)	60-120	30-130	0-20%
Aroclor-1260	8082	0.1	0.5	0.5 (NE)	39-136	39-136	0-20%

**Table 1-4 (Continued)**  
**Data Quality Objectives for Water Samples**

Analysis	Analytical Method	Method Detection Limit (µg/L)	Practical Quantitation Limit (µg/L)	Cleanup Level GW (SW) <sup>a</sup> (µg/L)	Laboratory Control Limits for Accuracy (% Recovery)		Laboratory Control Limits for Precision (RPD)
					LCS	MS/MSD	
<b>Priority Pollutant Inorganics</b>				<b>(TIN / DIN Cleanup Levels)</b>			
Antimony	7000	2	20	6/NE (750)	80-120	75-125	0-20%
Arsenic	7000	1	10	50/150 (1.4)	80-120	75-125	0-20%
Beryllium	6010B/7000	1	10	4/NE	80-120	75-125	0-20%
Cadmium	6010	2	20	5/0.16 (1.1)	80-120	75-125	0-20%
Chromium	6010	5	50	100/74 (11)	80-120	75-125	0-20%
Copper	6010	1	10	1,300/9 (9)	80-120	75-125	0-20%
Lead	7000	1	10	15/2.5 (2.5)	80-120	75-125	0-20%
Mercury	7470	0.07	1	2.0/NE (0.012)	80-120	75-125	0-20%
Nickel	6010B/7000	5	50	100/52 (52)	80-120	75-125	0-20%
Selenium	6010B/7000	20	100	10,000/5 (4.6)	80-120	75-125	0-20%
Silver	6010B/7000	10	50	50	80-120	75-125	0-20%
Thallium	6010B/7000	5	50	2/NE	80-120	75-125	0-20%
Zinc	6010B	6	50	11,000/120 (118)	80-120	75-125	0-20%

**Table 1-4 (Continued)**  
**Data Quality Objectives for Water Samples**

Notes:

<sup>a</sup>The cleanup level listed was generated by using the endpoint criteria presented in Appendix F of the Final Comprehensive Monitoring Plan, Revision 1 (U.S. Navy 2004). Values reported for inorganics are listed for total inorganic concentrations (18 AAC 75)/dissolved inorganic concentrations (Federal Ambient Water Quality Criteria). The values were chosen to ensure that the data generated by this sampling would meet or exceed the cleanup level required. The final assessment of compliance with endpoint criteria must be conducted using Appendix F to ensure that all criteria are taken into consideration. These values are strictly for the purpose of creating data quality objectives for the sampling and analysis.

Notes:

DIN – dissolved inorganics

µg/L – microgram per liter

LCS – laboratory control sample

MS/MSD – matrix spike/matrix spike duplicate

NE – not established

RPD – relative percent difference

SIM - selected ion monitoring

TIN – total inorganics

**Table 1-5  
 Data Quality Objectives for Sediment Samples**

Analysis	Analytical Method	Method Detection Limit (mg/kg)	Practical Quantitation Limit (mg/kg)	Cleanup Level (mg/kg)	Laboratory Control Limits for Accuracy (% Recovery)		Laboratory Control Limits for Precision (RPD)
					LCS	MS/MSD	
<b>Semivolatile Organic Compounds</b>							
Acenaphthene	8270C	0.4	5.0	NE	48-121	48-121	0-40%
Anthracene	8270C	0.5	5.0	NE	59-131	59-131	0-40%
Benzo(a)anthracene	8270C	0.05	0.1	NE	50-130	50-120	0-40%
Benzo(a)pyrene	8270C	0.02	0.1	NE	27-132	27-132	0-40%
Benzo(b)fluoranthene	8270C	0.5	5.0	NE	41-133	41-133	0-40%
Benzo(g,h,i)perylene	8270C	0.6	5.0	NE	50-125	50-125	0-40%
Benzo(k)fluoranthene	8270C	0.4	5.0	NE	60-160	60-160	0-40%
Bis(2-ethylhexyl)phthalate	8270 SIM	0.1	0.5	NE	40-125	40-125	0-40%
Chrysene	8270C	0.05	0.1	NE	50-120	50-120	0-40%
Fluoranthene	8270C	0.6	5.0	NE	51-140	51-140	0-40%
Fluorene	8270C	0.4	5.0	NE	58-130	58-130	0-40%
Indeno(1,2,3-cd)pyrene	8270C	0.05	0.1	NE	50-120	50-120	0-40%
Phenanthrene	8270C	0.1	0.5	NE	50-120	50-120	0-40%
Pyrene	8270C	0.6	5.0	NE	46-135	46-135	0-40%
<b>Polychlorinated Biphenyls (Aroclors)</b>							
Aroclor-1016	8082	0.001	0.005	NE	58-124	25-124	0-20%
Aroclor-1221	8082	0.001	0.005	NE	60-120	50-130	0-20%
Aroclor-1232	8082	0.001	0.005	NE	60-120	50-130	0-20%
Aroclor-1242	8082	0.001	0.005	NE	60-120	50-130	0-20%
Aroclor-1248	8082	0.001	0.005	NE	60-120	50-130	0-20%

**Table 1-5 (Continued)**  
**Data Quality Objectives for Sediment Samples**

Analysis	Analytical Method	Method Detection Limit (mg/kg)	Practical Quantitation Limit (mg/kg)	Cleanup Level (mg/kg)	Laboratory Control Limits for Accuracy (% Recovery)		Laboratory Control Limits for Precision (RPD)
					LCS	MS/MSD	
Aroclor-1254	8082	0.001	0.005	NE	60-120	50-130	0-20%
Aroclor-1260	8082	0.001	0.005	NE	39-136	39-136	0-20%
<b>Inorganics</b>							
Antimony	7000	0.2	1	NE	75-125	70-135	0-20%
Arsenic	7000	0.1	0.5	7.5	75-125	70-135	0-20%
Chromium	6010	0.5	2.5	10.7	75-125	70-135	0-20%
Nickel	6010/7000	0.2	1	14.9	75-125	70-135	0-20%

Notes:

- mg/kg – milligram per kilogram
- LCS – laboratory control sample
- MS/MSD – matrix spike/matrix spike duplicate
- NE – not established
- RPD – relative percent difference
- SIM - selected ion monitoring

**Table 1-6  
 Data Quality Objectives for Laboratory Water Quality Parameters**

<b>Water Quality Parameters<sup>a</sup></b>	<b>Analytical Method</b>	<b>Method Detection Limit (mg/L)</b>	<b>Practical Quantitation Limit (mg/L)</b>	<b>Laboratory Control Limits for Accuracy (% Recovery)</b>	<b>Laboratory Control Limits for Precision (RPD)</b>
Alkalinity	310.1 or SM 2320B	0.6	2	NP	0-20%
Chemical oxygen demand	410.1	2	5	85-115	0-20%
Methylene blue active substance	425.1	0.02	0.05	75-125	0-20%
Sulfate	300.0	0.03	0.2	90-110	0-20%
Total dissolved solids	160.1	5	25	NA	0-20%

<sup>a</sup>Additional water quality parameters will be measured using field test kits.

Notes:

mg/L - milligram per liter

NA - not applicable

NP - not provided

RPD - relative percent difference

**Table 1-7  
 Data Quality Objectives for Field Measurements**

<b>Field Measurement</b>	<b>Sampling Rationale</b>	<b>Measurement Method</b>	<b>Range</b>	<b>Accuracy</b>	<b>Detection Limit</b>
Temperature	Stabilization criteria	Horiba U-22	0–55°C	+/- 1.0°C	NA
pH	Stabilization criteria	Horiba U-22	0–14	+/- 0.1 pH	NA
Oxygen-reduction potential (eH)	Stabilization criteria	Horiba U-22	+/- 1999 mV	+/- 15 mV	NA
Turbidity	Stabilization criteria	Horiba U-22	0–800 NTU	+/- 5%	NA
Total dissolved solids	Stabilization criteria	Horiba U-22	0–100 mg/L	+/- 5 mg/L	NA
Conductivity	Stabilization criteria	Horiba U-22	0–4%	+/- 0.3%	NA
Salinity	Stabilization criteria	Horiba U-22	0–4%	+/- 0.3%	NA
Dissolved oxygen	Stabilization criteria	Horiba U-22	0–19.99 mg/L	+/- 0.2 mg/L	NA

Notes:

°C - degree Celsius

mg/L - milligram per liter

mV - millivolt

NA - not applicable

NTU - nephelometric turbidity unit

## 2.0 PALISADES LANDFILL

### 2.1 BACKGROUND

Palisades Landfill (SWMU 11) is located approximately 1 mile north of the main downtown area of Adak and was used as the primary disposal area for all operations on Adak Island from the 1940s to approximately 1970. The landfill area, which is approximately 6 acres, covers portions of the coastal uplands immediately adjacent to Kuluk Bay and part of a canyon or ravine. The ravine is approximately 1,200 feet long, 5 to 300 feet wide, and 5 to 150 feet deep, with a small stream (Palisades Creek) running through it. The mouth of the ravine opens immediately to Kuluk Bay (U.S. Navy 2001c).

The landfill received wastes from the 1940s to 1970. Approximately 80,000 to 100,000 cubic yards of solid waste are located in the landfill. A wide variety of materials were reportedly disposed of at Palisades Landfill, including waste petroleum, oils, and lubricants; chlorinated and nonchlorinated solvents; paint waste; sanitary trash; scrap vehicles; lead and mercury batteries; construction waste; and mercury. The landfill was covered with local soils in the early 1970s after disposal practices were stopped. A portion of the disposed material within the ravine has no cover and is on a steep slope. The exposed waste in the ravine consists primarily of barrels, assorted metal debris, and building demolition waste. The waste in the ravine completely covers a portion of Palisades Creek and dams the flow, detaining the water in a large pond before it continues through the landfill and empties into Kuluk Bay. The landfill does not extend into Kuluk Bay. Groundwater occurs locally under the site and discharges into the marine environment at the downgradient boundary (U.S. Navy 2001c).

Surface soil, groundwater, surface water, and stream sediment samples were collected during 1992 and 1998 site investigations. VOCs, semivolatile organic compounds (SVOCs), polychlorinated biphenyls (PCBs), and inorganic analytes were detected in the sediment and surface water. Although no RI or risk assessment was performed at the time, the FFA parties concluded that performing an IRA was the best option for this site (U.S. Navy 2001c).

In the summer of 1996, Palisades Landfill was closed per the 1995 interim action ROD as an IRA. Closure entailed installation of a landfill cover, institutional controls for access and land use, surface water controls, a vegetative cover, and long-term monitoring. The final OU A ROD (U.S. Navy, Alaska DEC, and USEPA 2000) determined that the selected interim actions met CERCLA requirements and no further remedial actions were required. Due to the presence of hazardous materials that do not allow for unrestricted use and unlimited access, Palisades Landfill will continue to be evaluated under the CERCLA 5-year review process. The Adak

5-year review report was completed in November 2001 (U.S. Navy 2001c) and will be updated in 2005 or 2006.

## **2.2 SAMPLING HISTORY RELATED TO CLOSURE MONITORING**

Sediment and surface water have been sampled at Palisades Landfill periodically since May 1996. As of September 2004, 12 sampling events have occurred at the Palisades Landfill (see 1-2). In May 1996, prior to landfill closure activities, two surface water and sediment locations were sampled and analyzed for pesticides/PCBs, SVOCs, and total inorganics (TIN). Surface water samples were also analyzed for dissolved inorganics (DIN); benzene, toluene, ethylbenzene, and xylenes (BTEX); and turbidity. Sediment samples were also analyzed for total organic carbon (TOC). In August and November 1996, following landfill closure, samples were collected again and analyzed for the same chemicals and parameters. In February and May of 1997, sampling of sediment and surface water was performed at the same locations (U.S. Navy 2001c). In June 1998, September 1999, November 2000, September 2001, October 2002, October 2003, and September 2004, sediment and surface water sampling was performed. The analytical results from the sampling conducted at Palisades Landfill from 1996 through 2004 are presented in Appendix E.

In 2004, samples were analyzed for the following target analytes in surface water and sediment, as specified in the Final CMP, Revision 1 (U.S. Navy 2004):

- Total PCBs
- Aroclors
- Bis(2-ethylhexyl)phthalate
- Selected polycyclic aromatic hydrocarbons (PAHs)
- Antimony
- Arsenic
- Chromium
- Nickel

## **2.3 DISCUSSION OF RESULTS**

During the 2004 landfill monitoring event, surface water and sediment samples were collected at the Palisades Landfill as specified in the Final CMP, Revision 1 (U.S. Navy 2004) and sent to the laboratory for analysis. The locations where samples were collected during this sampling event are shown on Figure 2-1. Field logbooks are provided in Appendix A, and the field sampling parameters collected during sampling are included in Appendix D. A summary of the analytical

results from the 2004 sampling event and the endpoint criteria are provided for sediment and surface water in Tables 2-1 and 2-2, respectively. These tables provide analytical results for the target analytes as defined in the Final CMP, Revision 1. The analytical results for all 2004 analytes are provided in Appendix F.

Visual inspections of the groundwater monitoring wells at Palisades Landfill were also completed during the groundwater sampling event. All wells were functional at the time of inspection. A summary of the results of the well inspections is provided in Appendix B. Inspections relative to institutional controls were conducted during the 2004 monitoring event and are reported under a separate cover.

Analytical results for sediment and surface water were compared to the endpoint criteria presented in Appendix F of the Final CMP, Revision 1. In addition, analytical results for inorganic analytes in sediments were compared to Adak background concentrations, where established. Analytical results that exceeded the endpoint criteria or the Adak background concentrations for sediment and surface water are summarized in Tables 2-3 and 2-4.

### **2.3.1 Sediments**

Sediment samples were collected at three locations (101, 102, and 103) and analyzed for SVOCs (EPA Methods 8270C/8270 selected ion monitoring [SIM]), PCBs (EPA Method 8082), TIN (EPA Methods 6020/7471A), TOC (EPA Method 9060 modified), and grain-size distribution (American Society for Testing and Materials [ASTM] Method D422). Sampling location 101 represents the upgradient location along the Palisades Creek flow path northwest of the landfill before it enters the ponded area. Sampling location 102 is located where the surface water exits the landfill at the base of the metal debris. Sampling location 103 is located in the sandy bank of Palisades Creek just before it enters Kuluk Bay and represents a downgradient sampling point intended to evaluate the migration of contaminants beyond location 102. The sediment sampling locations are shown on Figure 2-1. Sediment samples from locations 101 and 102 are considered freshwater sediment samples, and the sediment sample from location 103 is considered a marine sediment sample.

A summary of the analytical results from the 2004 sampling event and the endpoint criteria are provided for sediment in Table 2-1. As previously discussed, this provides analytical results for the target analytes as defined in the Final CMP, Revision 1 (U.S. Navy 2004). The analytical results for all analytes are provided in Appendix F. Results of the grain-size analyses are also provided in Appendix F. Analytical results that exceeded the endpoint criteria or the Adak background concentrations are summarized in Table 2-3.

It should be noted that the ecological endpoint criteria for the following selected chemicals provided in Tables 2-1 and 2-3 are based on  $\mu\text{g}/\text{kg}$  of TOC: benzo(a)anthracene (freshwater), benzo(b)fluoranthene (freshwater), benzo(k)fluoranthene (freshwater), bis(2-ethylhexyl)phthalate (freshwater and marine), fluoranthene (marine), fluorine (freshwater), and pyrene (marine). These endpoint criteria were derived from the ecological risk-based screening criteria (RBSC) provided in the preliminary source evaluation 2 (PSE-2) guidance document (U.S. Navy 1996). The ecological RBSCs presented in the PSE-2 document were calculated for these chemicals assuming that sediment samples would contain 1 percent TOC, and, therefore, the units of the ecological RBSC presented in the PSE-2 are microgram of analyte per kilogram of sediment.

Because of this assumption, the ecological RBSC provided in the PSE-2 document is only valid for sediment samples with a TOC content close to 1 percent. Two of the three sediment samples collected at the Palisades Landfill had TOC contents considerably different than 1 percent. Therefore, the ecological RBSC in the PSE-2, which is based on a 1 percent TOC content, are not valid for these two sediment samples. In order to convert the ecological RBSC in the PSE-2 document to units of microgram of analyte per kilogram of TOC (which is valid for any sediment sample, regardless of the TOC content), the ecological RBSCs in the PSE-2 document was divided by 0.01, the assumed decimal fraction of TOC.

