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Long-Term Monitoring Plan
Sites 1 and 3 and Eastern Plume
Naval Air Station, Brunswick, Maine

Contract No. N62472-92-D-1296
Contract Task Order No. 0047

Prepared for

Department of the Navy
Engineering Field Activity Northeast
Naval Facilities Engineering Command
North Loop & American Way, Building G
Code 182
Lester, Pennsylvania 19113-2090

Prepared by

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March 2004
Version: DRAFT; Revision: 1
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CONTENTS

Page

LIST OF REVISIONS
LIST OF FIGURES
LIST OF TABLES

1. INTRODUCTION 1-1

1.1 Purpose and Scope 1-1
1.2 Site Description 1-3

1.2.1 Site Background 1-3

1.2.1.1 Sites 1 and 3 1-3
1.2.1.2 Eastern Plume 1-4

1.2.2 Geology 1-5
1.2.3 Hydrogeology 1-5

1.3 Summary of Previous Investigations 1-6

1.3.1 Previous Investigations 1-6
1.3.2 Long-Term Monitoring 1-6

1.4 Summary of Revisions to Long-Term Monitoring Plan 1-7

1.4.1 Monitoring Locations Relative to the Eastern Plume 1-7
1.4.2 Sampling Locations 1-7

1.4.2.1 Sites 1 and 3 1-7
1.4.2.2 Eastern Plume 1-8
1.4.2.3 Groundwater Extraction and Treatment System 1-8

1.4.3 Sampling Frequency 1-8
1.4.4 Sampling Method 1-8
1.4.5 Water Elevation Gauging Program 1-9
1.4.6 Analytical Methods 1-9

1.5 Reports and Data Presentation 1-9

2. REGULATORY FRAMEWORK 2-1

Page

3. MONITORING PLAN 3-1

3.1 Long-Term Monitoring Program 3-1

3.1.1 Sites 1 and 3 3-2

3.1.1.1 Groundwater Sampling Program 3-2
3.1.1.2 Surface Water and Stream Sediment Sampling Program 3-2
3.1.1.3 Leachate Seep and Seep Sediment Sampling Program 3-3
3.1.1.4 Water Level Gauging Program 3-3

3.1.2 Eastern Plume 3-3

3.1.2.1 Groundwater Sampling Program 3-3
3.1.2.2 Surface Water Sampling Program 3-4
3.1.2.3 Stream Sediment Sampling Program 3-4
3.1.2.4 Leachate Seep Sampling Program 3-5
3.1.2.5 Groundwater Extraction and Treatment System Sampling Program 3-5
3.1.2.6 Water Elevation Gauging Program 3-5

3.2 Monitoring Frequency 3-6
3.3 Sampling Procedures 3-6

3.3.1 Groundwater Sampling Program 3-6
3.3.2 Surface Water and Stream Sediment Sampling Program 3-6
3.3.3 Leachate Seep and Seep Sediment Sampling Program 3-6
3.3.4 Groundwater Extraction and Treatment System Sampling Program 3-7

3.4 Engineering Inspection 3-7

3.4.1 Landfill Gas Monitoring 3-8

3.5 Program Modifications 3-8

3.5.1 Data Reduction and Analytical Data Quality Review 3-9
3.5.2 Laboratory Quality Assurance and Quality Control 3-9
3.5.3 Corrective Measures 3-9

Page

4. MAINTENANCE PLAN 4-1

4.1 Sites 1 and 3 and Eastern Plume Maintenance Activities 4-1

4.1.1 Cover Maintenance 4-1
4.1.2 Erosion Control Maintenance 4-1
4.1.3 Settlement and Subsidence Control Maintenance 4-2
4.1.4 Maintenance of Groundwater Monitoring System 4-2
4.1.5 Maintenance of Gas Monitoring System 4-2

REFERENCES

LIST OF REVISIONS

Section	Date	Revision	Description

LIST OF FIGURES

Number	Title
1-1	Site location map, Sites 1 and 3 and Eastern Plume, Naval Air Station, Brunswick, Maine.
1-2	Site plan for Sites 1 and 3 and Eastern Plume, Naval Air Station, Brunswick, Maine.
3-1	Long-term monitoring network, Sites 1 and 3 and Eastern Plume, Naval Air Station, Brunswick, Maine.
3-2	Long-term monitoring sampling locations, Sites 1 and 3 and Eastern Plume, Naval Air Station, Brunswick, Maine.
3-3	Long-term monitoring gauging locations, Sites 1 and 3 and Eastern Plume, Naval Air Station, Brunswick, Maine.

LIST OF TABLES

Number	Title
1-1	Summary of chemicals of concern for Sites 1 and 3 and Eastern Plume.
1-2	Summary of changes to the Long-Term Monitoring Program at Sites 1 and 3.
1-3	Summary of changes to the Long-Term Monitoring Program at Eastern Plume.
1-4	Summary of sentinel, perimeter, and interior plume wells.
3-1	Summary of the Long-Term Monitoring Program at Sites 1 and 3.
3-2	Summary of the Long-Term Monitoring Program at Eastern Plume.

1. INTRODUCTION

Naval Air Station (NAS) Brunswick is an active base, owned and operated by the Federal government through the Department of the Navy. NAS Brunswick is located in Brunswick, Maine, south of the Androscoggin River and south of Route 1 between Routes 24 and 123 (Figure 1-1). This facility is currently participating in the Navy's Installation Restoration Program. In 1987, the U.S. Environmental Protection Agency (EPA) placed NAS Brunswick on the National Priorities List. This Long-Term Monitoring Plan (LTMP), which is a revision of the original LTMP completed in 1995, was developed to support the Navy's overall strategy for remediation at two sites at NAS Brunswick, Sites 1 and 3 and the Eastern Plume. Changes to the existing LTMP have been made based on changes in chemical concentrations over time, new information regarding plume extent and migration, installation of new sampling points, and changes to remedial pumping locations. The LTMP has been revised with approval/concurrence of EPA and Maine Department of Environmental Protection (MEDEP) and in consultation with the Restoration Advisory Board. This LTMP is part of the selected remedial actions that are documented in the Record of Decision for a Remedial Action at Sites 1 and 3 (ABB-ES 1992) and Record of Decision for No Further Action at Sites 4, 11, and 13, and a Remedial Action for the Eastern Plume (ABB-ES 1998). The locations of these sites are shown on Figure 1-2.

1.1 PURPOSE AND SCOPE

The purpose of this LTMP document is to develop a monitoring program that identifies monitoring points and the media to be sampled, identifies the type of sampling and sampling frequency, and specifies the laboratory analysis to be implemented to verify the effectiveness of the selected remedial actions. These actions include groundwater extraction and treatment at the Eastern Plume, and installation of a low permeability cap and slurry wall at Sites 1 and 3.

The monitoring activities described in this document include:

- Sampling locations and procedures for groundwater, surface water, sediment, and leachate samples
- Visual inspection activities
- Required analytical parameters and laboratory methods
- Reporting requirement to be followed to document the effectiveness of the remedial actions
- Maintenance actions and corrective measures to be undertaken based upon the results of monitoring data.