The resulting ecological RBSCs, which are presented in Tables 2-1 and 2-3, are based on microgram per kilogram of TOC. To compare the analytical results for the chemicals listed above to the ecological RBSC based on units of microgram of analyte per kilogram of TOC, the analytical results must be carbon normalized. To carbon normalize the analytical results to a TOC concentration, the dry-weight concentration of the target analyte is divided by the decimal fraction representing the percent TOC content of the sediment sample. If the TOC content of the sample is less than 0.5 percent, then the dry-weight concentration is divided by 0.005 (the decimal fraction of 0.5 percent).

Analytical results for SVOCs, PCBs, and TIN in the sediment samples collected at the Palisades Landfill are discussed below.

### ***Semivolatile Organic Compounds***

Two SVOCs were detected in all three sediment samples (locations 101, 102, and 103) collected at the Palisades Landfill during the 2004 sampling event. Both of the detected SVOCs are included on the target analyte list for the Palisades Landfill: benzo(a)pyrene and indeno(1,2,3-c,d)pyrene. Benzo(a)pyrene was detected above the freshwater and marine sediment human health endpoint criterion of  $8.75 \mu\text{g}/\text{kg}$  at all three locations. Indeno(1,2,3-c,d)pyrene was not detected at concentrations that exceeded the freshwater and marine sediment human health endpoint criterion ( $87.5 \mu\text{g}/\text{kg}$ ) or the freshwater ecological endpoint criterion ( $34,000 \mu\text{g}/\text{kg}$ ).

In addition, the reporting limits for 11 SVOCs on the target analyte list (acenaphthene, anthracene, benzo[a]anthracene, benzo[b]fluoranthene, benzo[k]fluoranthene, bis[2-ethylhexyl]phthalate, chrysene, fluoranthene, fluorene, phenanthrene, and pyrene) in one or more of the sediment samples collected at the Palisades Landfill were greater than the endpoint criteria, primarily at location 102.

### ***Polychlorinated Biphenyls***

One PCB, Aroclor 1260, was detected in the sediment sample collected from location 102 during the September 2004 sampling event. This PCB, which is included on the target analyte list, was detected at a concentration above the freshwater and marine human health endpoint criterion of 8.3 µg/kg and the freshwater ecological endpoint criterion of 5 µg/kg. In addition, in the samples collected from locations 101 and 102, the reporting limit for Aroclor 1260 was greater than the endpoint criteria. The remaining six Aroclors were not detected in any of the three sediment samples collected at the Palisades Landfill during the September 2004 sampling event. However, the reporting limits for four of these six Aroclors (Aroclors 1016, 1232, 1248, and 1254) in all three of the sediment samples (locations 101, 102, and 103) were greater than the endpoint criteria.

Aroclors 1016, 1221, 1232, 1242, and 1248 have not been detected above their endpoint criteria in the 34 sediment samples collected from locations 101, 102, and 103 since monitoring was initiated (Appendix E). Aroclor 1254 was detected above the reporting limit once in the 34 sediment samples collected from Palisades Landfill in the 2001 sample from location 102. Aroclor 1260 has been detected above the reporting limit 12 times in the 34 samples collected from Palisades Landfill. Aroclor was detected four times in sediment samples from location 101 at estimated concentrations (“J” qualified) ranging from 4.8 to 16 µg/kg. The last detection above the reporting limit was identified in the 2000 sample from location 101. Location 101 is positioned upgradient of the Palisades landfill. Aroclor was detected seven times in sediment samples from location 102 at estimated concentrations ranging from 17 to 110 µg/kg. The last detection above the reporting limit (at an estimated 36.6 µg/kg) was identified in the 2004 sample from location 102. Aroclor was detected once in the 2000 sediment sample from location 103 at a concentration of 32 µg/kg.

Due to the low detection frequency of PCBs in sediment samples from Palisades Landfill at concentrations above the reporting limits, the presence of PCBs in the upgradient sediment sample, and the lack of partitioning of PCBs to surface water (discussed below), the Navy will recommend that PCB monitoring in sediment samples at this site be reduced to once every 5 years.

### ***Total Inorganics***

Three of the four total inorganics included on the target analyte list for the Palisades Landfill were detected above the Adak background concentrations, the endpoint criteria, or both in one or more of the three sediment samples. Arsenic was detected at concentrations above the marine and freshwater human health endpoint criteria of 0.0365 mg/kg in all three samples. In addition, the concentration of arsenic in the sediment sample from location 102 was above the Adak freshwater background concentration of 5.46 mg/kg. Chromium was detected in the sediment sample from location 102 at a concentration of 25 mg/kg, which is greater than the Adak freshwater background concentration (12.9 mg/kg). Chromium was detected in the sediment sample from location 103 at a concentration of 6.41 mg/kg, which is greater than the Adak marine background concentration (6.04 mg/kg). Nickel was detected in the sediment sample collected from location 102 at a concentration greater than the Adak freshwater background concentration of 10.05 mg/kg and the freshwater ecological endpoint criterion of 30 mg/kg. Nickel was detected in the sediment sample from location 103 at a concentration greater than the Adak marine background concentration of 5.01 mg/kg.

In addition to the inorganics included on the target analyte list, beryllium, copper, lead, mercury, and zinc were detected above endpoint criteria in the sediment samples collected from one or more of the sediment sampling locations (see Appendix E). Beryllium was detected at location 101 at an estimated concentration of 0.147 mg/kg, which is greater than the freshwater and marine human health endpoint criterion of 0.015 mg/kg. The concentrations of beryllium, copper, lead, mercury, and zinc in the sample collected at location 102 were 0.27 (estimated), 121, 208, 0.295, and 920 mg/kg, respectively. These concentrations were greater than the endpoint criteria for these compounds: 0.015, 70, 35, 0.15, and 120 mg/kg, respectively. All of these endpoint criteria are based on the ecological RBSC. In addition, the concentrations of lead, mercury, and zinc in the sediment sample from location 102 exceeded the Adak freshwater background concentrations. The Adak freshwater background concentrations for beryllium, copper, lead, mercury, and zinc are 0.51, 149.51, 8.32, 0.25, and 44.82 mg/kg, respectively. Finally, beryllium was detected at location 103 at an estimated concentration of 0.189 mg/kg, which is greater than the freshwater and marine human health endpoint criterion of 0.015 mg/kg.

#### **2.3.2 Surface Water**

Surface water samples were collected at two locations (101 and 102) and analyzed for PCBs (EPA Method 8082), TIN (EPA Methods 6020/7470A), and DIN (EPA Methods 6020/7470A). As previously discussed, sampling location 101 represents the upgradient location along the Palisades Creek flow path northwest of the landfill before it enters the ponded area. Sampling location 102 was taken where the surface water exits the landfill at the base of the metal debris. The surface water sampling locations are shown on Figure 2-1.

A summary of the analytical results from the 2004 sampling event and the endpoint criteria are provided for surface water in 2-2. As previously discussed, this provides analytical results for the target analytes as defined in the Final CMP, Revision 1 (U.S. Navy 2004). The analytical results for all analytes are provided in Appendix F. Analytical results that exceeded the endpoint criteria are summarized in 2-4. Analytical results for PCBs, TIN, and DIN in the surface water samples collected at the Palisades Landfill are discussed below.

### ***Polychlorinated Biphenyls***

PCBs were not detected in either of the two surface water samples collected at the Palisades Landfill during the September 2004 sampling event. However, the reporting limits for all of the PCBs (0.5 and 1 µg/L) were greater than the endpoint criteria for the PCBs (0.0045 µg/L).

PCBs have not been detected at concentrations above reporting limits in any of 154 surface water samples collected and analyzed at Palisades Landfill. The reporting limits have varied from 0.2 to 1 µg/L and were generally above the endpoint criteria of 0.0045 to 0.014. However, due to the lack of detected PCBs in surface water, the low solubility of PCBs, and the low concentrations of PCBs that have been infrequently measured in sediments at the site, the Navy will recommend that PCB monitoring in surface water at Palisades Landfill be terminated.

### ***Inorganics***

No dissolved inorganics or total inorganics included on the target analyte list for the Palisades Landfill were detected above the endpoint criteria. All inorganics not on the target analyte list were either not detected or detected at concentrations less than the endpoint criteria (see Appendix E).

## **2.4 CONCLUSIONS**

The analytical data for the period 2000 through 2004 was reviewed for the compounds included on the target analyte list and for those nontarget analytes that exceeded the endpoint criteria during the 2004 sampling event. The purpose of the analysis of the recent historical data is to determine if overt trends exist in the concentration data for the Palisades Landfill.

### **2.4.1 Sediments**

#### ***Semivolatile Organic Compounds***

Acenaphthene, benzo(g,h,i)perylene, benzo(k)fluoranthene, bis(2-ethylhexyl)phthalate, fluoranthene, and indeno(1,2,3-c,d)pyrene have not been detected at concentrations above the

endpoint criteria in sediment samples collected during the 2000, 2001, 2002, 2003, and 2004 sampling events. However, the reporting limits for acenaphthene, bis(2-ethylhexyl)phthalate, and fluoranthene in one or more sediment samples collected during 2001 and 2004 were above the endpoint criteria. In addition, the reporting limit for benzo(k)fluoranthene in the sample collected from location 102 in September of 2004 was above the endpoint criterion, and the reporting limit for indeno(1,2,3-c,d)pyrene for all three sediment samples collected in October of 2001 was above the endpoint criterion.

Anthracene, benzo(a)anthracene, benzo(b)fluoranthene, phenanthrene, and pyrene have only been detected at concentrations above the endpoint criteria during the November 2000 sampling event at location 102. However, the reporting limits were above the endpoint criteria for all of these compounds in two or more sediment samples collected during 2001 and 2004. Fluorene was detected at location 101 during the October 2002 sampling event at concentrations greater than the endpoint criteria. In addition, the reporting limits were above the endpoint criteria for this compound in two of the three sediment samples collected in 2001 and 2004.

Benzo(a)pyrene and chrysene are the only two SVOCs that were included on the target compound list that were detected at concentrations greater than the endpoint criteria more than once. Benzo(a)pyrene was detected at locations 101, 102, and 103 in September of 2004, at location 103 in October of 2003, at location 101 in October of 2002, and at locations 102 and 103 in November of 2000. Benzo(a)pyrene was not detected in 2001. However, the reporting limit for this compound was above the endpoint criterion for all three sediment samples collected in 2001. Chrysene was detected at location 101 in October of 2003 and at location 102 in November of 2000. Chrysene was not detected in 2001 or 2004. However, the reporting limit was above the endpoint criterion for two of the three sediment samples collected in 2001 and 2004. There appears to be no clear concentration trend for PAHs during the 2000 to 2004 time period. Evaluation of concentration trends is difficult to interpret, because of the variable reporting limits during the 2000 to 2004 time frame.

### ***Polychlorinated Biphenyls***

The only PCBs that have been detected during the 2000 to 2004 time period are Aroclor 1254 and Aroclor 1260. Aroclor 1254 was detected above endpoint criterion at location 102 at the Palisades Landfill during the October 2001 sampling event. Aroclor 1260 was detected above endpoint criterion at all three locations at the Palisades Landfill during the November 2000 sampling event and at location 102 during the October 2001 and the September 2004 sampling events. In addition, reporting limits exceeded the endpoint criteria for all Aroclors with endpoint criteria during the post-2000 sampling events. Since the reporting limits exceeded the endpoint criteria, an evaluation of concentration trends was not performed.

### ***Total Inorganics***

Antimony was not detected above the endpoint criterion during the 2000, 2002, 2003, and 2004 sampling events. However, it was detected above the endpoint criterion in the sample collected from location 102 during 2001. Arsenic has been detected above the endpoint criterion in all samples collected during the 2000, 2001, 2002, 2003, and 2004 sampling events. Chromium was detected in the sediment sample from location 102 during the 2003 sampling event at a concentration greater than the endpoint criterion. Nickel was detected in the sediment sample from location 102 at a concentration greater than the endpoint criterion during 2000, 2001, 2003, and 2004, and it was detected at a concentration greater than the endpoint criterion in the sample collected from location 103 during 2002.

In general, the concentrations of the inorganics included on the target analyte list appear to have decreased slightly when comparing the 2004 analytical results to the 2003 results. In addition, five inorganics not included on the target analyte list were detected above endpoint criteria in one or more sediment samples collected during the 2004 sampling event: beryllium, copper, lead, mercury, and zinc. With the exception of mercury, the concentrations of these chemicals have exceeded the endpoint criteria during previous sampling events, and the detected concentrations during the 2004 sampling event were similar to previous values. Mercury was detected above the endpoint criterion in the sample collected from location 102 during 2004. This compound has not been previously detected in any sediment samples above the endpoint criterion.

#### **2.4.2 Surface Water**

##### ***Polychlorinated Biphenyls***

PCBs were not detected in the surface water samples collected at the Palisades Landfill during the 2000 through 2004 time period. However, the reporting limits for all of the PCBs were greater than the endpoint criteria for the PCBs. Since the reporting limits exceeded the endpoint criteria, an evaluation of concentration trends is not possible.

##### ***Inorganics***

None of the dissolved inorganics or total inorganics included on the target analyte list for the Palisades Landfill were detected above the endpoint criteria during the 2000 through 2004 time period. (Note that the reporting limit for arsenic during the 2000 and 2001 sampling events was greater than the endpoint criterion.)

## **2.5 RECOMMENDATIONS**






### **2.5.1 Sediments**

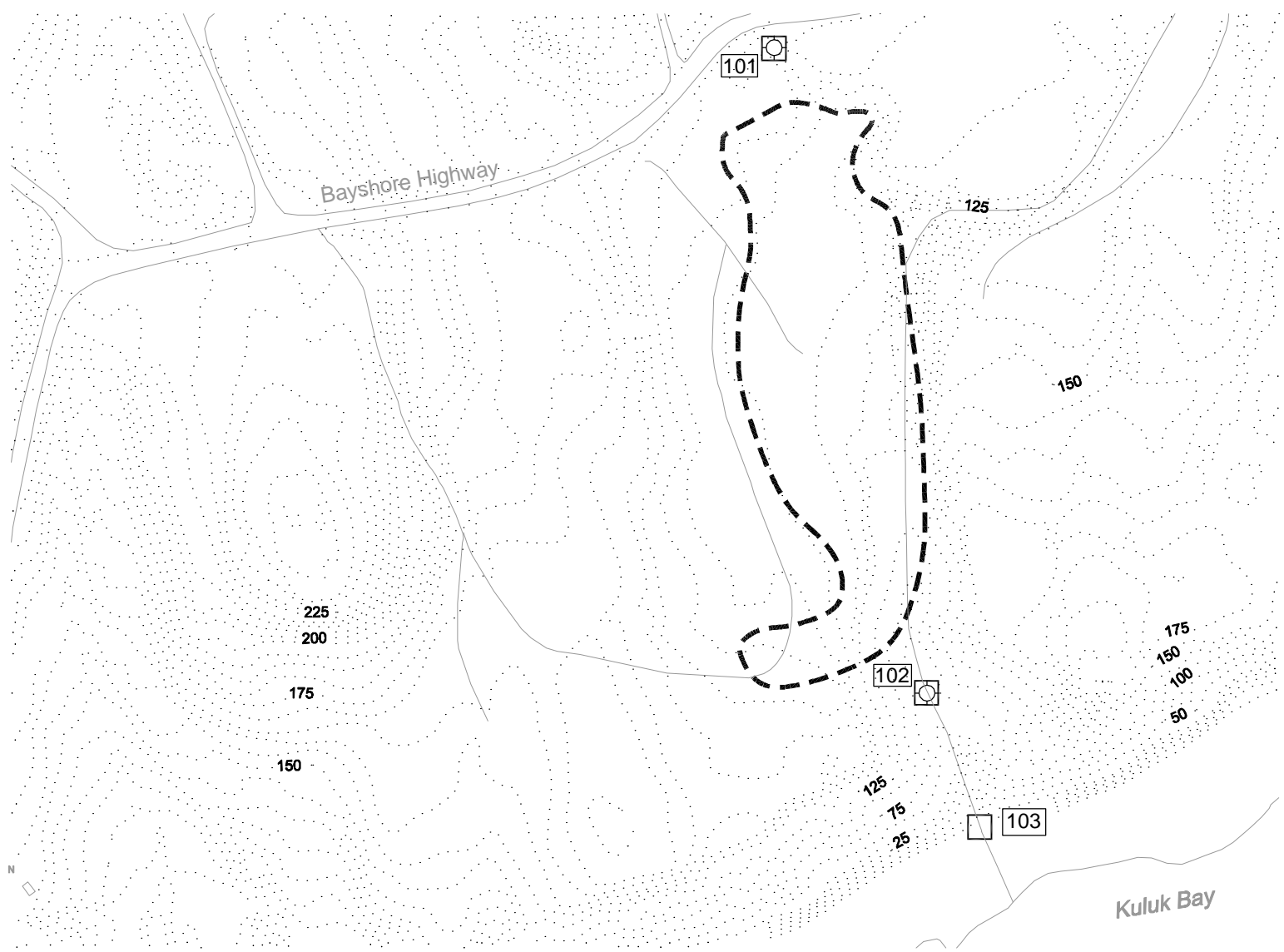
- Based on the September 2004 sampling results, the Navy recommends that sampling of sediments for SVOCs, TIN, TOC, and grain size be continued at the Palisades Landfill, in accordance with the Final CMP, Revision 1 (U.S. Navy 2004).
- Due to the low detection frequency of PCBs in sediment samples from Palisades Landfill at concentrations above the reporting limits, the presence of PCBs in the upgradient sediment sample, and the lack of partitioning to surface water, the Navy recommends that PCB monitoring in sediment samples at this site be reduced to once every other year with the next scheduled sampling to occur in 2006.

### **2.5.2 Surface Water**

- Based on the September 2004 sampling results, the Navy recommends that surface water sampling continue at the Palisades Landfill for TIN and DIN, in accordance with the Final CMP, Revision 1 (U.S. Navy 2004).
- Due to the lack of detected PCBs in surface water, the low solubility of PCBs, and the low concentrations of PCBs that have been infrequently measured in sediments at the site, the Navy recommends that PCB monitoring in surface water at Palisades Landfill be terminated.

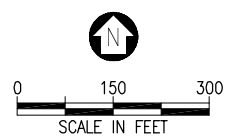
# LEGEND

-  Elevation Contour (ft Above MLLW)
-  Road
-  Surface Water Sample Location
-  Sediment Sample Location
-  Landfill Boundary



**NOTE:**  
 Palisades Landfill surface water location 103 has the following latitude/longitude coordinates based upon the GPS unit using NAD 27 reference: 51-54-20.1 and 176-36-34.7. For triangulation, the point is located as follows: from south marker 133 feet; from north marker 108 feet.

**U.S. NAVY**



**Figure 2-1**  
**Sampling Locations at SWMU 11, Palisades Landfill**

Delivery Order 0048  
 Adak Island, AK  
 2004 ANNUAL LANDFILL  
 MONITORING REPORT

**Table 2-1  
 Summary of Sediment Analytical Results at Palisades Landfill, September 2004**

Target Analyte	Location 101 <sup>d</sup> 9/24/04	Location 101 <sup>d,f</sup> Carbon Normalized 9/24/04	Location 102 <sup>d</sup> 9/24/04	Location 102 <sup>d,f</sup> Carbon Normalized 9/24/04	Location 103 <sup>e</sup> 9/24/04	Location 103 <sup>e,f</sup> Carbon Normalized 9/24/04	Adak Background Concentrations		Endpoint Criteria			
							Freshwater	Marine	Human Health RBSC <sup>h</sup>		Ecological RBSC <sup>h</sup>	
									Freshwater and Marine		Freshwater	Marine
<b>SVOCs–Bis(2-ethylhexyl)phthalate and PAHs (µg/kg)</b>												
Acenaphthene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	NA	NA	NA	1,640,000	150	NE	
Anthracene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	NA	NA	NA	8,210,000	85	NE	
Benzo(a)anthracene	660 U <sup>c</sup>	66,667 U	1,620 U <sup>c</sup>	85,714 U	660 U <sup>c</sup>	NA	NA	NA	87.5	110,000 <sup>g</sup>	NE	
Benzo(a)pyrene	29.2 <sup>b</sup>	NA	63.8 <sup>b</sup>	NA	19.9 <sup>b</sup>	NA	NA	NA	8.75	400	NE	
Benzo(b)fluoranthene	660 U <sup>c</sup>	66,667 U	1,620 U <sup>c</sup>	85,714 U	660 U <sup>c</sup>	NA	NA	NA	87.5	230,000 <sup>g</sup>	NE	
Benzo(g,h,i)perylene	660 U	NA	1620 U	NA	660 U	NA	NA	NA	821,000	NE	NE	
Benzo(k)fluoranthene	660 U	66,667 U	1,620 U <sup>c</sup>	85,714 U	660 U	NA	NA	NA	875	230,000 <sup>g</sup>	NE	
Bis(2-ethylhexyl)phthalate	4000 U	404,040 U <sup>c</sup>	9,800 U <sup>c</sup>	518,519 U <sup>c</sup>	4,000 U	800,000 U <sup>c</sup>	NA	NA	4,560	47,000 <sup>g</sup>	47,000 <sup>g</sup>	
Chrysene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	NA	NA	NA	8,750	40	NE	
Fluoranthene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	132,000 U	NA	NA	1,100,000	600	160,000 <sup>g</sup>	
Fluorene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	NA	NA	NA	1,100,000	35	NE	
Indeno(1,2,3-c,d)pyrene	11.1	1121	30.9	1635	7.66	NA	NA	NA	87.5	34,000 <sup>g</sup>	NE	
Phenanthrene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U <sup>c</sup>	NA	NA	NA	1,100,000	225	225	
Pyrene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	132,000 U	NA	NA	821,000	350	1,000,000 <sup>g</sup>	

**Table 2-1 (Continued)**  
**Summary of Sediment Analytical Results at Palisades Landfill, September 2004**

Target Analyte	Location 101 <sup>d</sup> 9/24/04	Location 101 <sup>d,f</sup> Carbon Normalized 9/24/04	Location 102 <sup>d</sup> 9/24/04	Location 102 <sup>d,f</sup> Carbon Normalized 9/24/04	Location 103 <sup>e</sup> 9/24/04	Location 103 <sup>e,f</sup> Carbon Normalized 9/24/04	Adak Background Concentrations		Endpoint Criteria			
							Freshwater	Marine	Human Health RBSC <sup>h</sup>		Ecological RBSC <sup>h</sup>	
									Freshwater and Marine		Freshwater	Marine
<b>PCBs (Aroclors) (µg/kg)</b>												
Aroclor 1016	16.6 U <sup>c</sup>	NA	40.8 U <sup>c</sup>	NA	16.6 U <sup>c</sup>	NA	NA	NA	8.3	7	NE	
Aroclor 1221	33.5 U	NA	82.1 U	NA	33.5 U	NA	NA	NA	NE	NE	NE	
Aroclor 1232	16.6 U <sup>c</sup>	NA	40.8 U <sup>c</sup>	NA	16.6 U <sup>c</sup>	NA	NA	NA	8.3	NE	NE	
Aroclor 1242	16.6 U	NA	40.8 U	NA	16.6 U	NA	NA	NA	NE	NE	NE	
Aroclor 1248	16.6 U <sup>c</sup>	NA	40.8 U <sup>c</sup>	NA	16.6 U <sup>c</sup>	NA	NA	NA	8.3	30	NE	
Aroclor 1254	16.6 U <sup>c</sup>	NA	40.8 U <sup>c</sup>	NA	16.6 U <sup>c</sup>	NA	NA	NA	8.3	60	NE	
Aroclor 1260	16.6 U <sup>c</sup>	NA	33.6 J <sup>b</sup>	NA	16.6 U <sup>c</sup>	NA	NA	NA	8.3	5	NE	
<b>Total Inorganics (mg/kg)f</b>												
Antimony	0.5 UJ	NA	1.03 J	NA	0.5 UJ	NA	10	1.5	11	2	2	
Arsenic	4.3 <sup>b</sup>	NA	10.4 <sup>a,b</sup>	NA	3.83 <sup>b</sup>	NA	5.46	7.5	0.0365	33	57	
Chromium	6.71	NA	25 <sup>a</sup>	NA	6.41 <sup>a</sup>	NA	12.91	6.04	27,400	80	260	
Nickel	9.13	NA	39 <sup>a,b</sup>	NA	15.5 <sup>a</sup>	NA	10.05	5.01	203	30	30	

<sup>a</sup>Value exceeds Adak background concentration.

<sup>b</sup>Value exceeds endpoint criteria.

<sup>c</sup>Reporting limit exceeds endpoint criteria.

<sup>d</sup>Freshwater sediment sample

<sup>e</sup>Marine sediment sample

**Table 2-1 (Continued)**  
**Summary of Sediment Analytical Results at Palisades Landfill, September 2004**

<sup>f</sup>Units are in  $\mu\text{g}/\text{kg}$  total organic carbon (carbon normalized concentration). To normalize to a total organic carbon (TOC) concentration, the dry-weight concentration of each parameter is divided by the decimal fraction representing the percent TOC content of the sediment. For the purposes of ecological risk assessment and comparison to certain regulations, it is necessary to carbon normalize certain chemicals. If the TOC content of the environmental sample is less than 0.5 percent, then the dry-weight concentration of the chemical parameter is divided by 0.005 (decimal fraction of 0.5 percent). For a TOC content greater than 0.5 percent, the carbon normalized value is used. The TOC content of the samples obtained from the Palisades Landfill was 0.99%, 1.89%, and 0.1% for locations 101, 102, and 103, respectively.

<sup>g</sup>Units are in  $\mu\text{g}/\text{kg}$  total organic carbon. The ecological RBSC in the preliminary source evaluation 2 (PSE-2) guidance document was calculated assuming a 1% TOC content and was provided on a basis of  $\mu\text{g}$  of analyte per kg of sediment. Because of this assumption, the RBSC provided in the PSE-2 document is only valid for sediment samples with a TOC content close to 1%. Two of the three sediment samples collected had TOC contents considerably different than 1%. Therefore, the RBSC based on a 1% TOC content is not valid for these two sediment samples. In order to convert the RBSC in the PSE-2 document to unit of  $\mu\text{g}$  of analyte per kg of TOC, the RBSC in the PSE-2 document was divided by 0.01, the assumed decimal fraction of TOC in the sample. The carbon normalized concentration of an analyte was then compared to the carbon normalized RBSC to determine exceedances.

<sup>h</sup>Final PSE-2 guidance document for Adak (U.S. Navy 1996)

Notes:

**Bolded values exceed either the Adak background concentration or the endpoint criteria.**

Blanks indicate no analysis was performed for that compound

J - estimated value

$\mu\text{g}/\text{kg}$  - microgram/kilogram

$\text{mg}/\text{kg}$  - milligram/kilogram

NA - not applicable

NE - not established

PAHs - polycyclic aromatic hydrocarbon

PCBs - polychlorinated biphenyls

RBSC - risk-based screening criteria

SVOCs - semivolatiles organic compounds

U - not detected; value shown is the reporting limit

**Table 2-2  
 Summary of Surface Water Analytical Results at  
 Palisades Landfill, September 2004**

Target Analyte	Location 101 9/24/2004 (µg/L)	Location 102 9/24/2004 (µg/L)	Endpoint Criteria	
			Alaska Water Quality Standards, 18 AAC 70 <sup>a</sup>	
			Aquatic Life (µg/L)	Human Health (Organisms Only) (µg/L)
<b>PCBs (Aroclors)</b>				
Aroclor 1016	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
Aroclor 1221	1 U <sup>b</sup>	1 U <sup>b</sup>	0.014	0.0045
Aroclor 1232	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
Aroclor 1242	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
Aroclor 1248	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
Aroclor 1254	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
Aroclor 1260	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
<b>Total Inorganics</b>				
Antimony	1 U	0.3 J	None	45,000
Arsenic	1 U	1 U	None	1.4 <sup>c</sup>
Chromium	0.73 J	1.11	210 <sup>d,e</sup>	None
Nickel	3.67	0.78 J	160 <sup>c</sup>	100
<b>Dissolved Inorganics</b>				
Antimony	1 UJ	0.25 J	None	45,000
Arsenic	1 U	1 U	190	1.4 <sup>b</sup>
Chromium	1 U	1 U	None	None
Nickel	1 J	0.78 J	None	100

<sup>a</sup>Criteria existing in 18 AAC 70 when Record of Decision for Operable Unit A and landfills were signed. (Changes to some of these criteria were adopted in an 18 AAC 70 amendment on March 24, 2003, but these changes are not shown in this table.)

<sup>b</sup>Reporting limit exceeds endpoint criteria.

<sup>c</sup>Human health criteria for carcinogens come from U.S. Environmental Protection Agency promulgation of human health criteria for carcinogens for Alaska at the 10<sup>-5</sup> risk level in the National Toxics Rule (40 CFR 131.36), in accordance with on-line Alaska Department of Environmental Conservation guidance at <[www.state.ak.us/dec/dawq/wqs/documents/carcinogens.htm](http://www.state.ak.us/dec/dawq/wqs/documents/carcinogens.htm)>, accessed April 10, 2003.

<sup>d</sup>At 100 mg/L hardness

<sup>e</sup>Value provided is for chromium III. The criteria for chromium VI is 11 µg/L.

**Table 2-2 (Continued)**  
**Summary of Surface Water Analytical Results at**  
**Palisades Landfill, September 2004**

Notes:

**Bolded values exceed the endpoint criteria.**

AAC - Alaska Administrative Code

J - estimated value

µg/L - microgram/liter

PCBs - polychlorinated biphenyls

U - not detected; value shown is the reporting limit

**Table 2-3  
 Summary of Exceedances of Endpoint Criteria in Sediments at  
 Palisades Landfill, September 2004**

Target Analyte	Location 101 <sup>d</sup> 9/24/04	Location 101 <sup>d,f</sup> Carbon Normalized 9/24/04	Location 102 <sup>d</sup> 9/24/04	Location 102 <sup>d,f</sup> Carbon Normalized 9/24/04	Location 103 <sup>e</sup> 9/24/04	Location 103 <sup>e,f</sup> Carbon Normalized 9/24/04	Adak Background Concentrations		Endpoint Criteria		
							Freshwater	Marine	Human Health RBSC <sup>h</sup> Freshwater and Marine	Ecological RBSC <sup>h</sup>	
										Freshwater	Marine
<b>SVOCs–Bis(2-ethylhexyl)phthalate and PAHs (µg/kg)</b>											
Acenaphthene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	NA	NA	NA	1,640,000	150	NE
Anthracene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	NA	NA	NA	8,210,000	85	NE
Benzo(a)anthracene	660 U <sup>c</sup>	66,667 U	1,620 U <sup>c</sup>	8,5714 U	660 U <sup>c</sup>	NA	NA	NA	87.5	110,000 <sup>g</sup>	NE
Benzo(a)pyrene	29.2 <sup>b</sup>	NA	63.8 <sup>b</sup>	NA	19.9 <sup>b</sup>	NA	NA	NA	8.75	400	NE
Benzo(b)fluoranthene	660 U <sup>c</sup>	66,667 U	1,620 U <sup>c</sup>	8,5714 U	660 U <sup>c</sup>	NA	NA	NA	87.5	230,000 <sup>g</sup>	NE
Benzo(k)fluoranthene	660 U	66,667 U	1,620 U <sup>c</sup>	8,5714 U	660 U	NA	NA	NA	875	230,000 <sup>g</sup>	NE
Bis(2-ethylhexyl)phthalate	4000 U	404,040 U <sup>c</sup>	9,800 U <sup>c</sup>	518,519 U <sup>c</sup>	4,000 U	800,000 U <sup>c</sup>	NA	NA	4,560	47,000 <sup>g</sup>	47,000 <sup>g</sup>
Chrysene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	NA	NA	NA	8,750	40	NE
Fluoranthene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	132,000 U	NA	NA	1,100,000	600	160,000 <sup>g</sup>
Fluorene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	NA	NA	NA	1,100,000	35	NE
Phenanthrene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U <sup>c</sup>	NA	NA	NA	1,100,000	225	225
Pyrene	660 U <sup>c</sup>	NA	1,620 U <sup>c</sup>	NA	660 U	132,000 U	NA	NA	821,000	350	1,000,000 <sup>g</sup>

**Table 2-3 (Continued)**  
**Summary of Exceedances of Endpoint Criteria in Sediments at**  
**Palisades Landfill, September 2004**

Target Analyte	Location 101 <sup>d</sup> 9/24/04	Location 101 <sup>d,f</sup> Carbon Normalized 9/24/04	Location 102 <sup>d</sup> 9/24/04	Location 102 <sup>d,f</sup> Carbon Normalized 9/24/04	Location 103 <sup>e</sup> 9/24/04	Location 103 <sup>e,f</sup> Carbon Normalized 9/24/04	Adak Background Concentrations		Endpoint Criteria		
							Freshwater	Marine	Human Health RBSC <sup>h</sup> Freshwater and Marine	Ecological RBSC <sup>h</sup>	
										Freshwater	Marine
<b>PCBs (Aroclors) (µg/kg)</b>											
Aroclor 1016	16.6 U <sup>c</sup>	NA	40.8 U <sup>c</sup>	NA	16.6 U <sup>c</sup>	NA	NA	NA	8.3	7	NE
Aroclor 1232	16.6 U <sup>c</sup>	NA	40.8 U <sup>c</sup>	NA	16.6 U <sup>c</sup>	NA	NA	NA	8.3	NE	NE
Aroclor 1248	16.6 U <sup>c</sup>	NA	40.8 U <sup>c</sup>	NA	16.6 U <sup>c</sup>	NA	NA	NA	8.3	30	NE
Aroclor 1254	16.6 U <sup>c</sup>	NA	40.8 U <sup>c</sup>	NA	16.6 U <sup>c</sup>	NA	NA	NA	8.3	60	NE
Aroclor 1260	16.6 U <sup>c</sup>	NA	33.6 J <sup>b</sup>	NA	16.6 U <sup>c</sup>	NA	NA	NA	8.3	5	NE
<b>Total Inorganics (mg/kg)<sup>f</sup></b>											
Arsenic	4.3 <sup>b</sup>	NA	10.4 <sup>a,b</sup>	NA	3.83 <sup>b</sup>	NA	5.46	7.5	0.0365	33	57
Chromium	6.71	NA	25 <sup>a</sup>	NA	6.41 <sup>a</sup>	NA	12.91	6.04	27,400	80	260
Nickel	9.13	NA	39 <sup>a,b</sup>	NA	15.5 <sup>a</sup>	NA	10.05	5.01	203	30	30

<sup>a</sup>Value exceeds Adak background concentration.