- The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) five-year review is part of the continuation of the LTMP. At the end of each five-year period, evaluation of the data collected at these sites will be used to determine if changes are desirable or required for the implemented remedial strategy. Long-term monitoring has been conducted since 1995, and the first five-year review was completed in March 2000. Periodic evaluations will provide a basis for continued sampling and refinements/alterations to the monitoring program or remedial activity, as appropriate. At a minimum, environmental monitoring at Sites 1 and 3 will continue for 30 years and be extended if necessary, and at the Eastern Plume until it is no longer necessary, as decided in consultation with EPA, MEDEP, and the community.

Based on changes to the original LTMP, the following goal has been added to the Long-Term Monitoring Program:

- Monitor the groundwater monitoring wells within the landfill on a quarterly basis to ensure that the water elevation does not rise above the level of the waste.

The goal of the Long-Term Monitoring Program is to obtain data necessary to document the long-term changes in environmental media at Sites 1 and 3 and the Eastern Plume. As noted in the Record of Decision for Sites 1 and 3 (ABB-ES 1992), the specific goals of long-term monitoring are to:

- Monitor the effectiveness of the remedial action for the protection of human health and the environment

- Monitor the effectiveness of the installed low permeability cap and a slurry wall to limit groundwater contact with waste

- Use field activities conducted as part of long-term monitoring to assess the condition of the site monitoring wells and physical features, such as the landfill cap and other appurtenances

- Assess the dispersion and degradation of contamination that has already emanated from the landfill.

As noted in the Record of Decision for No Further Action at Sites 4, 11, and 13, and a Remedial Action for the Eastern Plume groundwater monitoring (ABB-ES 1998), the goals of long-term monitoring are to:

- Provide a tiered approach to attain the requirements of MEDEP water quality standards

- Monitor changes in the plume nature and extent and potential migration pathways

- Monitor the treatment plant effluent
- Use field activities conducted as part of long-term monitoring to assess the condition of the site monitoring wells.

The components of the LTMP have been defined based on the final Records of Decision for Sites 1 and 3 (ABB-ES 1992) and No Further Action at Sites 4, 11, and 13, and a Remedial Action for the Eastern Plume (ABB-ES 1998). Depending on the long-term trends of the compound concentrations, monitoring frequency may be increased or decreased, as determined to be necessary, with approval by EPA and MEDEP. Refinements to the LTMP may include additions or reductions of sampling points in the long-term monitoring network, increase or decrease of the frequency of sampling, changing areas of sampling emphasis, or alterations of laboratory analytical methods or field sampling methods. Refinements to the LTMP will be based on a comparison of sample results to regulatory standards (Maximum Exposure Guidelines, Maximum Contaminant Levels, or Surface Water Quality Criteria) and the nature of trends of recent contaminant concentrations as compared to their respective historical trends. Refinements to the LTMP will be considered based on consultation with Restoration Advisory Board members. The decision to reduce or terminate the monitoring program will be made by the Navy, EPA, and MEDEP with input from the Restoration Advisory Board, and based on the results of long-term monitoring.

This document is organized as follows: Chapter 1 provides an introduction, overview of past site activities, and a summary of changes to the Long-Term Monitoring Program; Chapter 2 presents regulatory information used in developing the LTMP; Chapter 3 presents the LTMP for Sites 1 and 3 and the Eastern Plume; and Chapter 4 presents the maintenance plan for Sites 1 and 3 landfill.

1.2 SITE DESCRIPTION

1.2.1 Site Background

1.2.1.1 Sites 1 and 3

Sites 1 and 3 are two closed landfills within a restricted area in the central portion of NAS Brunswick. Records indicate that the Site 1 landfill was used from 1955 to 1975 and the Site 3 landfill operated as a disposal area from 1960 to 1973 (E.C. Jordan 1990a). These landfills were used to dispose of wastes including garbage, food, oil, solvents, pesticides, petroleum products, paint, aircraft and automobile parts, and various chemicals. No waste material was observed at Site 3, and low-level soil contamination was detected (E.C. Jordan 1990a). Although Site 3 originally was believed to be a separate disposal area from Site 1, field sampling activities did not show a clear delineation between the two sites. Remedial measures were initiated in April 1995. Remedial activities undertaken at Sites 1 and 3 include the installation of a slurry wall around the western, northern, and eastern perimeter of the landfill footprint and the installation of a low permeability cap (Figure 1-2). Two groundwater extraction wells were constructed and

used to dewater the landfill within the slurry wall. These wells were deactivated in November 1997 when the water table was lowered below the bottom of the waste fill (with the exception of the area around monitoring well MW-234R) and did not rise during a subsequent 6-month period of monitoring water levels.

As indicated in the 1992 Record of Decision, environmental impacts have been observed in several media at Sites 1 and 3, including the following: surface and subsurface soil, groundwater, leachate, surface water, and sediment (ABB-ES 1992). The chemicals of concern identified in the 1995 LTMP are detailed in Table 1-1 and include:

- Volatile organic compounds (VOCs) and Target Analyte List (TAL) metals in groundwater
- VOCs, dichlorodiphenyltrichloroethane, and TAL metals in landfill leachate
- TAL metals in surface water
- VOCs, semivolatile organic compounds, polycyclic aromatic hydrocarbons, and metals in sediment.

1.2.1.2 Eastern Plume

The Eastern Plume has been attributed to past solvent disposal practices from Site 4 (Acid/Caustic Pit), Site 11 (former Fire Training Area), and Site 13 (Defense Reutilization and Marketing Office area), which leached into groundwater. Site 4, the Acid/Caustic Pit, was used from 1969 to 1974 for disposal of liquid waste. Investigations showed that subsurface soil around Site 4 was not contaminated and groundwater was only contaminated with low levels of trichloroethene (ABB-ES 1992). Site 11 is a former Fire Training Area that was used regularly over a 30-year period until it closed in 1990. Trichloroethene and 1,1,1-trichloroethane were the most prevalent contaminants in the groundwater (ABB-ES 1992). Site 13, the Defense Reutilization and Marketing Office area, consisted of 3 underground storage tanks located south of Site 4. One tank was used for diesel fuel, while the remaining 2 tanks were used to store waste fuels, oils, and degreasing solvents. All 3 tanks were removed during the 1980s, and a new fiberglass underground storage tank was installed. Most recent groundwater samples contained low levels of VOCs (ABB-ES 1992).

The dissolved-phase plume associated with these disposal activities was found to consist primarily of chlorinated VOCs, including, among others, tetrachloroethene, 1,1,1,-trichloroethane, and trichloroethene. The approximate limits of the plume in 1991 and 1999, as shown on Figure 1-2, are based on where VOCs have been detected during the Long-Term Monitoring Program. The chemicals of concern at the Eastern Plume are listed in Table 1-1. A groundwater treatment system, consisting of 5 groundwater extraction wells screened through the shallow and deep zones of the overburden aquifer, and a treatment plant began operating in

June 1995 to remediate both the northern and southern lobes of the Eastern Plume and to provide hydraulic control of the VOC plume and remove dissolved-phase VOCs from groundwater. A sixth extraction well (EW-2A) screened in the deep zone of the overburden aquifer, was installed near the confluence of Mere Brook and Merriconeag Stream and pumping began in June 1998 to improve the hydraulic control and remediation of the Eastern Plume. Groundwater within the Eastern Plume will continue to be remediated to address groundwater contamination (ABB-ES 1998).