<sup>b</sup>Value exceeds endpoint criteria.

<sup>c</sup>Reporting limit exceeds endpoint criteria.

<sup>d</sup>Freshwater sediment sample

<sup>e</sup>Marine sediment sample

**Table 2-3 (Continued)**  
**Summary of Exceedances of Endpoint Criteria in Sediments at**  
**Palisades Landfill, September 2004**

<sup>f</sup>Units are in  $\mu\text{g}/\text{kg}$  total organic carbon (carbon normalized concentration). To normalize to a total organic carbon (TOC) concentration, the dry-weight concentration of each parameter is divided by the decimal fraction representing the percent TOC content of the sediment. For the purposes of ecological risk assessment and comparison to certain regulations, it is necessary to carbon normalize certain chemicals. If the TOC content of the environmental sample is less than 0.5 percent, then the dry-weight concentration of the chemical parameter is divided by 0.005 (decimal fraction of 0.5 percent). For a TOC content greater than 0.5 percent, the carbon normalized value is used. The TOC content of the samples obtained from the Palisades Landfill was 0.99%, 1.89%, and 0.1% for locations 101, 102, and 103, respectively.

<sup>g</sup>Units are in  $\mu\text{g}/\text{kg}$  total organic carbon. The ecological RBSC in the preliminary source evaluation 2 (PSE-2) guidance document was calculated assuming a 1% TOC content, and was provided on a basis of  $\mu\text{g}$  of analyte per kg of sediment. Because of this assumption, the RBSC provided in the PSE-2 document is only valid for sediment samples with a TOC content close to 1%. Two of the three sediment samples collected had TOC contents considerably different than 1%. Therefore, the RBSC based on a 1% TOC content is not valid for these two sediment samples. In order to convert the RBSC in the PSE-2 document to unit of  $\mu\text{g}$  of analyte per kg of TOC, the RBSC in the PSE-2 document was divided by 0.01, the assumed decimal fraction of TOC in the sample. The carbon normalized concentration of an analyte was then compared to the carbon normalized RBSC to determine exceedances.

<sup>h</sup>Final PSE-2 guidance document for Adak (U.S. Navy 1996)

Notes:

**Bolded values exceed either the Adak background concentration or the endpoint criteria.**

Blanks indicate no analysis was performed for that compound.

J - estimated value

$\mu\text{g}/\text{kg}$  - microgram/kilogram

$\text{mg}/\text{kg}$  - milligram/kilogram

NA - not applicable

NE - not established

PCBs - polychlorinated biphenyls

RBSC - risk-based screening criteria

SVOCs - semivolatile organic compounds

U - not detected; value shown is the reporting limit

**Table 2-4  
 Summary of Exceedances of Endpoint Criteria in Surface Water at  
 Palisades Landfill, September 2004**

Target Analyte	Location 101 9/24/2004 (µg/L)	Location 102 9/24/2004 (µg/L)	Endpoint Criteria	
			Alaska Water Quality Standards, 18 AAC 70 <sup>a</sup>	
			Aquatic Life (µg/L)	Human Health (Organisms Only) (µg/L)
<b>PCBs (Aroclors)</b>				
Aroclor 1016	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
Aroclor 1221	1 U <sup>b</sup>	1 U <sup>b</sup>	0.014	0.0045
Aroclor 1232	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
Aroclor 1242	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
Aroclor 1248	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
Aroclor 1254	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045
Aroclor 1260	0.5 U <sup>b</sup>	0.5 U <sup>b</sup>	0.014	0.0045

<sup>a</sup>Criteria existing in 18 AAC 70 when Record of Decision for Operable Unit A and landfills were signed. (Changes to some of these criteria were adopted in an 18 AAC 70 amendment on March 24, 2003, but these changes are not shown in this table.)

<sup>b</sup>Reporting limit exceeds endpoint criteria.

Notes:

AAC - Alaska Administrative Code

µg/L - microgram/liter

PCBs - polychlorinated biphenyls

U - not detected; value shown is the reporting limit

### **3.0 METALS LANDFILL**

#### **3.1 BACKGROUND**

The Metals Landfill (SWMU 13) is located immediately southeast of the central community of Adak and is bounded by Monument Hill to the west and Kuluk Bay to the east. The total volume of landfill waste and soil in the Metals Landfill is approximately 400,000 cubic yards. The total site area is approximately 28 acres, while approximately 19 acres were formally used as a landfill (U.S. Navy 2001c).

The Metals Landfill began operations in the 1940s and received a variety of waste materials including sanitary trash, construction waste, paints, chlorinated and nonchlorinated solvents, batteries, scrap vehicles, medical waste, and sewage sludge. In 1970, restrictions were placed on the types of materials that could be disposed of at the landfill. Beginning in 1988, when a sludge press was installed at the sewage treatment plant, dewatered sewage sludge was disposed of on the southern end of the eastern section of the landfill. The landfill stopped receiving wastes in 1989 (U.S. Navy 2001c).

A site inspection of Metals Landfill was conducted in 1989 by regulatory agencies. The investigation discovered four drums with liquid, one cracked vehicle battery, and one acetylene cylinder scattered in one small area of the landfill. As a result of the inspection, the regulatory agency determined that the battery area contains hazardous waste and therefore, was deemed a hazardous waste pile under the Resource Conservation and Recovery Act (RCRA). This is the only area of the landfill to have a RCRA issue; the remaining landfill has been designated as a solid waste management unit under RCRA. The presence of the batteries resulted in a Federal Facilities Compliance Agreement (FFCA) being signed and issued by the EPA in November 1990 (U.S. Navy 2001c).

In 1996, the discrete waste pile within the Metals Landfill was closed as a waste pile under the RCRA guidelines. Closure entailed verification of the collection and disposal of five batteries from the site at a permitted hazardous waste landfill and the completion of a survey plat that included a note restricting the disturbance of the hazardous waste disposal unit in accordance with regulations.

In the summer of 1996, the entire Metals Landfill was closed per the 1995 ROD as an IRA. Closure included evaluation and removal of shoreline debris, implementation of surface water erosion controls, construction of a landfill cap, placement of a vegetative cover, implementation of institutional controls for access and land use, and long-term monitoring. The final OU A ROD determined that the selected interim actions met CERCLA requirements and no further

remedial actions were required. Because of the presence of hazardous materials that do not allow for unrestricted use and unlimited access, Metals Landfill, along with Palisades Landfill, will continue to be evaluated under the CERCLA 5-year review process (U.S. Navy 2001d). The 5-year review report was completed in November 2001 (U.S. Navy 2001c) and will be updated in 2005 or 2006.

### **3.2 SAMPLING HISTORY RELATED TO CLOSURE MONITORING**

Groundwater has been sampled at the Metals Landfill periodically since July 1996. To date, 11 sampling events at the Metals Landfill have occurred from 1996 through 2004 (see 1-2). In July 1996 and November 1996, groundwater was sampled at eight locations for VOCs, SVOCs, PCBs/pesticides, TIN, and DIN. In May 1997, December 1997, June 1998, September 1999, November 2000, September 2001, October 2002, October 2003, and September 2004, groundwater sampling was also performed. All eight locations were sampled during these events with the exception of locations 401 and 404 during the November 2000 event. The analytical results from the sampling conducted at Metals Landfill from 1996 through 2004 are presented in Appendix E.

In 2004, samples were analyzed for the following target analytes in groundwater:

- Bis(2-ethylhexyl)phthalate
- Chlorobenzene
- 1,4-Dichlorobenzene
- 1,3-Dichlorobenzene
- Ethenes
- Arsenic
- Barium

### **3.3 DISCUSSION OF GROUNDWATER SAMPLING RESULTS**

During the 2004 landfill monitoring event, groundwater samples were collected at the Metals Landfill as specified in the Final CMP, Revision 1 (U.S. Navy 2004), and sent to the laboratory for analysis. The locations where samples were collected during this sampling event are shown on Figure 3-1. Field logbooks are provided in Appendix A, and the field sampling parameters collected during sampling are included in Appendix D. A summary of the analytical results from the 2004 sampling event and the endpoint criteria are provided for groundwater in 3-1. This provides analytical results for the target analytes as defined in the Final CMP, Revision 1. The analytical results for all 2004 analytes are provided in Appendix F. A second set of samples

were collected from all wells on a different date for analysis of MBAS, because holding times were missed on the first set of samples.

Analytical results for groundwater were compared to the endpoint criteria presented in Appendix F of the Final CMP, Revision 1. In addition, analytical results for inorganics in groundwater were compared to Adak background concentrations, where established. Analytical results that exceeded the endpoint criteria or the Adak background concentrations are summarized in 3-2.

Visual inspections of the groundwater monitoring wells at Metals Landfill were also completed during the groundwater sampling event. All wells were functional at the time of inspection. A summary of the results of the well inspections is provided in Appendix B. Inspections relative to institutional controls were conducted during the 2004 monitoring event and are reported under a separate cover.

Groundwater samples were collected from eight monitoring wells: MW13-1 (location 401), MW13-2 (location 402), MW13-3 (location 403), MW13-4 (location 404), MW13-5 (location 405), MW-603 (location 603), MW-604 (location 604), and MW-605 (location 605). Groundwater samples were analyzed for VOCs (EPA Method 8260B), SVOCs (EPA Methods 8270C/8270 SIM), TIN (EPA Methods 6020/7470A), DIN (EPA Methods 6020/7470A), and water quality parameters (WQPs), including inorganic ions (EPA Method 300.0), MBAS (EPA Method 425.1), total Kjeldahl nitrogen (EPA Method 351.2), ammonia (EPA Method 350.1), alkalinity (EPA Method SM 2320B), chemical oxygen demand (EPA Method 410.4), and total dissolved solids (EPA Method 160.1). Based on historical groundwater level data, monitoring wells are positioned at locations that are hydraulically downgradient of the solid waste at the Metals Landfill. All groundwater sampling locations are shown on Figure 3-1.

A summary of the analytical results from the 2004 sampling event and the endpoint criteria are provided for groundwater in 3-1. As previously discussed, this provides analytical results for the target analytes as defined in the Final CMP, Revision 1. The analytical results for all 2004 analytes are provided in Appendix F. Analytical results that exceeded the endpoint criteria are summarized in 3-2. Analytical results for VOCs, SVOCs, TIN, and DIN in the groundwater samples collected at the Metals Landfill are discussed below.

### ***Semivolatile Organic Compounds***

Bis(2-ethylhexyl)phthalate, the only SVOC included on the target analyte list for the Metals Landfill, was not detected in any of the groundwater samples collected at the Metals Landfill during the 2004 sampling event. Two SVOCs, not included in the target analyte list, were detected in groundwater samples collected at the Metals Landfill during the September 2004

sampling event. One SVOC (fluoranthene) was detected in the groundwater sample collected from MW13-1, and two SVOCs (fluoranthene and pyrene) were detected in the groundwater sample collected at MW-605 (see Appendix E). Fluoranthene was detected at estimated concentrations of 0.0572 µg/L and 0.0968 µg/L, which are both less than the endpoint criterion (1,460 µg/L). Pyrene was detected at a concentration of 0.0912 µg/L, which is also less than the endpoint criterion (1,100 µg/L). The endpoint criteria are based on the Alaska Cleanup Levels in 18 AAC 75.345.

### ***Volatile Organic Compounds***

VOCs were detected in seven of the eight groundwater samples collected at the Metals Landfill during the 2004 sampling event. A total of 13 VOCs were detected in groundwater samples collected from MW13-1, MW13-2, MW13-3, MW13-4, MW-603, MW-604, and MW-605. Of these, six of the detected VOCs are included on the target analyte list for the Metals Landfill: 1,3-dichlorobenzene, 1,4-dichlorobenzene, chlorobenzene, cis-1,2-dichloroethene, tetrachloroethene, and trichloroethene. 1,3-Dichlorobenzene was detected in the groundwater samples collected from MW13-1, MW13-3, and MW-605. 1,4-Dichlorobenzene and chlorobenzene were detected in the groundwater sample collected from MW-605. Cis-1,2-dichloroethene was detected in the groundwater samples collected from MW13-1, MW13-4, MW-603, and MW-605. Tetrachloroethene was detected in the groundwater sample collected from MW-603, and trichloroethene was detected in the groundwater samples collected from MW13-1, MW13-4, MW-603, and MW-604. None of the detected target analytes exceeded their respective endpoint criteria (3-1).

1,1,1-Trichloroethane, 1,1-dichloroethane, 1,2,4-trichlorobenzene, 1,2-dichlorobenzene, benzene, chloroethane, and dichlorodifluoromethane were the VOCs not on the target analyte list that were detected in the groundwater samples collected at the site (see Appendix E). 1,1,1-Trichloroethane was detected in the groundwater sample collected from MW13-4 at a concentration less than the endpoint criterion of 200 µg/L. 1,1-Dichloroethane was detected in the groundwater samples collected from MW13-2, MW13-3, MW13-4, and MW-605 at concentrations less than the endpoint criterion of 3,650 µg/L. 1,2,4-Trichlorobenzene was detected in the groundwater sample collected from MW13-1 at a concentration less than the endpoint criterion of 70 µg/L. 1,2-Dichlorobenzene and benzene were detected in the sample collected from MW-605 at concentrations less than the endpoint criteria of 600 and 5 µg/L, respectively. Chloroethane was also detected in the groundwater sample collected from MW-605 at 4.43 µg/L. There is no established endpoint criterion for chloroethane. Finally, dichlorodifluoromethane was detected in groundwater samples collected from MW-603 and MW-605 at concentrations of 0.57 and 1.21 µg/L, respectively. There is no established endpoint criterion for dichlorodifluoromethane. All of the endpoint criteria are based on the Alaska Cleanup Levels in 18 AAC 75.345.

### ***Inorganics***

No dissolved inorganics or total inorganics included on the target analyte list for the Metals Landfill were detected above the endpoint criteria. However, dissolved arsenic and total and dissolved barium were detected in groundwater samples at concentrations above the Adak background concentrations. Dissolved arsenic exceeded the Adak background concentration of 2 µg/L in samples collected from MW13-1, MW13-2, and MW-605. Total barium was detected at a concentration of 57.9 µg/L in the sample from MW-605. This concentration is greater than the Adak background concentration of 54.4 µg/L. Dissolved barium was also detected at a concentration of 57.9 µg/L in the sample from MW-605. This concentration is greater than the Adak background concentration of 45.2 µg/L. All inorganics not on the target analyte list were either not detected or detected at concentrations less than their respective endpoint criteria (see Appendix E).

### ***Water Quality Parameters***

Total alkalinity was measured in groundwater samples at concentrations ranging from 165 to 459 mg/L. Chemical oxygen demand was measured in groundwater samples at concentrations ranging from 4.87 to 16.5 mg/L. MBAS was measured in groundwater samples at concentrations ranging from 9.5 to 39.2 µg/L. Sulfate was measured in groundwater samples at concentrations ranging from 15.3 to 72.8 mg/L. Total dissolved solids were measured in groundwater samples at concentrations ranging from 324 to 991 mg/L.

MBAS has been measured in the 1997, 2003, and 2004 groundwater samples collected at the landfill. Concentrations have ranged from 9.5 to 140 µg/L. The Alaska Administrative Code and federal regulations have not established groundwater cleanup levels for MBAS. The holding time for MBAS is 48 hours, which is very difficult and expensive to accommodate at this remote location. The Navy will recommend that MBAS monitoring be discontinued at this site.

## **3.4 CONCLUSIONS**

The analytical data for the period 2000 through 2004 were reviewed for the compounds included on the target analyte list and for those compounds that exceeded the endpoint criteria during the 2004 sampling event and that are not included on the target analyte list. The purpose of the analysis of the recent historical data is to determine if overt trends exist in the concentration data for the Metals Landfill.

### ***Semivolatile Organic Compounds***

Bis(2-ethylhexyl)phthalate, the only SVOC included on the target analyte list for the Metals Landfill, was not detected in any of the groundwater samples collected during the 2004 sampling event. This compound was detected above endpoint criterion at two locations during the 2000 sampling event. Therefore, it appears that the concentration of this compound is decreasing (Appendix E).

### ***Volatile Organic Compounds***

Of the eight compounds included on the target analyte list for the Metals Landfill, six were detected during the 2000 through 2004 time period. 1,1-dichloroethene and trans-1,2-dichloroethene were not detected during any of the sampling events. 1,3-dichlorobenzene, 1,4-dichlorobenzene, chlorobenzene, cis-1,2-dichloroethene, tetrachloroethene, and trichloroethene were detected during the 2004 sampling event. All of these compounds were also detected during at least one other sampling event between 2000 and 2004. All concentrations of detected target analytes were less than endpoint criteria.

### ***Inorganics***

No dissolved inorganics or total inorganics included on the target analyte list for the Metals Landfill have been detected above the endpoint criteria during the 2000 through 2004 time period.

## **3.5 RECOMMENDATIONS**

Based on the September 2004 sampling results, it is recommended that sampling be continued at the Metals Landfill for total arsenic and barium and dissolved arsenic and barium.

Since bis(2-ethylhexyl)phthalate has not been detected above the endpoint criterion since 2000 (Appendix E), the Navy recommends that SVOC monitoring at Metals Landfill be reduced to once every other year with the next scheduled sampling to occur in 2006.

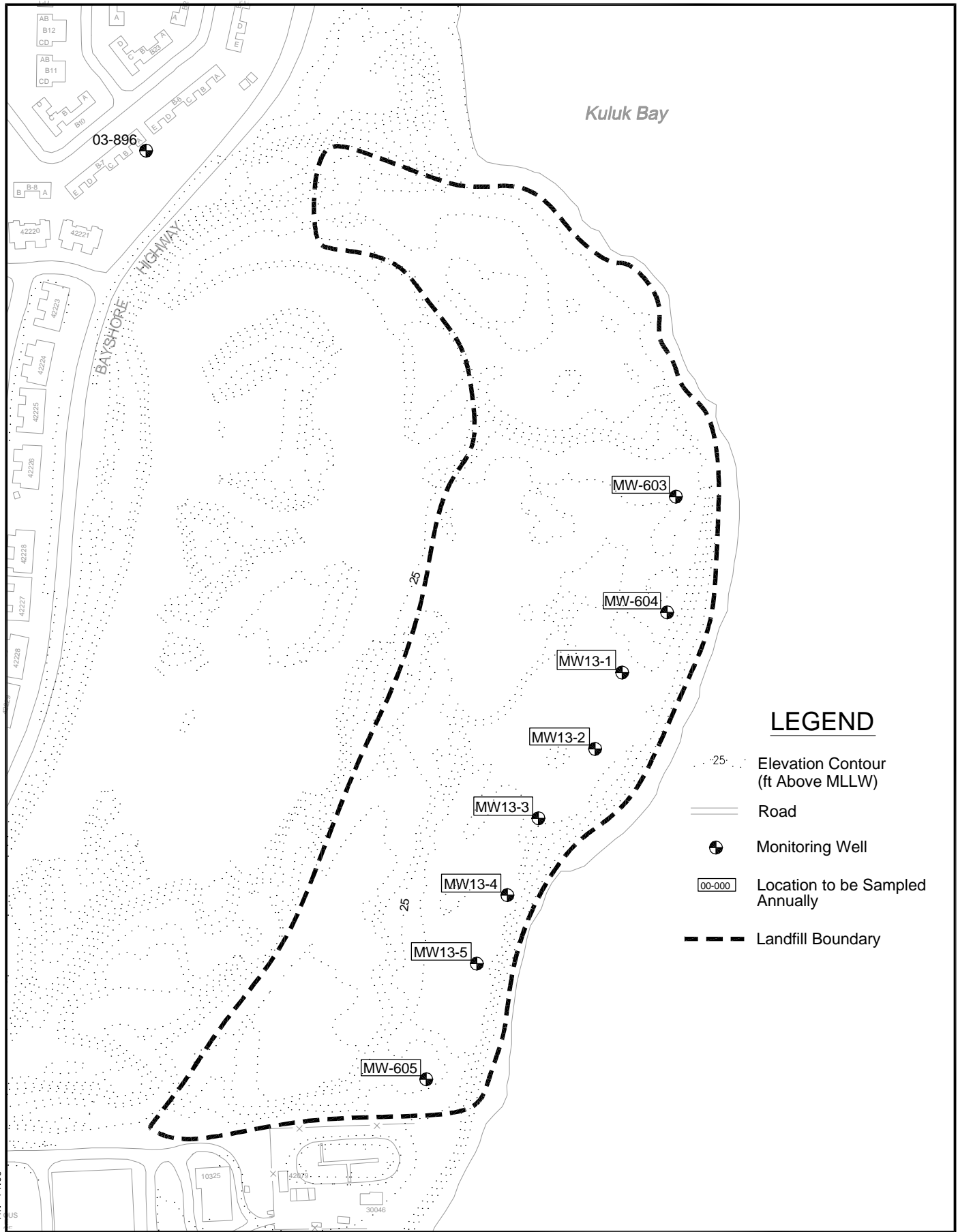
Since target analytes 1,1-dichloroethene, 1,4-dichlorobenzene, chlorobenzene, cis-1,2-dichloroethene, and tetrachloroethene have not been detected in groundwater samples at concentrations above their respective endpoint criteria, and trichloroethene and trans-1,2-dichloroethene have not been detected above their respective endpoint criteria since 1998, the Navy recommends that groundwater monitoring for VOCs be reduced to once every other year with the next scheduled sampling to occur in 2006.

FINAL ANNUAL LANDFILL MONITORING REPORT  
OU A, Former Adak Naval Complex  
U.S. Navy, Engineering Field Activity, Northwest  
Contract No. N44255-02-D-2008  
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There are no MBAS cleanup levels specified in the Alaska Administrative Code or federal regulations. Given the difficulty and expense of analyzing MBAS within the 48-hour holding time, the Navy recommends that MBAS monitoring be discontinued at this site.

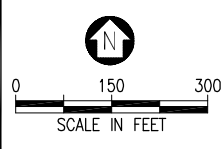
FILENAME: T:\ADAK\IDIC\Sub-Tasks\DO 48\ALMR\Fig 3-1 SWMU 13 LANDFILL.dwg  
 EDIT DATE: 05/13/05 AT: 11:09



**LEGEND**

- Elevation Contour (ft Above MLLW)
- Road
- Monitoring Well
- Location to be Sampled Annually
- Landfill Boundary

**U.S. NAVY**



**Figure 3-1  
 Sampling Locations at  
 SWMU 13, Metals Landfill**

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 MONITORING REPORT

**Table 3-1  
 Summary of Groundwater Analytical Results at Metals Landfill, September 2004**

Target Analyte	Location 401 (MW13-1) 9/18/04 (µg/L)	Location 402 (MW13-2) 9/18/04 (µg/L)	Location 403 (MW13-3) 9/18/04 (µg/L)	Location 404 (MW13-4) 9/18/04 (µg/L)	Location 405 (MW13-5) 9/18/04 (µg/L)	Location 603 (MW-603) 9/18/04 (µg/L)	Location 604 (MW-604) 9/18/04 (µg/L)	Location 605 (MW-605) 9/18/04 (µg/L)	Adak Background Concentration (µg/L)	Endpoint Criteria
	Alaska Cleanup Levels 18 AAC 75.345 <sup>a</sup> (µg/L)									
<b>Volatile Organic Compounds</b>										
1,1-Dichloroethene	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	NA	7
1,3-Dichlorobenzene	0.19 J	1 UJ	0.25 J	1 UJ	1 UJ	1 UJ	1 UJ	1.35 J	NA	None
1,4-Dichlorobenzene	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	5.1 J	NA	75
Chlorobenzene	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	18 J	NA	100
cis-1,2-Dichloroethene	0.24 J	1 UJ	1 UJ	0.23 J	1 UJ	0.21 J	1 UJ	0.52 J	NA	70
Tetrachloroethene	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	0.35 J	1 UJ	1 UJ	NA	5
trans-1,2-Dichloroethene	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	1 UJ	NA	100
Trichloroethene	0.37 J	1 UJ	1 UJ	0.25 J	1 UJ	0.43 J	0.36 J	1 UJ	NA	5
<b>Semivolatile Organic Compounds</b>										
Bis(2-ethylhexyl)phthalate	0.583 UJ	0.571 UJ	0.727 UJ	0.818 UJ	1.17 UJ	2.45 UJ	0.5 U	0.558 UJ	NA	6
<b>Total Inorganic Compounds</b>										
Arsenic	5.4	5.07	1 U	1.23	0.82 J	2.82	3.11	4.33	13.3	50
Barium	12	12.1	2.55	2.31	3.27	1.46	4.21	<b>57.9<sup>b</sup></b>	54.4	2000
<b>Dissolved Inorganics</b>										
Arsenic	<b>4.74<sup>b</sup></b>	<b>4.57<sup>b</sup></b>	1 UJ	1.07 UJ	0.88 UJ	1.67 UJ	1.5 UJ	<b>3.7<sup>b</sup></b>	2	50
Barium	11.8	2.65	1.59	2.26	3.19	1.5	2.83	<b>57.9<sup>b</sup></b>	45.2	2000

**Table 3-1 (Continued)**  
**Summary of Groundwater Analytical Results at Metals Landfill, September 2004**

<sup>a</sup>Cleanup levels shown are applicable if groundwater is a source of drinking water at the site. A concentration equal to 10 times the concentration shown may be used if Alaska Department of Environmental Conservation determines groundwater is not a current source of drinking water.

<sup>b</sup>Value exceeds Adak background concentration.

Notes:

**Bolded values exceed the Adak background concentration.**

AAC - Alaska Administrative Code

J - estimated value

µg/L - microgram/liter

NA - not applicable

U - not detected; value shown is the reporting limit

UJ - estimated reporting limit

**Table 3-2  
 Summary of Exceedances of Background or Endpoint Criteria in Groundwater at  
 Metals Landfill, September 2004**

Target Analyte	Location 401 (MW13-1) 9/18/04 (µg/L)	Location 402 (MW13-2) 9/18/04 (µg/L)	Location 403 (MW13-3) 9/18/04 (µg/L)	Location 404 (MW13-4) 9/18/04 (µg/L)	Location 405 (MW13-5) 9/18/04 (µg/L)	Location 603 (MW-603) 9/18/04 (µg/L)	Location 604 (MW-604) 9/18/04 (µg/L)	Location 605 (MW-605) 9/18/04 (µg/L)	Adak Background Concentration (µg/L)	Endpoint Criteria  Alaska Cleanup Levels 18 AAC 75.345 <sup>a</sup> (µg/L)
	<b>Total Inorganic Compounds</b>									
Arsenic	5.4	5.07	1 U	1.23	0.82 J	2.82	3.11	4.33	13.3	50
Barium	12	12.1	2.55	2.31	3.27	1.46	4.21	<b>57.9<sup>b</sup></b>	54.4	2000
<b>Dissolved Inorganics</b>										
Arsenic	<b>4.74<sup>b</sup></b>	<b>4.57<sup>b</sup></b>	1 UJ	1.07 UJ	0.88 UJ	1.67 UJ	1.5 UJ	<b>3.7<sup>b</sup></b>	2	50
Barium	11.8	2.65	1.59	2.26	3.19	1.5	2.83	<b>57.9<sup>b</sup></b>	45.2	2000

<sup>a</sup>Cleanup levels shown are applicable if groundwater is a source of drinking water at the site. A concentration equal to 10 times the concentration shown may be used if Alaska Department of Environmental Conservation determines groundwater is not a current source of drinking water.

<sup>b</sup>Value exceeds Adak background concentration.

Notes:

**Bolded values exceed the Adak background concentration.**

AAC - Alaska Administrative Code

J - estimated value

µg/L - microgram/liter

NA - not applicable

U - not detected; value shown is the reporting limit

UJ - estimated reporting limit

## **4.0 WHITE ALICE LANDFILL**

### **4.1 BACKGROUND**

The White Alice Landfill (SWMUs 18/19) is located in the vicinity of an abandoned quarry west of the downtown area and is comprised of the former South Sector Drum Disposal Area and the Quarry Metal Disposal Area. The South Sector Drum Disposal Area was located at the base of the abandoned quarry. Approximately twenty 55-gallon drums were disposed of on low-lying tundra. The drums were heavily rusted, and were most likely deposited during the 1940s. There is no information on the contents of the drums or any other history available (U.S. Navy 2001c). The Quarry Metal Disposal Area was a small scrap metal disposal area located in the abandoned quarry. Scrap metal, including material from demolition of Quonset huts, has been placed on the floor of the quarry. The disposal area was active from 1980 to 1985. No information was available on the history of any contaminant releases at the site (U.S. Navy 2001c).

Once combined to form the White Alice Landfill, the areas received construction waste into the 1990s. In 1997 the landfill was closed according to the State of Alaska's solid waste regulations (18 AAC 60). Closure entailed placement of a landfill cover, grading and contouring, surface water/erosion controls, access restrictions in the form of a sign and a gate, and a vegetative cover per Alaska solid waste landfill closure requirements (18 AAC 60).

### **4.2 SAMPLING HISTORY RELATED TO CLOSURE MONITORING**

Groundwater and surface water has been sampled at the White Alice Landfill periodically since March 1996. To date, 12 sampling events have occurred from 1996 through 2004 (see 1-2). Sampling at the White Alice Landfill has consisted of four quarterly rounds and eight annual rounds of sampling at two monitoring wells and three surface water seeps. The quarterly sampling rounds were completed in March, June, September, and October of 1996. Eight annual sampling rounds were subsequently completed in December 1997, June 1998, September 1999, November 2000, September 2001, October 2002, October 2003, and September 2004. The analytical results from the sampling conducted at White Alice Landfill from 1996 through 2004 are presented in Appendix E.

In 2004, samples were analyzed for the following target analytes in surface water and groundwater:

- Arsenic
- Barium

- Nickel
- Chromium

### **4.3 DISCUSSION OF RESULTS**

During the 2004 landfill monitoring event, surface water and groundwater samples were collected at the White Alice Landfill as specified in the Final CMP, Revision 1 (U.S. Navy 2004), and sent to the laboratory for analysis. The locations where samples were collected during this sampling event are shown on Figure 4-1. Field logbooks are provided in Appendix A, and the field sampling parameters collected during sampling are included in Appendix D. A summary of the analytical results from the 2004 sampling event and the endpoint criteria are provided for surface water and groundwater in Tables 4-1 and 4-2, respectively. These tables provide analytical results for the target analytes as defined in the Final CMP, Revision 1. The analytical results for all analytes are provided in Appendix F.

Analytical results for surface water and groundwater were compared to the endpoint criteria presented in Appendix F of the Final CMP, Revision 1 (U.S. Navy 2004). In addition, analytical results for inorganics in groundwater were compared to Adak background concentrations, where established.

Visual inspections of the groundwater monitoring wells at White Alice Landfill were also completed during the groundwater sampling event. All wells were functional at the time of inspection. A summary of the well inspections is provided in Appendix B. Inspections relative to institutional controls were conducted during the 2004 monitoring event and are reported under a separate cover.

#### **4.3.1 Surface Water**

Surface water samples were collected from three locations (WASW01, WASW02, and WASW03) and analyzed for VOCs (EPA Method 8260B), TIN (EPA Methods 6020/7470A), DIN (EPA Methods 6020/7470A) and WQPs including inorganic ions (EPA Method 300.0), MBAS (EPA Method 425.1), total Kjeldahl nitrogen (EPA Method 351.2), ammonia (EPA Method 350.1), alkalinity (EPA Method SM 2320B), chemical oxygen demand (EPA Method 410.4), and total dissolved solids (EPA Method 160.1). WASW01 is located in an unnamed stream to the west and downgradient from the White Alice Landfill. WASW02 is located within a shallow surface flow originating along the west and northwest flank of the landfill. WASW03 is located in the pond across the road from the southeast entrance of the landfill. The sample locations are shown on Figure 4-1.