1.2.2 Geology

The stratigraphy of the eastern portion of NAS Brunswick is comprised of overburden sand, silt, and clay units overlying an irregular bedrock surface. Three major units were identified in the overburden: sand, transition, and clay (E.C. Jordan 1991). The lower sand which lies between the transition and the clay is the focus of the remediation efforts at the Eastern Plume. The lower sand joins with the upper sand under the Eastern Plume source areas (i.e., Sites 4, 11, and 13). Clay thickness is variable across the Eastern Plume ranging from 0 to greater than 60 ft thick. The top surface of the clay and bedrock have variable elevations which are inferred to influence VOC concentrations as noted with higher concentrations being observed in the clay troughs.

1.2.3 Hydrogeology

Groundwater occurs beneath the site in both overburden and bedrock. Variations in groundwater flow directions have been observed when comparing the shallow and deep flow systems. Shallow groundwater flows toward Mere Brook and Merriconeag Stream. Groundwater within the overburden unit is generally unconfined in the western portions of the site. The lower sand unit is found between the transition unit and clay. This contaminated lower sand unit is found in the general area of the confluence of Mere Brook and Merriconeag Stream, and is under confined aquifer conditions in these areas. Deep groundwater flow is generally to the south-southeast and may discharge to surface water, although this relationship is not fully understood. Trough-shaped depressions in the upper surface of the Presumpscot clay unit are present along the eastern boundary of the Eastern Plume and appear to influence groundwater flow and VOC migration in the deep interval and concentrating VOCs in troughs (E.C. Jordan 1990a).

Bedrock is overlain by relatively impermeable Presumpscot clay, creating confined conditions (E.C. Jordan 1991). Groundwater flow is through fractures and joints in the bedrock, and the horizontal and vertical distribution of groundwater in these water-bearing zones is believed to be highly variable. Upper portions of the bedrock have higher permeability than deeper zones (E.C. Jordan 1990a).

1.3 SUMMARY OF PREVIOUS INVESTIGATIONS

1.3.1 Previous Investigations

The Navy's cleanup of hazardous wastes at NAS Brunswick falls under the Navy's Installation Restoration Program and meets the requirements of the CERCLA and the Superfund Amendments and Reauthorization Act. Investigations conducted prior to long-term monitoring were performed as follows:

- The Navy completed Draft Final Remedial Investigation and Phase I Feasibility Study reports (E.C. Jordan 1990a, 1990b) for Sites 1 and 3 and Eastern Plume. The Remedial Investigation Report described field sampling investigations, geology, and hydrogeology, and presented contamination nature and extent and risk assessments. The Phase I Feasibility Study identified and initiated remedial action objectives, and developed and screened remedial alternatives for the 9 original sites studied during the Remedial Investigation.

- The Navy submitted a Draft Final Supplemental Remedial Investigation report for an additional 4 sites in August 1991 (E.C. Jordan 1991). The report also contained additional field sampling results for the Eastern Plume.

- The Navy identified the groundwater associated with Sites 4, 11, and 13 (i.e., the Eastern Plume) as a distinct area of contamination and initiated the remedial process in 1992 with the signing of a final Record of Decision for the Eastern Plume (ABB-ES 1998). The interim remedial action was intended to control and prevent further migration of contaminated groundwater toward Harpswell Cove and to reduce the amount of contamination within the Eastern Plume.

- The final Record of Decision for a Remedial Action at Sites 1 and 3 (ABB-ES 1992) and the final Record of Decision for No Further Action at Sites 4, 11, and 13, and a Remedial Action for the Eastern Plume (ABB-ES 1998) identified and initiated remedial measures, including installation of a low permeability cap and slurry wall at Sites 1 and 3 and groundwater extraction and treatment at the Eastern Plume.

1.3.2 Long-Term Monitoring

As of March 2004, a total of 23 monitoring events have been conducted at Sites 1 and 3 and Eastern Plume under the LTMP initiated in May 1995. The results of the groundwater sampling and data trend analysis conducted during the events from May 1995 through November 2000 are summarized in the Annual Reports (EA 1996, 1997a, 1999, and 2000a). The Monitoring Event 20 Report (April 2002) was the first report to incorporate elements of the annual report into a monitoring event report. Each monitoring event report presents and discusses analytical data, evaluates trends, and provides recommendations and conclusions.

1.4 SUMMARY OF REVISIONS TO LONG-TERM MONITORING PLAN

This LTMP contains changes to the original 1995 and February 2000 LTMPs for Sites 1 and 3 and Eastern Plume (EA 2000b). These changes are summarized in Tables 1-2 and 1-3, respectively. The revisions have been made based on a review of analytical data from previous monitoring events, increased understanding of site geology and hydrogeology, installation of additional sampling points, and discussions held with the MEDEP, EPA, and other Restoration Advisory Board members. In addition, the revision to this LTMP addresses changes in the analytical program and sample collection and preservation techniques. The following section summarizes the revisions included in the February 2000 LTMP, and the current long-term monitoring requirements for Sites 1 and 3 and Eastern Plume are presented in Chapter 3.

1.4.1 Monitoring Locations Relative to the Eastern Plume

To aid in assessment of long-term trends in VOC concentrations detected in groundwater within the Eastern Plume, monitoring points which are sampled as part of the Long-Term Monitoring Program have been assigned to one of three categories based on their location relative to the Eastern Plume:

1. **Sentinel Wells**—Wells located outside the area of known contamination. Groundwater data from these wells would be used to warn of plume migration.

2. **Perimeter Wells**—Wells located at the edge of the plume. Groundwater data from these wells would be used to monitor the changes at or near the plume boundary.

3. **Interior Plume Wells**—Wells located within the area of known contamination. Groundwater data from these wells would be used to monitor VOC variations within the plume.

Table 1-4 summarizes the sentinel wells, perimeter wells, and interior plume wells at the Eastern Plume which are sampled as part of the Long-Term Monitoring Program.

1.4.2 Sampling Locations

Following a review of the groundwater concentrations reported in Monitoring Events 1 through 22, sampling points at Sites 1 and 3 and Eastern Plume have been revised. Changes for each site are summarized below.

1.4.2.1 Sites 1 and 3

From 16 to 27 October 2000, EA decommissioned a total of 20 monitoring wells in accordance with MEDEP's Solid Waste Management Rules, Chapter 405, Section H, at various sites throughout the NAS Brunswick. A total of 630 ft of wells and piezometers were decommissioned because they were no longer used for active monitoring or they were damaged. EA generated a letter report in January 2001 to document the well decommissioning effort

completed by EA during October 2000 (EA 2001).

Changes to the Long-Term Monitoring Program at Sites 1 and 3 are summarized in Table 1-2.

1.4.2.2 Eastern Plume

In October 2000, piezometers P-110, P-112, and P-124 were decommissioned as part of the well decommissioning task completed at NAS Brunswick during 2000.

The following deep groundwater monitoring wells in the Southern Boundary of the Eastern Plume were added to the Long-Term Monitoring Program in November 2003 at the request of the project stakeholders: MW-335, MW-336, MW-337, MW-338A, MW-338B, MW-338C, and MW-339. Four new piezometers were added to the Long-Term Monitoring Program in the Southern Boundary area (PZ-1, PZ-2, PZ-6, and PZ-11).

An existing groundwater monitoring well (MW-315A) located in the Southern Boundary was added into the Long-Term Monitoring Program at the request of the MEDEP in November 2003.

1.4.2.3 Groundwater Extraction and Treatment System

In October 2000, extraction wells EW-2, EW-3, and EW-5 were removed from the Long-Term Monitoring Program. These three extraction wells have been decommissioned by Foster Wheeler Corporation in the Fall and Winter of 2000. Extraction well EW-5A was installed in September 2000 by Foster Wheeler Corporation. Extraction well EW-5A was placed into service in January 2001.

1.4.3 Sampling Frequency

The initial LTMP established the requirement for monitoring/sampling to be conducted on a quarterly basis for 5 years (ABB-ES 1994). Tri-annual sampling was initiated in June 1996 following approval by MEDEP and EPA Region 1. Following a review of the groundwater concentrations reported in Monitoring Events 1 through 13, sampling frequency was reduced to bi-annual sampling in 1999 at Sites 1 and 3 and Eastern Plume. Bi-annual sampling will occur during April and September, which corresponds approximately to months with high and low water conditions.

1.4.4 Sampling Method

The sampling methods for surface water and leachate sampling will remain unchanged from the initial LTMP. The standard operating procedures for groundwater sampling have been revised to reflect the use of both aqueous diffusion samplers and low-flow sampling using dedicated submersible pumps. Groundwater samples were collected from the wells at Sites 1 and 3 and the Eastern Plume using the low-flow sampling technique. In 1998, the Navy began a pilot program

using the aqueous diffusion sampling method at selected wells within the Eastern Plume as summarized in Table 1-1. This sampling method has been officially incorporated into the LTMP.

1.4.5 Water Elevation Gauging Program

In addition to the bi-annual well gauging task in April and September of every year, quarterly gauging will be conducted at the following wells and peizometer locations EP-17, EP-18, EP-19, EP-20, EW-06, EW-07, MW-201R, and MW-234R during the months of January, April, July, and October each year. After the groundwater elevation data are collected by the field team, the Field Team Leader, or Site Manager, will review the newly collected data with the historical groundwater elevations collected at these wells ensure that there are no discrepancies and to allow for field confirmation of any anomalous data. The quarterly groundwater elevation data must be transmitted to the MEDEP, EPA, and Brunswick Area Citizens for a Safe Environment within 10 business days of collection. The quarterly gauging data will also be presented in the monitoring event report.

1.4.6 Analytical Methods

At Sites 1 and 3, the analytical sampling parameters have not changed. The analytical requirements for the Eastern Plume have been reduced (tentatively identified compounds are no longer be analyzed) following a review of analytical data collected during Monitoring Events 1 through 17. The Eastern Plume analytical program has been reduced to Target Compound List (TCL) VOCs by EPA Method 8260B only.

At the groundwater extraction and treatment plant, the sampling requirement for inorganic analysis will be eliminated as long as EW-6 and EW-7, the primary sources of inorganics, remain deactivated. Currently, the groundwater treatment plant receives water only from the Eastern Plume, which does not contain elevated concentrations of inorganic elements.

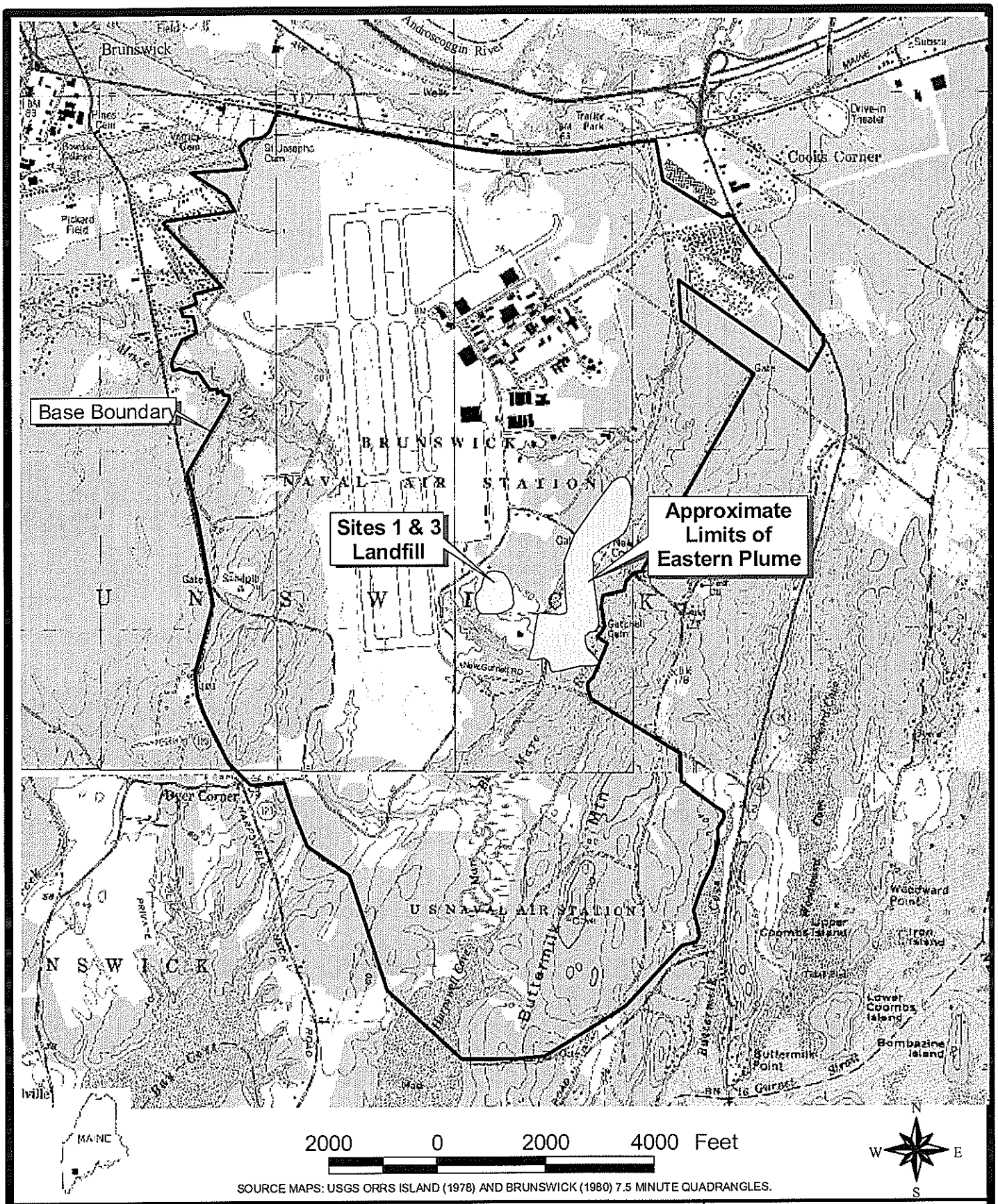
1.5 REPORTS AND DATA PRESENTATION

Monitoring event reports will present the data in tabular format and on figures, and will provide additional descriptions of environmental trends which were previously included in Annual Reports. Annual reports will no longer be prepared. Monitoring Event reports will provide data interpretation in the form of tables, figures, trend graphs, and other graphical tools. The reports will contain detailed presentation of data results and provide conclusions and recommendations based on the results of data collected from Sites 1 and 3 and Eastern Plume. Each report will provide a basis for discussing the findings of the Long-Term Monitoring Program sampling for Sites 1 and 3 and Eastern Plume, propose refinements of the monitoring program, and provide the response to comments letters received on the previous year's monitoring event reports.