A summary of the analytical results from the 2004 sampling event and the endpoint criteria are provided for surface water in 4-1. As previously discussed, this provides analytical results for the target analytes as defined in the Final CMP, Revision 1. None of the analytical results for the target analytes exceeded the endpoint criteria. The analytical results for all 2004 analytes are provided in Appendix F. Analytical results for VOCs, TIN, and DIN in the surface water samples collected at the White Alice Landfill are discussed below.

### ***Volatile Organic Compounds***

No VOCs are included on the target analyte list for the White Alice Landfill. However, 1,1,2,2-tetrachloroethane and trichloroethene were detected in the surface water sample collected from WASW02 (see Appendix E). 1,1,2,2-Tetrachloroethane and trichloroethene were detected at concentrations of 1.37 and 1.06 µg/L, respectively. Neither of these VOCs exceeded the endpoint criteria, which is based on the National Toxics Rule (40 Code of Federal Regulations [CFR] 131.36).

### ***Inorganics***

No dissolved inorganics or total inorganics included on the target analyte list for the White Alice Landfill were detected above the endpoint criteria (4-1). All inorganics not on the target analyte list were either not detected or detected at concentrations less than the endpoint criteria (see Appendix E).

### ***Water Quality Parameters***

Total alkalinity was measured in surface water samples at concentrations ranging from 2.19 to 43.5 mg/L. Chemical oxygen demand was measured in surface water samples at concentrations ranging from 3.2 to 19.1 mg/L. MBAS was measured in surface water samples at concentrations ranging from 18 to 50 µg/L. Sulfate was measured in surface water samples at concentrations ranging from 2.04 to 7.64 mg/L. Total dissolved solids were measured in surface water samples at concentrations ranging from 50 to 135 mg/L.

MBAS has been measured in the 1996, 1999, 2000, 2001, 2003, and 2004 surface water samples collected at the landfill. Concentrations have ranged from 18 to 1,600 µg/L. The highest MBAS concentration was measured in the 2000 surface water sample from location WASW01. The Alaska Administrative Code and federal regulations have not established groundwater cleanup levels for MBAS. The holding time for MBAS is 48 hours, which is very difficult and expensive to accommodate at this remote location. The Navy will recommend that MBAS monitoring be discontinued at this site.

### **4.3.2 Groundwater**

Groundwater samples were collected from two monitoring wells (MW21-3 and MW21-4) and were analyzed for VOCs (EPA Method 8260B), TIN (EPA Methods 6020/7470A), DIN (EPA Methods 6020/7470A), and WQPs including inorganic ions (EPA Methods 300.0/), MBAS (EPA Method 425.1), total Kjeldahl nitrogen (EPA Method 351.2), ammonia (EPA Method 350.1), alkalinity (EPA Method SM 2320B), chemical oxygen demand (EPA Method 410.4), and total dissolved solids (EPA 160.1). MW21-3 is located downgradient of the landfill, and MW21-4 is positioned upgradient of the landfill. All groundwater sampling locations are shown on Figure 4-1.

A summary of the analytical results from the 2004 sampling event and the endpoint criteria are provided for groundwater in 4-2. As previously discussed, this provides analytical results for the target analytes as defined in the Final CMP, Revision 1. None of the analytical results for the target analytes exceeded the endpoint criteria or the established Adak background concentrations. The analytical results for all 2004 analytes are provided in Appendix F. Analytical results for VOCs, TIN, and DIN in the groundwater samples collected at the White Alice Landfill are discussed below.

#### ***Volatile Organic Compounds***

No VOCs are included on the target analyte list for the White Alice Landfill. However, cis-1,2-dichloroethene and toluene were detected in the groundwater sample collected from MW21-3 (see Appendix E). Cis-1,2-dichloroethene and toluene were detected at estimated concentrations of 0.21 and 0.25 µg/L, respectively. Neither of these VOCs exceeded the endpoint criteria, which are based on the Alaska Cleanup Levels in 18 AAC 60.

#### ***Inorganics***

No dissolved inorganics or total inorganics included on the target analyte list for the White Alice Landfill were detected above the endpoint criteria or the Adak background concentrations in the groundwater samples collected at the site. In addition, the concentrations of inorganics not on the target analyte list were all below the endpoint criteria (see Appendix E).

#### ***Water Quality Parameters***

Total alkalinity was measured in groundwater samples at concentrations ranging from 30.6 to 84.8 mg/L. Chemical oxygen demand was measured in groundwater samples at concentrations ranging from 5 to 14.3 mg/L. MBAS was measured in groundwater samples at concentrations ranging from 13.8 to 50 µg/L. Sulfate was measured in groundwater samples at concentrations

ranging from 2.99 to 3.36 mg/L. Total dissolved solids were measured in groundwater samples at concentrations ranging from 89 to 165 mg/L.

MBAS has been measured in the 1996, 1999, 2000, 2001, 2003, and 2004 groundwater samples collected at the landfill. Concentrations have ranged from 13.8 to 1,000 µg/L. The highest MBAS concentration was measured in the 1996 groundwater samples from both locations MW21-3 and MW21-4. The Alaska Administrative Code and federal regulations have not established groundwater cleanup levels for MBAS. The holding time for MBAS is 48 hours, which is very difficult and expensive to accommodate at this remote location. The Navy will recommend that MBAS monitoring be discontinued at this site.

#### **4.4 CONCLUSIONS**

The analytical data for the period 2000 through 2004 was reviewed for the compounds included on the target analyte list and for those compounds that exceeded the endpoint criteria during the 2004 sampling event that are not included on the target analyte list. The purpose of the analysis of the recent historical data is to determine if overt trends exist in the concentration data for the White Alice Landfill.

##### **4.4.1 Surface Water**

###### ***Volatile Organic Compounds***

No VOCs are included on the target analyte list for the White Alice Landfill. Two VOCs not included on the target analyte list were detected in one surface water sample collected during the 2004 sampling event. Neither of the VOCs detected in the surface water exceeded endpoint criteria.

###### ***Inorganics***

No dissolved inorganics or total inorganics included on the target analyte list for the White Alice Landfill were detected above the endpoint criteria during the 2000 through 2004 time period. However, the reporting limits for arsenic during the 2000 and 2001 sampling events were greater than the endpoint criterion. All inorganics not on the target analyte list were either not detected or detected at concentrations less than the endpoint criteria during the 2004 sampling event.

## **4.4.2 Groundwater**

### ***Volatile Organic Compounds***

No VOCs are included on the target analyte list for the White Alice Landfill. Two VOCs not included on the target analyte list were detected in one groundwater sample collected during the 2004 sampling event. Neither of the VOCs detected in groundwater exceeded endpoint criteria.

### ***Inorganics***

No dissolved inorganics or total inorganics included on the target analyte list were detected in groundwater above the endpoint criteria during the 2000 through 2004 time period. All inorganics not on the target analyte list were detected at concentrations less than the endpoint criteria during the 2004 sampling event.

## **4.5 RECOMMENDATIONS**

### **4.5.1 Surface Water**

Since none of the surface water target analytes have been detected above endpoint criteria in any of the samples collected since 1996 (Appendix E), the Navy recommends decreasing the surface water monitoring frequency at White Alice Landfill to once every other year with the next scheduled sampling to occur in 2006.

There are no MBAS cleanup levels specified in the Alaska Administrative Code or federal regulations. Given the difficulties and expense of analyzing surface water samples for MBAS within the 48-hour holding time, the Navy recommends that MBAS monitoring in surface water be discontinued at this site.

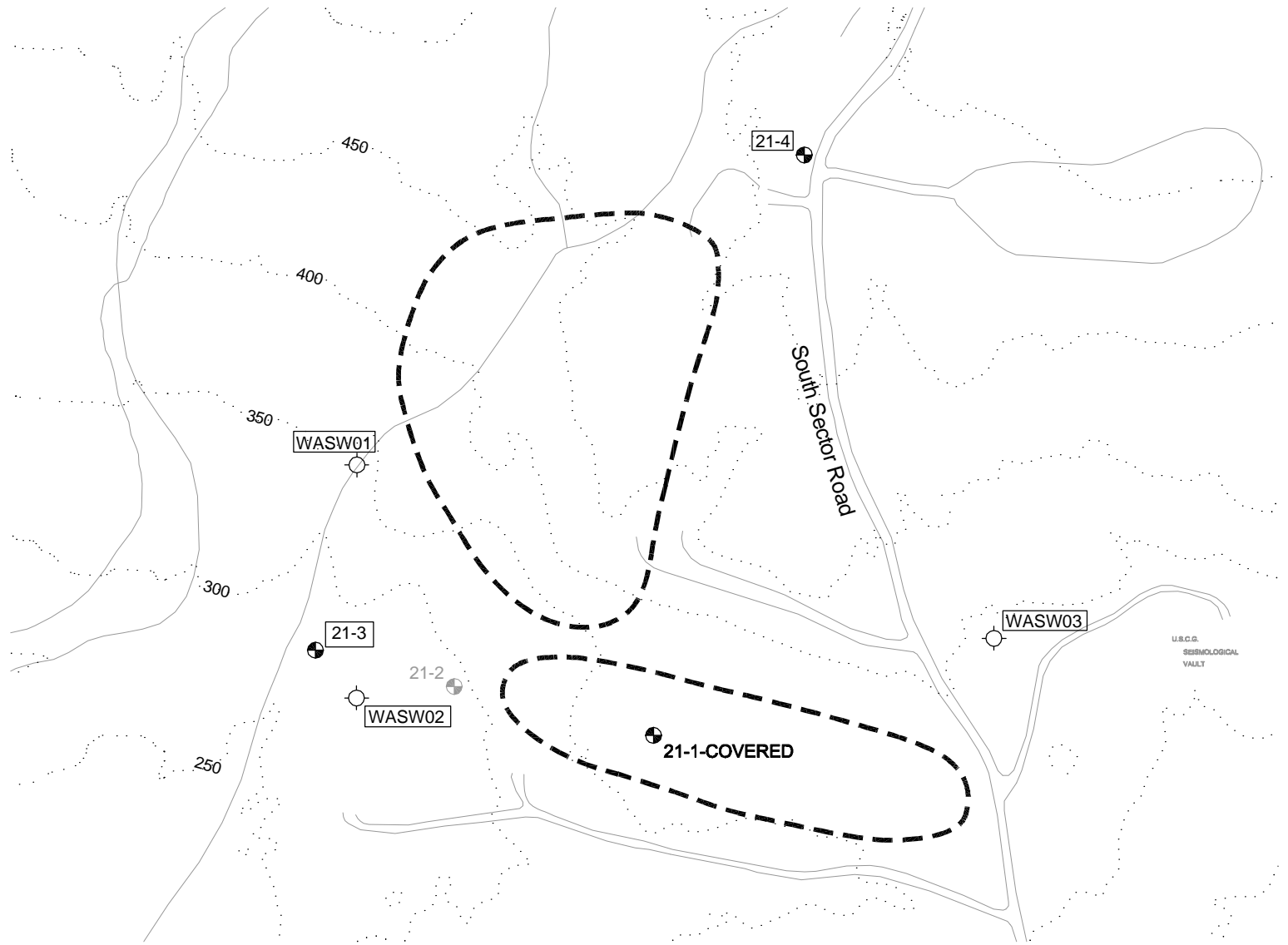
### **4.5.2 Groundwater**

Since none of the groundwater target analytes have been detected above endpoint criteria in any of the samples collected since 1996 (Appendix E), the Navy recommends decreasing the groundwater monitoring frequency at White Alice Landfill to once every other year with the next scheduled sampling to occur in 2006.

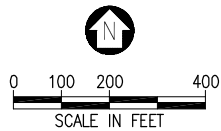
There are no MBAS cleanup levels specified in the Alaska Administrative Code or federal regulations. Given the difficulties and expense of analyzing groundwater samples for MBAS within the 48-hour holding time, the Navy recommends that MBAS monitoring in groundwater be discontinued at this site.

# LEGEND

- 25--- Elevation Contour (ft Above MLLW)
- ==== Road
- X- Fence
- - - Landfill Boundary
- ⊕ Monitoring Well
- ⊙ Surface Water Sample Location
- 00-000 Sampling Location



**U.S. NAVY**



**Figure 4-1**  
**Sampling Locations at SWMUs 18/19, White Alice Landfill**

Delivery Order 0048  
Adak Island, AK  
**2004 ANNUAL LANDFILL  
MONITORING REPORT**

**Table 4-1**  
**Summary of Surface Water Analytical Results at White Alice Landfill, September 2004**

Target Analyte	Location 201 (WASW01) 9/22/04 (µg/L)	Location 202 (WASW02) 9/22/04 (µg/L)	Location 203 (WASW03) 9/22/04 (µg/L)	Endpoint Criteria	
				Alaska Water Quality Standards, 18 AAC 70 <sup>a</sup>	
				Aquatic Life (µg/L)	Human Health (Organisms Only) (µg/L)
<b>Total Inorganics</b>					
Arsenic	0.48 J	1 U	1 U	None	1.4 <sup>b</sup>
Barium	7.06	6.8	3.46	None	None
Chromium	1.37	0.91 J	1 U	210 <sup>c,d</sup>	None
Nickel	2 U	2 U	3.98	160 <sup>c</sup>	100
<b>Dissolved Inorganics</b>					
Arsenic	1 U	1 UJ	1 U	190	1.4 <sup>b</sup>
Barium	4.02	6.98	3.43	None	None
Chromium	1 U	1 U	1 U	None	None
Nickel	2 UJ	0.38 UJ	2 UJ	None	100

<sup>a</sup>Criteria existing in 18 AAC 70 when Record of Decision for Operable Unit A and landfills were signed. (Changes to some of these criteria were adopted in an 18 AAC 70 amendment on March 24, 2003, but these changes are not shown in this table.)

<sup>b</sup>Human health criteria for carcinogens come from U.S. Environmental Protection Agency promulgation of human health criteria for carcinogens for Alaska at the 10<sup>-5</sup> risk level in the National Toxics Rule (40 CFR 131.36), in accordance with on-line Alaska Department of Environmental Conservation guidance at <[www.state.ak.us/dec/dawq/wqs/documents/carcinogens.htm](http://www.state.ak.us/dec/dawq/wqs/documents/carcinogens.htm)>, accessed April 10, 2003.

**Table 4-1 (Continued)**  
**Summary of Surface Water Analytical Results at White Alice Landfill, September 2004**

<sup>c</sup>At 100 mg/L hardness

<sup>d</sup>Value provided is for chromium III. The criteria for chromium VI is 11 µg/L.

Notes:

AAC - Alaska Administrative Code

J - estimated value

µg/L - microgram/liter

U - not detected; value shown is the reporting limit

UJ - estimated reporting limit

**Table 4-2  
 Summary of Groundwater Analytical Results at White Alice Landfill, September 2004**

Target Analyte	Location 200 (MW 21-3) 9/22/04 (µg/L)	Location 204 (MW 21-4) 9/22/04 (µg/L)	Adak Background Concentration (µg/L)	Endpoint Criteria
				Alaska Cleanup Levels, 18 AAC 60 (µg/L)
<b>Total Inorganics</b>				
Arsenic	2.22	1 U	13.3	50
Barium	23.8	0.93 J	54.4	2000
Chromium	6.1	0.85 J	9.4	100
Nickel	5.51	2 U	NE	100
<b>Dissolved Inorganics</b>				
Arsenic	0.48 J	1 U	2	50
Barium)	7.6	0.77 J	45.2	2000
Chromium	1 U	1 U	NE	100
Nickel	0.51 J	2 U	37.6	100

Notes:  
 AAC - Alaska Administrative Code  
 J - estimated value  
 µg/L - microgram/liter  
 NE - not established  
 U - not detected; value shown is the reporting limit

## **5.0 ROBERTS LANDFILL**

### **5.1 BACKGROUND**

Roberts Landfill (SWMU 25) is located approximately 1 mile southwest of the downtown area, Adak Island, Alaska. The landfill covers approximately 15 acres. The landfill operated from the early 1950s until 1972 and from 1975 until 2002. During the initial operation, wastes managed included sanitary trash, metal debris, batteries, solvents, waste paints, and construction rubble. From 1975 until closure at the end of 2002, the landfill only accepted sanitary trash. Roberts Landfill is unlined (U.S. Navy 2001c).