Monitoring event reports will be submitted to EPA and MEDEP and other Restoration Advisory Board members to inform interested parties of the findings of the environmental monitoring conducted at Sites 1 and 3 and Eastern Plume. In addition to presenting providing data interpretation in the annual report, long-term monitoring findings will be discussed at the Restoration Advisory Board meetings.

The following table provides a schedule of expected report issue months and regulator review periods:

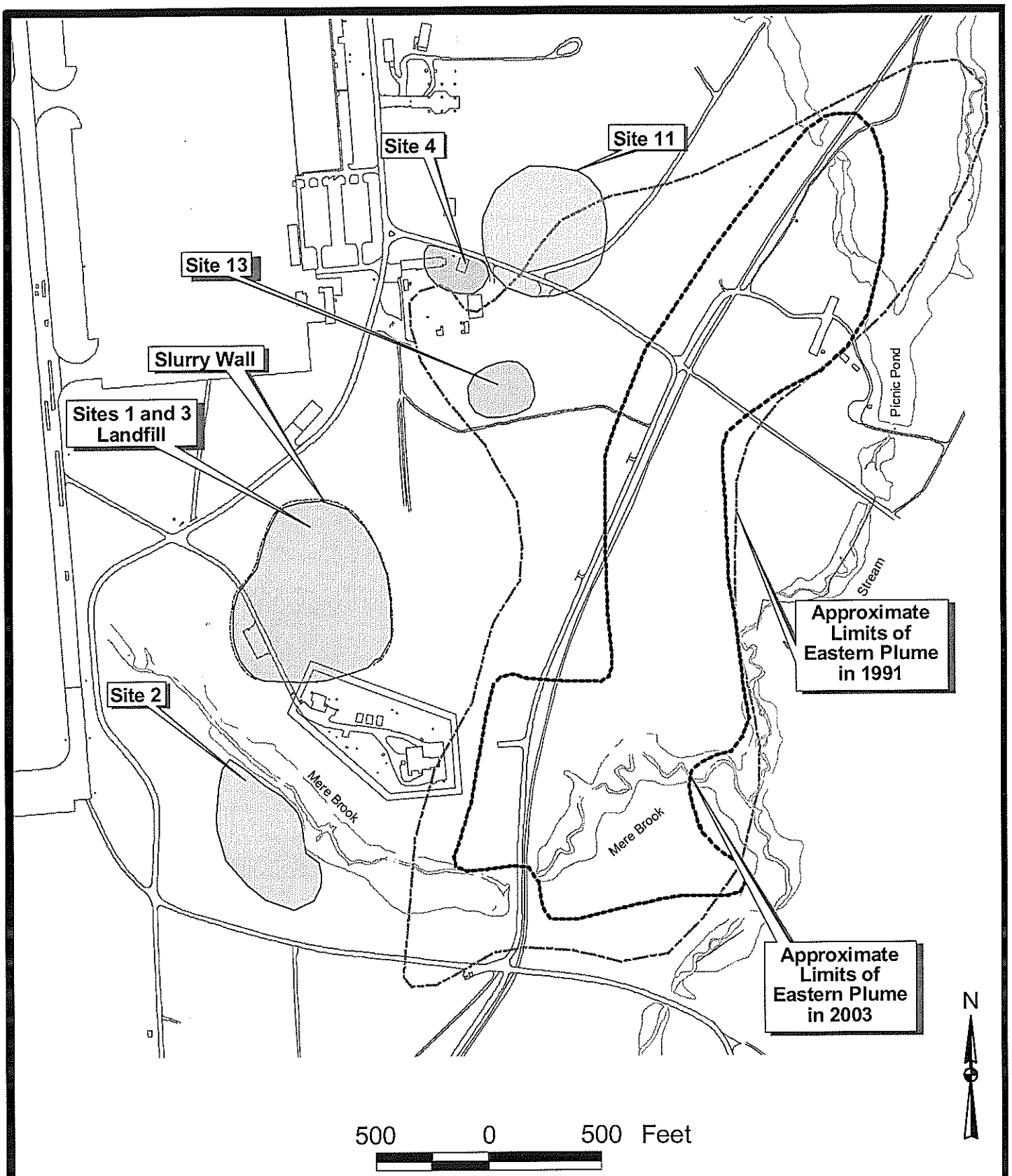
Task	Report Preparation Duration or Review Period	Scheduled Delivery Date
Monitoring Event Report (April)	2 months	End of June
Comments from Regulators	1 month	End of July
Monitoring Event Report (September)	2 months	End of November
Comments from Regulators	1 month	End of December
NOTE: Response to comments received for the draft monitoring event reports will be included in the final version of the monitoring event report.		



SOURCE MAPS: USGS ORRS ISLAND (1978) AND BRUNSWICK (1980) 7.5 MINUTE QUADRANGLES.

EA®	SITES 1 AND 3 AND EASTERN PLUME NAVAL AIR STATION, BRUNSWICK, MAINE	FIGURE 1-1 SITE LOCATION MAP

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT No	FILE No
ACE	DC	DC	ACE	AS SHOWN	MARCH 2004	29600.47	I:\NASB_GIS \NAVY.APR



EA®	NAVAL AIR STATION BRUNSWICK, MAINE	FIGURE I-2 SITE PLAN FOR SITES I AND 3 AND EASTERN PLUME

PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT No	FILE No
ACE	DC	DC	ACE	AS SHOWN	12 MARCH 2004	29600.47	I:\NASB_GIS \NAVY.APR

TABLE 1-1 SUMMARY OF CHEMICALS OF CONCERN FOR SITES 1 AND 3 AND EASTERN PLUME

Media	Volatile Organic Compounds[a]	Semivolatile Organic Compounds	Pesticides	Inorganic Target Analytes
SITES 1 AND 3				
Groundwater	Chlorobenzene 1,1-Dichloroethane 1,2-Dichloroethene (total) 1,4 Dichlorobenzene Ethylbenzene Methylene Chloride Toluene Total Xylenes Vinyl Chloride	None	None	Aluminum Arsenic Barium Chromium Lead Manganese Nickel Sodium
Surface Water	None	None	None	Lead Manganese Zinc
Sediment	1,1,2,2-Tetrachloroethane	Bis(2-ethylhexyl)phthalate Polycyclic aromatic hydrocarbons	None	Arsenic Cadmium Chromium Copper Lead Manganese Mercury Nickel Vanadium Zinc
Leachate Seep/Sediment	1,4-Dichlorobenzene 1,1-Dichloroethane 1,2-Dichloroethene Ethylbenzene 1,1,2,2-Tetrachloroethane Total Xylenes Trichloroethene Vinyl Chloride	None	4,4'-Dichlorodiphenyl -trichloroethane	Antimony Arsenic Beryllium Cadmium Chromium Cyanide Lead Manganese Mercury Nickel Vanadium Zinc
EASTERN PLUME				
Groundwater	1,1-Dichloroethene 1,1-Dichloroethane *cis*-1,2-Dichloroethene[b] *trans*-1,2-tichloroethene[b] Tetrachloroethene 1,1,1-Trichloroethane Trichloroethene	None	None	None

(a) It is noted that the total volatile organic compounds calculated in the monitoring event reports is the sum of all detected volatile organic compounds with exception of methylene chloride, acetone, and 2-butanone.
(b) The *cis* and *trans* isomers for 1,2-dichloroethene are reported depending on the contract laboratory used for the sample analysis. Typically, the 1,2,-dichloroethene is reported as total.

TABLE 1-2 SUMMARY OF CHANGES TO THE LONG-TERM MONITORING PROGRAM AT SITES 1 AND 3

Sample Type/Location	Monitoring Frequency	Slurry Wall	Sample Parameters			Gauging
			TCL VOC	TAL Elements	Field Parameters[a]	
Shallow Monitoring Wells						
MW-201R [b]	Bi-Annual	Outside	NR	NR	NR	X
MW-202A	Bi-Annual	Outside	X	X	X	X
MW-202B	Bi-Annual	Outside	NR	NR	NR	X
MW-203	Bi-Annual	Outside	X	X	X	X
MW-204	Bi-Annual	Outside	X	X	X	X
MW-210B	Bi-Annual	Outside	NR	NR	NR	X
MW-211B	Bi-Annual	Inside	NR	NR	NR	X
MW-215R	Bi-Annual	Inside	NR	NR	NR	X
MW-217B	Bi-Annual	Inside	X	X	X	X
MW-234R[b]	Bi-Annual	Inside	NR	NR	NR	X
MW-240	Bi-Annual	Outside	X	X	X	X
MW-2101	Bi-Annual	Outside	X	X	X	X
Deep Monitoring Wells						
MW-216A	Bi-Annual	Inside	NR	NR	NR	X
MW-217A	Bi-Annual	Inside	NR	NR	NR	X
MW-218	Bi-Annual	Outside	X	X	X	X
MW-219	Bi-Annual	Outside	X	X	X	X
MW-220	Bi-Annual	Outside	NR	NR	NR	X
MW-232A	Bi-Annual	Inside	NR	NR	NR	X
MW-233R	Bi-Annual	Inside	NR	NR	NR	X

(a) Determination of field parameters in accordance with U.S. Environmental Protection Agency 600/4-79/020 using the following methods: pH (Method 150.1), temperature (Method 170.1), specific conductance (Method 120.1), and turbidity (Method 180.1). Optional field parameters, including dissolved oxygen (Method 360.1) and Eh, are also recorded. The field parameters also include the collection of the water level measurement.

(b) In addition to the bi-annual well gauging task in April and September of every year, quarterly gauging will be conducted at the following wells and peizometer locations: EP-17, EP-18, EP-19, EP-20, EW-06, EW-07, MW-201R, and MW-234R during the months of January, April, July, and October each year. After the groundwater elevation data are collected by the field team, the Field Team Leader, or Site Manager, will review the newly collected data with the historical groundwater elevations collected at these wells ensure that there are no discrepancies and to allow for field confirmation of any anomalous data. The quarterly groundwater elevation data must be transmitted to the MEDEP, EPA, and Brunswick Area Citizens for a Safe Environment within 10 business days of collection. The quarterly gauging data will also be presented in the monitoring event report.

NOTE: TCL = Target Compound List.
VOC = Volatile organic compound (EPA SW-846).
TAL = Target Analyte List.
NR = Not required.

Sample Type/Location	Monitoring Frequency	Slurry Wall	Sample Parameters			Gauging
			TCL VOC	TAL Elements	Field Parameters[a]	
Bedrock Wells						
MW-210A	Bi-Annual	Outside	NR	NR	NR	X
MW-210R	Bi-Annual	Inside	NR	NR	NR	X
MW-211A	Bi-Annual	Inside	NR	NR	NR	X
Extraction Wells						
EW-06 [b]	Bi-Annual	Inside	NR	NR	NR	X
EW-07 [b]	Bi-Annual	Inside	NR	NR	NR	X
Shallow EP-Series Piezometers						
EP-16	Bi-Annual	Inside	NR	NR	NR	X
EP-17 [b]	Bi-Annual	Inside	NR	NR	NR	X
EP-18 [b]	Bi-Annual	Inside	NR	NR	NR	X
EP-19 [b]	Bi-Annual	Inside	NR	NR	NR	X
EP-20 [b]	Bi-Annual	Inside	NR	NR	NR	X
Leachate Station Seep						
SEEP-1	Bi-Annual	X	X	X		NR
SEEP-2	B-Annual	X	X	X		NR
SEEP-3	Bi-Annual	X	X	X		NR
SEEP-4	Bi-Annual	X	X	X		NR
SEEP-5	Bi-Annual	X	X	X		NR
SEEP-9	Bi-Annual	X	X	X		NR
Leachate Station Sediment						
LT-1	Bi-Annual	X	X	NR		NR
LT-2	Bi-Annual	X	X	NR		NR
LT-3	Bi-Annual	X	X	NR		NR
LT-4	Bi-Annual	X	X	NR		NR
LT-5	Bi-Annual	X	X	NR		NR
LT-9	Bi-Annual	X	X	NR		NR
Surface Water						
SW-4	Bi-Annual	X	X	X		NR
SW-7	Bi-Annual	X	X	X		NR
SW-8	Bi-Annual	X	X	X		NR
SW-9	Bi-Annual	X	X	X		NR
SW-15	Bi-Annual	NR	X	X		NR
SW-16	Bi-Annual	NR	X	X		NR
Sediment						
SED-9	Annual	NR	X[c]	NR		NR
SED-15	Annual	NR	X[c]	NR		NR
SED-16	Annual	NR	X[c]	NR		NR
SED-17	Annual	NR	X[c]	NR		NR
SED-18	Annual	NR	X[c]	NR		NR
SED-19	Annual	NR	X[c]	NR		NR

(c) Samples were analyzed for pesticides by EPA Method 8081A, and grain size and total organic carbon by Lloyd Kahn.