Closure activities began at the Roberts Landfill in April 1997 and included placing a low-permeability soil cover over the landfill, grading and contouring, implementing access restrictions, installing surface water/erosion controls, placing a vegetative cover, securing adjacent bunkers filled with asbestos materials, maintaining the cover, periodic monitoring, and institutional controls for land use. In March 2002, the Navy submitted a permit renewal application to extend operations at Roberts Landfill through 2002. The application was made to accommodate operation of an inert demolition waste monofill and one cell for disposal of approximately 10 cubic yards of asbestos-containing material (U.S. Navy 2002). The fill operation was in support of the Navy's cabin demolition project, which was completed in September 2002, at which time the landfill was regraded and covered. Following that activity, the Navy applied for and received approval for closure from Alaska DEC at the end of 2002 (U.S. Navy 2002).

### **5.2 SAMPLING HISTORY RELATED TO CLOSURE MONITORING**

Groundwater and surface water has been sampled at the Roberts Landfill periodically since March 1996. To date, 12 sampling events have occurred from 1996 through 2004 (see 1-2). Sampling at Roberts Landfill has consisted of four quarterly rounds and eight annual rounds of sampling at four monitoring wells and five surface water seeps. The quarterly sampling rounds were completed in March, June, September, and October of 1996. Eight annual sampling rounds were subsequently completed in December 1997, June 1998, September 1999, November 2000, September 2001, October 2002, October 2003, and September 2004. The analytical results from the sampling conducted at Roberts Landfill from 1996 through 2004 are summarized in Appendix E.

In 2004, samples were analyzed for the following target analytes in surface water and groundwater:

- Ethenes
- BTEX
- Priority pollutant total metals antimony, arsenic, beryllium, cadmium, chromium, copper, lead, mercury, nickel, selenium, silver, thallium, and zinc

### **5.3 DISCUSSION OF RESULTS**

During the 2004 landfill monitoring event, surface water and groundwater samples were collected at the Roberts Landfill as specified in the Final CMP, Revision 1 (U.S. Navy 2004), and sent to the laboratory for analysis. The locations where samples were collected during this sampling event are shown on Figure 5-1. Field logbooks are provided in Appendix A, and the field sampling parameters collected during sampling are included in Appendix D. A summary of the analytical results from the 2004 sampling event and the endpoint criteria are provided for surface water and groundwater in Tables 5-1 and 5-2, respectively. These tables provide analytical results for the target analytes as defined in the Final CMP, Revision 1. The analytical results for all analytes are provided in Appendix F. A second set of samples were collected from all surface water sampling locations and wells on a different date for analysis of methylene blue active substances (MBAS) because holding times were missed on the first set of samples.

Analytical results for surface water and groundwater were compared to the endpoint criteria presented in Appendix F of the Final CMP, Revision 1. In addition, analytical results for inorganics in groundwater were compared to Adak background concentrations, where established. Analytical results that exceeded the endpoint criteria or the Adak background concentrations are summarized in Tables 5-3 and 5-4.

Visual inspections of the groundwater monitoring wells at Roberts Landfill were also completed during the groundwater sampling event. All wells were functional at the time of inspection. A summary of the well inspections is provided in Appendix B. Inspections relative to institutional controls were conducted during the 2004 monitoring event and are reported under a separate cover.

### 5.3.1 Surface Water

Surface water samples were collected from five locations (RLSW01, RLSW02, RLSW03, RLSW04, and RLSW05) and analyzed for VOCs (EPA Method 8260B), TIN (EPA Methods 6020/7470A), DIN (EPA Methods 6020/7470A), and WQPs including inorganic ions (EPA Method 300.0), MBAS (EPA Method 425.1), total Kjeldahl nitrogen (EPA Method 351.2), ammonia (EPA Method 350.1), alkalinity (EPA Method SM 2320B), chemical oxygen demand (EPA Method 410.4), and total dissolved solids (EPA Method 160.1). Two surface water samples were collected from the water diversion channels on either side of the landfill. RLSW01 is located within the diversion channel just before it exits the fenced area of the landfill at the northeastern corner. RLSW02 is located in the diversion channel that runs along the eastern edge of the landfill at the most upgradient point where free-flowing water existed. The third sample was collected at RLSW03, from a small pond fed by a stream that flows from the eastside of the landfill, daylighting behind the old VFW building. A fourth sample was collected from RLSW04, which is within the stream east of the landfill, across Happy Valley Road. The fifth surface water sample was collected from RLSW05 at the mouth of Mitt Creek where it flows into Mitt Lake. The sampling locations are shown on Figure 5-1.

A summary of the analytical results from the 2004 sampling event and the endpoint criteria are provided for surface water in 5-1. As previously discussed, this provides analytical results for the target analytes as defined in the Final CMP, Revision 1 (U.S. Navy 2004). The analytical results for all 2004 analytes are provided in Appendix F. Analytical results that exceeded the endpoint criteria are summarized in 5-3. Analytical results for VOCs, TIN, and DIN in the surface water samples collected at the Roberts Landfill are discussed below.

#### *Volatile Organic Compounds*

No VOCs included on the target analyte list for the Roberts Landfill were detected in the samples collected in September of 2004. However, naphthalene was detected in the surface water sample collected from RLSW01 at an estimated concentration of 0.17 µg/L (Appendix E). There is no established endpoint criterion for this compound in surface water.

#### *Inorganic Analytes*

One inorganic on the target analyte list for the Roberts Landfill was detected at a concentration greater than the endpoint criterion. Total copper was detected at RLSW03 and RLSW05 at concentrations of 65.5 and 37.4 µg/L, both of which are above the endpoint criteria of 12 µg/L. The endpoint criterion for copper is based on the Alaska Water Quality Standards (18 AAC 70) for aquatic life. There is no endpoint criterion for dissolved copper in surface water. In addition, the reporting limit for total silver exceeded the aquatic life Alaska Water Quality Standards

(0.12 µg/L). The reporting limit for total mercury exceeded both the aquatic life (0.012 µg/L) and the human health (0.15 µg/L) Alaska Water Quality Standards, and the reporting limit for dissolved mercury exceeded the human health Alaska Water Quality Standard (0.15 µg/L).

### ***Water Quality Parameters***

Total alkalinity was measured in surface water samples at concentrations ranging from 4.53 to 63.3 mg/L. Chemical oxygen demand was measured in surface water samples at concentrations ranging from 4.31 to 13.2 mg/L. MBAS was measured in surface water samples at concentrations ranging from an estimated concentration of 18 µg/L to an estimated concentration of 22 µg/L. Sulfate was measured in surface water samples at concentrations ranging from 11.3 to 61.6 mg/L. Total dissolved solids were measured in surface water samples at concentrations ranging from 81 to 148 mg/L.

MBAS has been measured in the 1996, 1999, 2000, 2001, 2003, and 2004 surface water samples collected at the landfill. Concentrations have ranged from 9.5 to 7,400 µg/L. The highest MBAS concentration was measured in the 2000 surface water sample from location RLSW04. The Alaska Administrative Code and federal regulations have not established groundwater cleanup levels for MBAS. The holding time for MBAS is 48 hours, which is very difficult and expensive to accommodate at this remote location. The Navy will recommend that MBAS monitoring be discontinued at this site.

### **5.3.2 Groundwater**

Groundwater samples were collected from four monitoring wells (A-2, A-3, A-5, and B-1) and were analyzed for VOCs (EPA Method 8260B), TIN (EPA Method 6020/7470A), DIN (EPA Methods 6020/7470A), and WPQs including inorganic ions (EPA Method 300.0), MBAS (EPA Method 425.1), total Kjeldahl nitrogen (EPA Method 351.2), ammonia (EPA Method 350.1), alkalinity (EPA Method SM 2320B), chemical oxygen demand (EPA Method 410.4), and total dissolved solids (EPA Method 160.1). Three wells (A-3, A-5, and B-1) are located downgradient along the east flank of the Roberts Landfill. Well A-2 is located downgradient of the west flank of the landfill. All groundwater sampling locations are shown on Figure 5-1.

A summary of the analytical results from the 2004 sampling event and the endpoint criteria are provided for groundwater in 5-2. As previously discussed, this provides analytical results for the target analytes as defined in the Final CMP, Revision 1 (U.S. Navy 2004). The analytical results for all 2004 analytes are provided in Appendix F. Analytical results that exceeded the endpoint criteria are summarized in 5-4. Analytical results for VOCs, TIN, and DIN in the groundwater samples collected at the Roberts Landfill are discussed below.

### ***Volatile Organic Compounds***

None of the VOCs included on the target analyte list for the Roberts Landfill were detected in the four groundwater samples collected at the site. However, naphthalene was detected in the groundwater sample collected from well A-2 and trichlorofluoromethane was detected in the groundwater sample collected from well B-1 (see Appendix E). Naphthalene and trichlorofluoromethane were detected at concentrations of 1.71  $\mu\text{g/L}$  (estimated) and 2.28  $\mu\text{g/L}$ , respectively. There is no endpoint criterion established for trichlorofluoromethane, and the estimated concentration of naphthalene did not exceed the endpoint criterion of 1,460  $\mu\text{g/L}$ .

### ***Inorganics***

No dissolved inorganics or total inorganics included on the target analyte list for the Roberts Landfill were detected above the endpoint criteria. One of the 13 total inorganics included on the target analyte list was detected at a concentration above the Adak background concentration in the groundwater sample collected from well A-3. Total copper was detected at a concentration of 273  $\mu\text{g/L}$ , which is above the Adak background concentration of 69.5  $\mu\text{g/L}$ .

### ***Water Quality Parameters***

Total alkalinity was measured in groundwater samples at concentrations ranging from 0.55 to 101 mg/L. Chemical oxygen demand was measured in groundwater samples at concentrations ranging from 2.92 to 4.87 mg/L. MBAS was detected in one groundwater sample at an estimated concentration of 9.5  $\mu\text{g/L}$ . Sulfate was measured in groundwater samples at concentrations ranging from 39 to 58.1 mg/L. Total dissolved solids were measured in groundwater samples at concentrations ranging from 98 to 219 mg/L.

MBAS has been measured in the 1996, 1999, 2000, 2001, 2003, and 2004 groundwater samples collected at the landfill. Concentrations have ranged from 9.5 to 6,400  $\mu\text{g/L}$ . The highest MBAS concentration was measured in the 2000 groundwater sample from well A-3. The Alaska Administrative Code and federal regulations have not established groundwater cleanup levels for MBAS. The holding time for MBAS is 48 hours, which is very difficult and expensive to accommodate at this remote location. The Navy will recommend that MBAS monitoring be discontinued at this site.

## **5.4 CONCLUSIONS**

The analytical data for the period 2000 through 2004 was reviewed for the compounds included on the target analyte list and for those compounds that exceeded the endpoint criteria that are not

included on the target analyte list. The purpose of the analysis of the recent historical data is to determine if trends exist in the concentration data for the Roberts Landfill.

#### **5.4.1 Surface Water**

##### ***Volatile Organic Compounds***

No VOCs included on the target analyte list for the White Alice Landfill were detected in the samples collected in September of 2004. With the exception of cis-1,2-dichloroethene, none of the target analytes were detected during the 2000, 2001, 2002, and 2003 sampling events. Cis-1,2-dichloroethene was detected at a concentration close to the reporting limit in 2000. This compound does not have a surface water endpoint criterion.

##### ***Inorganics***

One inorganic (copper) on the target analyte list for the Roberts Landfill was detected at concentrations greater than the endpoint criterion at two locations. In addition, total copper was detected at concentrations above the endpoint criterion at two locations during the 2000, 2001, 2002, and 2003 sampling events. Total zinc was detected during 2000, 2002, and 2003 at concentrations greater than the endpoint criterion at one location. It was not detected above the endpoint criterion during the 2004 sampling event. All of the other inorganics included on the target analyte list for the Roberts Landfill were either not detected, or detected at concentrations less than the endpoint criteria. However, the reporting limits for total arsenic exceeded the endpoint criterion in 2000 and 2001; total cadmium exceeded the endpoint criterion in 2001; total and dissolved mercury exceeded the endpoint criterion in 2000, 2001, 2002, 2003, and 2004; and total silver exceeded the endpoint criterion in 2000, 2001, 2002, 2003, and 2004.

#### **5.4.2 Groundwater**

##### ***Volatile Organic Compounds***

None of the VOCs included on the target analyte list for the Roberts Landfill were detected in the four groundwater samples collected at the site during 2004. With the exception of ethylbenzene, toluene, m,p-xylene, and o-xylene, none of the target analytes were detected during the 2000, 2001, 2002, and 2003 sampling events. Ethylbenzene, o-xylene, and toluene were detected at concentrations less than the endpoint criteria at one location during the 2000 sampling event. m,p-Xylene was detected at concentrations less than the endpoint criterion at two locations during the 2000 sampling event. All detected concentrations were close to the reporting limits.

### ***Inorganics***

No dissolved inorganics or total inorganics included on the target analyte list for the Roberts Landfill were detected above the endpoint criteria during 2004. However, copper was detected at a concentration above the Adak background concentration in the groundwater sample collected from well A-3. In addition, three of the total inorganics included on the target analyte list—chromium, lead, and nickel—were detected above the endpoint criteria in the groundwater sample collected from one location during the 2003 sampling event. These compounds were not detected above the endpoint criteria during the 2000, 2001, 2002, and 2004 sampling events.

## **5.5 RECOMMENDATIONS**

### **5.5.1 Surface Water**

Although VOCs have not been detected at concentrations above endpoint criteria in surface water samples collected at Roberts Landfill from 2000 through 2004, the Navy recommends that surface water monitoring for VOCs be continued on an annual basis because only two years of post-closure monitoring data have been collected.

Based on 2000 through 2004 sampling results for surface water samples collected at Roberts Landfill, the Navy recommends that surface water monitoring for inorganics continue on an annual basis.








There are no MBAS cleanup levels specified in the Alaska Administrative Code or federal regulations. Given the difficulties and expense of analyzing surface water samples for MBAS within the 48-hour holding time, the Navy recommends that MBAS monitoring in surface water be discontinued at this site.

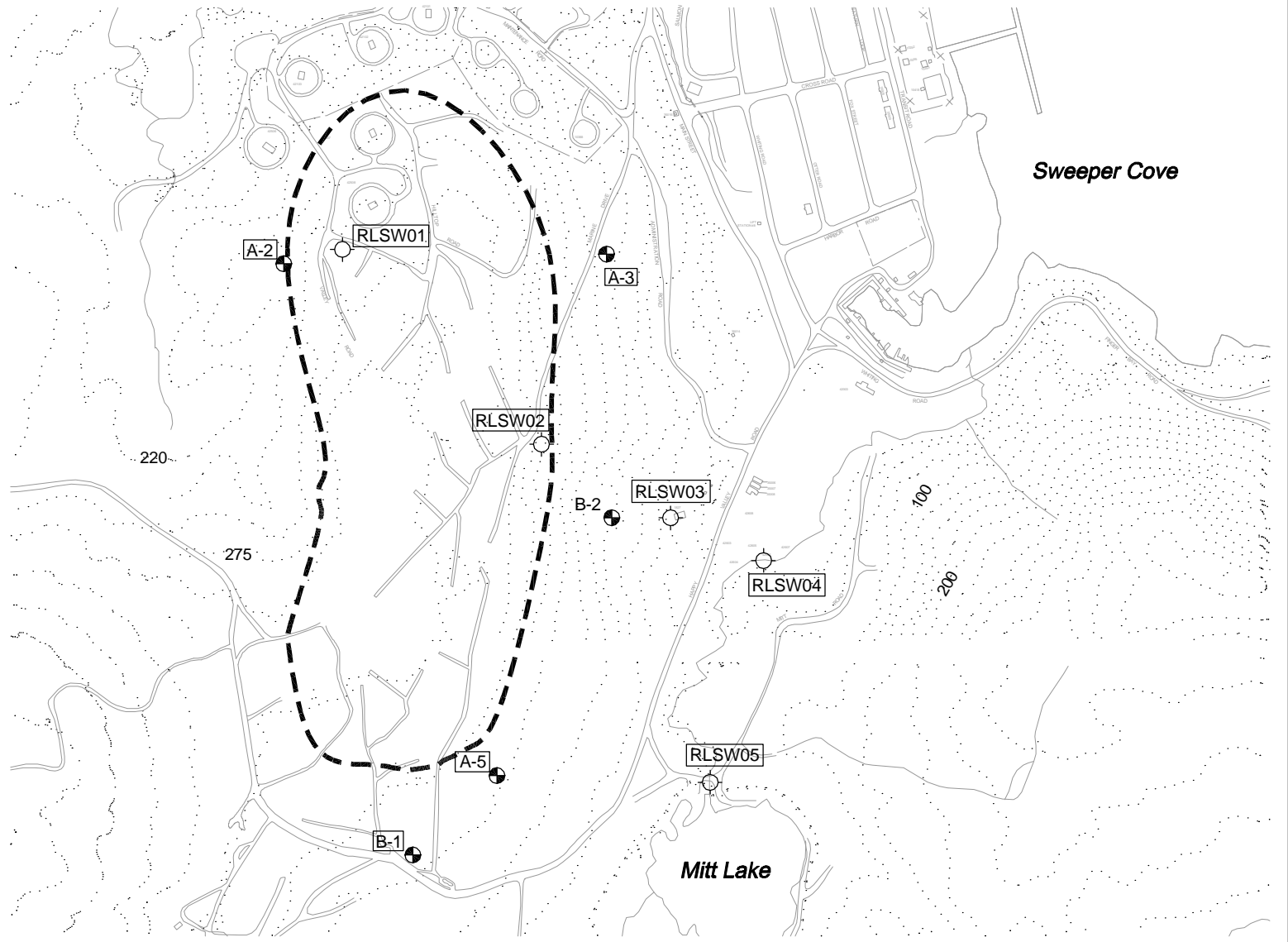
### **5.5.2 Groundwater**

Because only two years of post-closure monitoring data have been collected at Roberts Landfill, the Navy recommends that groundwater monitoring for VOCs and inorganics (including aluminum) be continued on an annual basis.