TABLE 1-3 SUMMARY OF CHANGES TO THE LONG-TERM MONITORING PROGRAM AT EASTERN PLUME

Sample Type/Location	Monitoring Frequency	Well Location	Sample Parameters		Gauged
			TCL VOC	Field Parameters[a]	
Shallow Monitoring Wells					
MW-105 B	Bi-Annual	Perimeter	NR	NR	X
MW-106	Bi-Annual	NA	NR	NR	X
MW-206 B	Bi-Annual	NA	NR	NR	X
MW-207 B	Bi-Annual	NA	NR	NR	X
MW-209	Bi-Annual	NA	NR	NR	X
MW-222	Bi-Annual	NA	NR	NR	X
MW-223	Bi-Annual	NA	NR	NR	X
MW-224	Bi-Annual	Perimeter	X[b]	X	X
MW-225 B	Bi-Annual	NA	NR	NR	X
MW-229 B	Bi-Annual	NA	NR	NR	X
MW-231B	Bi-Annual	Sentinel	X[b]	X	X
MW-307	Bi-Annual	NA	NR	NR	X
MW-318	Bi-Annual	Sentinel	X[b]	X	X
MW-332	Bi-Annual	Interior Plume	X[b]	X	X
MW-1104	Bi-Annual	Perimeter	X[b]	X	
Deep Monitoring Wells					
MW-105 A	Bi-Annual	Perimeter	X[b]	X	X
MW-205	Bi-Annual	Interior Plume	X[c]	X	X
MW-206 A	Bi-Annual	NA	NR	NR	X
MW-207 A	Bi-Annual	Interior Plume		Destroyed	X
MW-207 AR	Bi-Annual	Interior Plume	X[b]	X	X
MW-208	Bi-Annual	NA	NR	NR	X
MW-225 A	Bi-Annual	Perimeter	X[b]	X	X
MW-229 A	Bi-Annual	Perimeter	X[b]	X	X
MW-230 A	Bi-Annual	Sentinel	X[b]	X	X
MW-231A	Bi-Annual	Sentinel	X[b]	X	X
MW-303	Bi-Annual	Sentinel	X[b]	X	X
MW-305	Bi-Annual	Sentinel	X[b]	X	X
MW-306	Bi-Annual	Perimeter	X[b]	X	
MW-310	Bi-Annual	NA	NR	NR	
MW-311	Bi-Annual	Interior Plume	X[b]	X	X
MW-312	Bi-Annual	NA	NR	NR	X

(a) Determination of field parameters in accordance with U.S. Environmental Protection Agency 600/4-79/020 using the following methods: pH (Method 150.1), temperature (Method 170.1), specific conductance (Method 120.1), and turbidity (Method 180.1). Optional field parameters, including dissolved oxygen (Method 360.1) and Eh, are also recorded. The field parameters also include the collection of the water level measurement.
(b) The groundwater sample was collected utilizing the diffusion sampler method.
(c) MW-205 was gauged but not sampled during Monitoring Event 22.

NOTE:
TCL = Target Compound List.
VOC = Volatile organic compound.
NR = Sampling is not required as per the draft final Long-Term Monitoring Plan (EA 2000b).
NA = Not applicable. Well is not sampled, therefore, location is not indicated.
Perimeter = Located at the edge of the plume to monitor concentrations of plume boundary.
Sentinel = Outside area of known contamination to be used to warn of plume migration.
Interior Plume = Within area of known contamination to monitor plume migration.

Sample Type/Location	Monitoring Frequency	Well Location	Sample Parameters		Gauged
			TCL VOC	Field Parameters[a]	
Deep Monitoring Wells (continued)					
MW-313	Bi-Annual	Sentinel	X[b]	X	X
MW-319	Bi-Annual	Interior Plume	X[b]	X	X
MW-315A	Bi-Annual	Sentinel	X[b]	X	X
MW-330	Bi-Annual	Perimeter	X[b]	X	X
MW-331	Bi-Annual	Interior Plume	X[b]	X	X
MW-333	Bi-Annual	Sentinel	X[b]	X	X
MW-334	Bi-Annual	Sentinel	X[b]	X	X
MW-335	Bi-Annual	Sentinel	X[b]	X	
MW-336	Bi-Annual	Sentinel	X[b]	X	
MW-337	Bi-Annual	Sentinel	X[b]	X	
MW-338A	Bi-Annual	Sentinel	X[b]	X	
MW-338B	Bi-Annual	Sentinel	X[b]	X	
MW-338C	Bi-Annual	Sentinel	X[b]	X	
MW-339	Bi-Annual	Sentinel	X[b]	X	
MW-NASB-212	Bi-Annual	Perimeter	X[b]	X	
Bedrock Monitoring Wells					
MW-308	Bi-Annual	Sentinel	X[b]	X	X
MW-309 A	Bi-Annual	NA	NR	NR	X
MW-309 B	Bi-Annual	Sentinel	X[b]	X	X
MW-316A	Bi-Annual	NA	NR	NR	X
MW-316B	Bi-Annual	NA	NR	NR	X
MW-317A	Bi-Annual	NA	NR	NR	X
MW-317B	Bi-Annual	NA	NR	NR	X
MW-323	Bi-Annual	NA	X[d]	X	X
Shallow P-Series Piezometers					
P-103	Bi-Annual	NA	NR	NR	X
P-111	Bi-Annual	Perimeter	X[d]	X	X
P-121	Bi-Annual	NA	NR	NR	X
P-132	Bi-Annual	Sentinel	X[b]	X	X
Deep P-Series Piezometers					
PZ-1	Bi-Annual	NA	NR	NR	X
PZ-2	Bi-Annual	NA	NR	NR	X
PZ-6	Bi-Annual	NA	NR	NR	X
PZ-11	Bi-Annual	NA	NR	NR	X
P-105	Bi-Annual	NA	NR	NR	X
P-106	Bi-Annual	Interior Plume	X[d]	X	X
Extraction Wells					
EW-01	Bi-Annual	Interior Plume	X	X	X
EW-02A	Bi-Annual	Interior Plume	X	X	X
EW-04	Bi-Annual	Interior Plume	X	X	X
EW-05A	Bi-Annual	Interior Plume	X	X	X

(d) The groundwater sample was collected utilizing the low-flow sampling method.

33 AdB

Sample Type/Location	Monitoring Frequency	Well Location	Sample Parameters		Gauged
			TCL VOC	Field Parameters[a]	
Deep EP-Series Piezometers					
EP-01	Bi-Annual	NA	NR	NR	X
EP-02	Bi-Annual	NA	NR	NR	X
EP-03	Bi-Annual	NA	NR	NR	X
EP-04	Bi-Annual	NA	NR	NR	X
EP-05	Bi-Annual	NA	NR	NR	X
EP-06	Bi-Annual	NA	NR	NR	X
EP-07	Bi-Annual	NA	NR	NR	X
EP-09	Bi-Annual	NA	NR	NR	X
EP-10	Bi-Annual	NA	NR	NR	X
EP-11	Bi-Annual	NA	NR	NR	X
Deep EP-Series Piezometers (continued)					
EP-12	Bi-Annual	NA	NR	NR	X
EP-13	Bi-Annual	NA	NR	NR	X
EP-14	Bi-Annual	NA	NR	NR	X
EP-15	Bi-Annual	NA	NR	NR	X
Surface Water					
SW-10	Bi-Annual	NA	X	X	NR
SW-11	Bi-Annual	NA	X	X	NR
SW-12	Bi-Annual	NA	X	X	NR
SW-13	Bi-Annual	NA	X	X	NR
SW-14	Bi-Annual	NA	X	X	NR
GP-1A	Bi-Annual	NA	NR	NR	X
GP-2A	Bi-Annual	NA	NR	NR	X
GP-3B	Bi-Annual	NA	NR	NR	X
GP-4A	Bi-Annual	NA	NR	NR	X
GP-5B	Bi-Annual	NA	NR	NR	X
GP-6A	Bi-Annual	NA	NR	NR	X
Seep					
SEEP-10	Bi-Annual		X	X	NR
SEEP-11	Bi-Annual		X	X	NR

TABLE 1-4 SUMMARY OF SENTINEL, PERIMETER, AND INTERIOR PLUME WELLS

Sentinel Wells	Perimeter Wells	Interior Plume Wells
MW-230A	MW-229A	MW-205
MW-231A	MW-105A	MW-207A
MW-231B	MW-225A	MW-311
MW-313	MW-NASB-212	MW-319
MW-318	MW-224	MW-331
MW-333	MW-330	MW-332
MW-334	P-111	P-106
MW-303	MW-1104	EW-1
MW-305		EW-2
P-132		EW-2A
MW-308		EW-3
MW-309B		EW-4
		EW-5
		MW-306

NOTE: Only monitoring wells located in the Eastern Plume study area which are sampled under this Long-Term Monitoring Plan have been assigned designations.
Definitions listed below were established during the 10 February 1999 Technical Restoration Advisory Board Meeting:

- Sentinel wells are located outside the area of known contamination to be used to warn of plume migration.
- Perimeter wells are located at the edge of the plume to monitor the plume boundary.
- Interior plume wells are located within the area of known contamination to monitor plume migration.