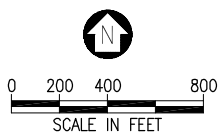
There are no MBAS cleanup levels specified in the Alaska Administrative Code or federal regulations. Given the difficulties and expense of analyzing groundwater samples for MBAS within the 48-hour holding time, the Navy recommends that MBAS monitoring in groundwater be discontinued at this site.

# LEGEND

-  Elevation Contour (ft Above MLLW)
-  Road
-  Fence
-  Landfill Boundary
-  Monitoring Well
-  Surface Water Sample Location
-  Sampling Location



**U.S. NAVY**



**Figure 5-1**  
**Sampling Locations at SWMU 25, Roberts Landfill**

Delivery Order 0048  
 Adak Island, AK  
**2004 ANNUAL LANDFILL  
 MONITORING REPORT**

**Table 5-1**  
**Summary of Surface Water Analytical Results at Roberts Landfill, September 2004**

Target Analyte	Location 301 (RLSW01) 9/11/04 (µg/L)	Location 302 (RLSW02) 9/11/04 (µg/L)	Location 303 (RLSW03) 9/11/04 (µg/L)	Location 304 (RLSW04) 9/11/04 (µg/L)	Location 305 (RLSW05) 9/11/04 (µg/L)	Endpoint Criteria	
						Alaska Water Quality Standards, 18 AAC 70 <sup>a</sup>	
						Aquatic Life (µg/L)	Human Health (Organisms Only) (µg/L)
<b>Volatile Organic Compounds</b>							
1,1-Dichloroethene	1 U	1 U	1 U	1 U	1 U	None	320 <sup>b</sup>
Benzene	1 U	1 U	1 U	1 U	1 U	None	710 <sup>b</sup>
cis-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	None	None
Ethylbenzene	1 U	1 U	1 U	1 U	1 U	None	3,280
m,p-Xylenes	2 U	2 U	2 U	2 U	2 U	None	None
o-Xylenes	1 U	1 U	1 U	1 U	1 U	None	None
Tetrachloroethene	1 U	1 U	1 U	1 U	1 U	None	88.5 <sup>b</sup>
Toluene	1 U	1 U	1 U	1 U	1 U	None	424,000
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	1 U	None	None
Trichloroethene	1 U	1 U	1 U	1 U	1 U	None	810 <sup>b</sup>
<b>Total Inorganics</b>							
Antimony	0.21 J	1 U	1 U	1 U	1 U	None	45,000
Arsenic	1 U	1 U	1 U	1 U	1 U	None	1.4 <sup>b</sup>
Beryllium	1 U	1 U	1 U	1 U	1 U	None	None
Cadmium	1 U	1 U	1 U	1 U	1 U	1.1 <sup>c</sup>	None

**Table 5-1 (Continued)**  
**Summary of Surface Water Analytical Results at Roberts Landfill, September 2004**

Target Analyte	Location 301 (RLSW01) 9/11/04 (µg/L)	Location 302 (RLSW02) 9/11/04 (µg/L)	Location 303 (RLSW03) 9/11/04 (µg/L)	Location 304 (RLSW04) 9/11/04 (µg/L)	Location 305 (RLSW05) 9/11/04 (µg/L)	Endpoint Criteria	
						Alaska Water Quality Standards, 18 AAC 70 <sup>a</sup>	
						Aquatic Life (µg/L)	Human Health (Organisms Only) (µg/L)
<b>Total Inorganics (Continued)</b>							
Chromium	1 U	0.8 J	0.77 J	1 U	0.85 J	210 <sup>c,d</sup>	None
Copper	1.98 J	3.83	<b>65.5<sup>e</sup></b>	2.88	<b>37.4<sup>e</sup></b>	12 <sup>c</sup>	None
Lead	1 U	1 U	1 U	1 U	1 U	3.2 <sup>c</sup>	None
Mercury	<b>0.2 U<sup>f</sup></b>	<b>0.2 U<sup>f</sup></b>	<b>0.2 U<sup>f</sup></b>	<b>0.2 U<sup>f</sup></b>	<b>0.2 U<sup>f</sup></b>	0.012	0.15
Nickel	0.44 J	0.43 J	2.09	2 U	0.94 J	160 <sup>c</sup>	100
Selenium	1 U	1 U	0.88 J	1 U	1 U	5	None
Silver	<b>1 U<sup>f</sup></b>	<b>1 U<sup>f</sup></b>	<b>1 U<sup>f</sup></b>	<b>1 U<sup>f</sup></b>	<b>1 U<sup>f</sup></b>	0.12	None
Thallium	1 U	1 U	1 U	1 U	1 U	None	48
Zinc	57.3	5 U	9.65	2.61 J	4.25 J	110 <sup>c</sup>	None
<b>Dissolved Inorganics</b>							
Antimony	1 U	1 U	1 U	1 UJ	1 UJ	None	45,000
Arsenic	1 U	1 UJ	1 U	1 U	1 UJ	190	1.4 <sup>b</sup>
Beryllium	1 U	1 U	1 U	1 U	1 U	None	None
Cadmium	1 U	1 U	1 U	1 U	1 U	None	None
Chromium	1 U	1 U	1 U	1 U	1 U	None	None

**Table 5-1 (Continued)**  
**Summary of Surface Water Analytical Results at Roberts Landfill, September 2004**

Target Analyte	Location 301 (RLSW01) 9/11/04 (µg/L)	Location 302 (RLSW02) 9/11/04 (µg/L)	Location 303 (RLSW03) 9/11/04 (µg/L)	Location 304 (RLSW04) 9/11/04 (µg/L)	Location 305 (RLSW05) 9/11/04 (µg/L)	Endpoint Criteria	
						Alaska Water Quality Standards, 18 AAC 70 <sup>a</sup>	
						Aquatic Life (µg/L)	Human Health (Organisms Only) (µg/L)
<b>Dissolved Inorganics (Continued)</b>							
Copper	2.02	4.61	73.2	2.32	33.4	None	None
Lead	1 U	1 U	1 U	1 UJ	1 U	None	None
Mercury	<b>0.2 U<sup>f</sup></b>	<b>0.2 U<sup>f</sup></b>	<b>0.2 U<sup>f</sup></b>	<b>0.2 U<sup>f</sup></b>	<b>0.2 U<sup>f</sup></b>	None	0.15
Nickel	1.88 UJ	1.46 UJ	4.28	1.92 J	1.83 J	None	100
Selenium	1.24 U	1 U	1.53 U	1 U	1.24 U	None	None
Silver	1 U	1 U	1 U	1 U	1 U	None	None
Thallium	0.04 UJ	1 U	1 U	1 UJ	1 U	None	48
Zinc	52.8	5 U	11.6	2.11 J	4.29 J	None	None

<sup>a</sup>Criteria existing in 18 AAC 70 when Record of Decision for Operable Unit A and landfills were signed. (Changes to some of these criteria were adopted in an 18 AAC 70 amendment on March 24, 2003, but these changes are not shown in this table.)

<sup>b</sup>Human health criteria for carcinogens come from U.S. Environmental Protection Agency promulgation of human health criteria for carcinogens for Alaska at the 10<sup>-5</sup> risk level in the National Toxics Rule (40 CFR 131.36), in accordance with on-line Alaska Department of Environmental Conservation guidance at <[www.state.ak.us/dec/dawq/wqs/documents/carcinogens.htm](http://www.state.ak.us/dec/dawq/wqs/documents/carcinogens.htm)>, accessed April 10, 2003.

<sup>c</sup>At 100 mg/L hardness

<sup>d</sup>Value provided is for chromium III. The criteria for chromium VI is 11 µg/L.

<sup>e</sup>Value exceeds endpoint criteria.

<sup>f</sup>Reporting limit exceeds endpoint criteria.

**Table 5-1 (Continued)**  
**Summary of Surface Water Analytical Results at Roberts Landfill, September 2004**

Notes:

**Bolded values exceed the endpoint criteria.**

AAC - Alaska Administrative Code

J - estimated value

µg/L - microgram/liter

U - not detected, value shown is the reporting limit

UJ - estimated reporting limit

**Table 5-2  
 Summary of Groundwater Analytical Results at  
 Roberts Landfill, September 2004**

Target Analyte	Location 320 (A-2) 9/11/04 (µg/L)	Location 307 (A-3) 9/11/04 (µg/L)	Location 308 (A-5) 9/11/04 (µg/L)	Location 306 (B-1) 9/11/04 (µg/L)	Adak Background Concentrations (µg/L)	Endpoint Criteria
						Alaska Cleanup Levels 18 AAC 60 (µg/L)
<b>Volatile Organic Compounds</b>						
1,1-Dichloroethene	1 U	1 U	1 U	1 U	NA	7
Benzene	1 U	1 U	1 U	1 U	NA	5
cis-1,2-Dichloroethene	1 U	1 U	1 U	1 U	NA	70
Ethylbenzene	1 U	1 U	1 U	1 U	NA	700
m,p-Xylenes	2 U	2 U	2 U	2 U	NA	10,000 <sup>a</sup>
o-Xylenes	1 U	1 U	1 U	1 U	NA	10,000 <sup>a</sup>
Tetrachloroethene	1 U	1 U	1 U	1 U	NA	5
Toluene	1 U	1 U	1 U	1 U	NA	1,000
trans-1,2-Dichloroethene	1 U	1 U	1 U	1 U	NA	100
Trichloroethene	1 U	1 U	1 U	1 U	NA	5
<b>Total Inorganics</b>						
Antimony	1 U	1 U	1 U	1 U	NE	6
Arsenic	0.73 J	1 U	1 U	1 U	13.3	50
Beryllium	1 U	1 U	1 U	1 U	NE	4
Cadmium	1 U	1 U	1 U	1 U	8.3	5
Chromium	1 U	7.73	0.81 J	1.13	9.4	100
Copper	0.98 J	273 <sup>b</sup>	2 U	33.3	69.5	1,300
Lead	1 U	0.48 J	1 U	1 U	11.8	15
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	NE	2
Nickel	2.64	3.72	2.23	4.52	NE	100
Selenium	1 U	1 U	1 U	1 U	NE	50
Silver	1 U	1 U	1 U	1 U	NE	180
Thallium	1 U	1 U	1 U	1 U	NE	2
Zinc	3.15 J	11	5.09	19.9	320	11,000
<b>Dissolved Inorganics</b>						
Antimony	1 U	1 U	1 U	1 U	6.2	6
Arsenic	0.44 J	1 UJ	1 UJ	1 UJ	2	50
Beryllium	1 U	1 U	1 U	1 U	NE	4

**Table 5-2 (Continued)**  
**Summary of Groundwater Analytical Results at**  
**Roberts Landfill, October 2003**

Target Analyte	Location 320 (A-2) 9/11/04 (µg/L)	Location 307 (A-3) 9/11/04 (µg/L)	Location 308 (A-5) 9/11/04 (µg/L)	Location 306 (B-1) 9/11/04 (µg/L)	Adak Background Concentrations (µg/L)	Endpoint Criteria
						Alaska Cleanup Levels 18 AAC 60 (µg/L)
<b>Dissolved Inorganics (Continued)</b>						
Cadmium	1 U	1 UJ	1 U	1 U	4.8	5
Chromium	1 U	4.14	1 U	1 U	NE	100
Copper	2 UJ	234	2 U	33.1	NE	1300
Lead	1 UJ	1 UJ	1 U	1 U	NE	15
Mercury	0.2 U	0.2 U	0.2 U	0.2 U	NE	2
Nickel	6.01	3.79	4.12 J	5.52	37.6	100
Selenium	1 U	1.12 U	0.9 UJ	0.94 UJ	NE	50
Silver	0.08 UJ	1 U	1 U	1 U	NE	180
Thallium	1 U	1 U	1 U	0.07 UJ	NE	2
Zinc	3.35 J	9.91	4.95 J	20.1	25.4	11000

<sup>a</sup>Value is for total xylenes.

<sup>b</sup>Value exceeds Adak background.

Notes:

**Bolded values exceed the Adak background concentration.**

AAC - Alaska Administrative Code

J - estimated value

µg/L - microgram/liter

NA - not applicable

NE - not established

U - not detected; value shown is the reporting limit

UJ - estimated reporting limit

**Table 5-3**  
**Summary of Exceedances of Endpoint Criteria in Surface Water at Roberts Landfill, September 2004**

Target Analyte	Location 301 (RLSW01) 9/11/04 (µg/L)	Location 302 (RLSW02) 9/11/04 (µg/L)	Location 303 (RLSW03) 9/11/04 (µg/L)	Location 304 (RLSW04) 9/11/04 (µg/L)	Location 305 (RLSW05) 9/11/04 (µg/L)	Endpoint Criteria	
						Alaska Water Quality Standards, 18 AAC 70 <sup>a</sup>	
						Aquatic Life (µg/L)	Human Health (Organisms Only) (µg/L)
<b>Total Inorganics</b>							
Copper	1.98 J	3.83	<b>65.5<sup>b</sup></b>	2.88	<b>37.4<sup>b</sup></b>	12 <sup>c</sup>	None
Mercury	<b>0.2 U<sup>d</sup></b>	<b>0.2 U<sup>d</sup></b>	<b>0.2 U<sup>d</sup></b>	<b>0.2 U<sup>d</sup></b>	<b>0.2 U<sup>d</sup></b>	0.012	0.15
Silver	<b>1 U<sup>d</sup></b>	<b>1 U<sup>d</sup></b>	<b>1 U<sup>d</sup></b>	<b>1 U<sup>d</sup></b>	<b>1 U<sup>d</sup></b>	0.12	None
<b>Dissolved Inorganics</b>							
Mercury	<b>0.2 U<sup>d</sup></b>	<b>0.2 U<sup>d</sup></b>	<b>0.2 U<sup>d</sup></b>	<b>0.2 U<sup>d</sup></b>	<b>0.2 U<sup>d</sup></b>	None	0.15

<sup>a</sup>Criteria existing in 18 AAC 70 when Record of Decision for Operable Unit A and landfills were signed. (Changes to some of these criteria were adopted in an 18 AAC 70 amendment on March 24, 2003, but these changes are not shown in this table.)

<sup>b</sup>Value exceeds endpoint criteria.

<sup>c</sup>At 100 mg/L hardness

<sup>d</sup>Reporting limit exceeds endpoint criteria.

Notes:

**Bolded values exceed the endpoint criteria.**

AAC - Alaska Administrative Code

J - estimated value

µg/L - microgram/liter

U - not detected; value shown is the reporting limit

**Table 5-4  
 Summary of Exceedances of Endpoint Criteria in Groundwater  
 at Roberts Landfill, September 2004**

Target Analyte	Location 320 (A-2)	Location 307 (A-3)	Location 308 (A-5)	Location 306 (B-1)	Adak Background Concentration (µg/L)	Endpoint Criterion
	9/11/04 (µg/L)	9/11/04 (µg/L)	9/11/04 (µg/L)	9/11/04 (µg/L)		Alaska Cleanup Levels 18 AAC 60 (µg/L)
<b>Total Inorganics</b>						
Copper	0.98 J	<b>273<sup>a</sup></b>	2 U	33.3	69.5	1,300

<sup>a</sup>Value exceeds Adak background.

Notes:

**Bolded values exceed the Adak background concentration.**

AAC - Alaska Administrative Code

J - estimated value

µg/L - microgram/liter

U - not detected; value shown is the reporting limit

## 6.0 REFERENCES

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