2. REGULATORY FRAMEWORK

The selected remedial actions undertaken at Sites 1 and 3 and the Eastern Plume are those specified in their respective Records of Decision (ABB-ES 1992, 1998). In the absence of CERCLA, EPA and MEDEP guidance has been used during development of LTMPs for hazardous waste sites at which a remedial action has been implemented. This LTMP was developed to comply with relevant and appropriate requirements of the Records of Decision and the groundwater monitoring component of the selected removal alternative of the Engineering/Cost Analysis. The long-term monitoring requirements were initially developed using the Resource Conservation and Recovery Act requirements for detection monitoring (40 CFR 265 Subpart F) and landfill closure and post-closure (40 CFR 264.110-264.120), and State of Maine Solid Waste Management Rules, Chapter 401. Subsequent modifications to the Long-Term Monitoring Program will be conducted in accordance with Section 6.10 of the October 1990 NAS Brunswick Federal Facility Agreement.

This LTMP provides a basis for ongoing evaluation of remedial actions and provides the fundamental data set that will constitute the basis for the formal five-year reviews. The first five-year review was conducted in 2000, with the next scheduled for 2004. The five-year review requires analysis of newly promulgated or modified federal and state environmental laws to determine if they are applicable or relevant and appropriate requirements, and to determine if they challenge the protectiveness of the remedy. Approval of this LTMP by EPA and MEDEP is required prior to implementation.

3. MONITORING PLAN

This chapter describes the long-term monitoring requirements for Sites 1 and 3 and Eastern Plume, and details the sampling locations, sampling frequency, analytical methods, and visual inspections to be conducted during monitoring events. Field sampling procedures are presented in the Base-Wide Quality Assurance Project Plan (in progress). The quality assurance and quality control procedure requirements are described in the Base-Wide Quality Assurance Project Plan (in progress). Health and safety procedures to be followed during sampling are described in the Safety, Health, and Emergency Response Plan for NAS Brunswick (EA 1997b).

Monitoring results collected during the performance of long-term monitoring are being used to:

- Assess ambient water quality conditions in groundwater and surface water by collecting samples to monitor trends
- Evaluate the effectiveness of the groundwater extraction system by assessing trends in the concentration of VOCs in groundwater within the boundaries of the Eastern Plume, and provide recommendations to improve system effectiveness
- Analyze the effective capture zone of the groundwater extraction system at Sites 1 and 3 and the Eastern Plume to assess the status of hydraulic control of the plume
- Evaluate the effectiveness of the landfill cap, slurry wall, and local aquifer dewatering by evaluating trends in VOCs and TAL metals in surface water, groundwater, sediment, and leachate seep and seep sediment samples within and adjacent to Sites 1 and 3
- Monitor the water level within the landfill to ensure that the current level does not rise above the level of the waste.

3.1 LONG-TERM MONITORING PROGRAM

A Long-Term Monitoring Program is currently being conducted at Sites 1 and 3 and Eastern Plume. At Sites 1 and 3, long-term monitoring activities will continue to include collection of groundwater, surface water, sediment, and leachate seep and seep sediment samples. At Eastern Plume, long-term monitoring activities will continue to include collection of groundwater, surface water, and sediment samples. A summary of the sampling program for Sites 1 and 3 and Eastern Plume can be found in Tables 3-1 and 3-2, respectively. The locations of monitoring points (i.e., the long-term monitoring network) are shown on Figure 3-1.

3.1.1 Sites 1 and 3

3.1.1.1 Groundwater Sampling Program

At Sites 1 and 3, a total of 7 shallow monitoring wells (MW-202A, MW-202B, MW-203, MW-204, MW-217B, MW-240, and MW-2101), 3 deep monitoring wells (MW-218, MW-219, and MW-220 will be sampled to monitor groundwater quality. The monitoring frequency, and sampling parameters are summarized in Table 1-2. The long-term monitoring sampling locations are presented in Figure 3-2.

Groundwater samples will be analyzed for TCL VOCs by EPA Method 8260B and TAL elements, including metals by inductively coupled plasma by EPA Method 6010 and graphite furnace by EPA Method 7000 series. Field parameters that will be monitored at the time of sampling include pH, temperature, turbidity, specific conductance, Eh, and dissolved oxygen. The monitoring wells are gauged at the time of sampling. Currently, the groundwater samples at Sites 1 and 3 are collected using low-flow sampling techniques. One shallow groundwater monitoring well MW-217B is sampled by the aqueous diffusion sampling method.

3.1.1.2 Surface Water and Stream Sediment Sampling Program

A total of 6 surface water sampling locations (SW-4, SW-7, SW-8, SW-9, SW-15, and SW-16) are included in the Long-Term Monitoring Program. Four locations (SW-04, SW-07, SW-08, and SW-09) are downstream from Sites 1 and 3 and two locations (SW-15 and SW-16) are upstream. The upstream locations will be used as reference locations to assess whether inorganics are being transported from sources located upgradient of the sites. These sampling locations are also summarizing in Table 1-2. Sampling locations are shown on Figure 3-2.

The downstream surface water sampling locations will be analyzed for TCL VOCs by EPA Method 8260B and TAL elements, including metals by inductively coupled plasma by EPA Method 6010 and graphite furnace by EPA Method 7000 series. Upstream sample locations (SW-15 and SW-16) will be analyzed for TAL elements only, including metals, by inductively coupled plasma by EPA Method 6010 and graphite furnace by EPA Method 7000 series. Field parameters will be monitored at the time of sampling, including pH, temperature, turbidity, and specific conductance, Eh, and dissolved oxygen. Note that SW-15 and SW-16 are only sampled once a year during the fall LTMP which occurs in September.

Six stream sediment sampling locations (SED-09 and SED-15 through SED-19) are included in the Long-Term Monitoring Program. Sampling locations are shown on Figure 3-2. Stream sediment samples will be analyzed for TAL elements, including metals by inductively coupled plasma by EPA Method 6010 and graphite furnace by EPA Method 7000 Series, organochlorine pesticides by EPA SW846 Method 8081, grain size by ASTM Method D422, and total organic carbon by Method CLP 9096. These sediment samples are only collected during the fall LTMP which occurs in September.

3.1.1.3 Leachate Seep and Seep Sediment Sampling Program

A total of 6 leachate samples (SEEP-1 through SEEP-5, and SEEP-9) will be collected. The leachate seep samples are collected downgradient of the Sites 1 and 3 landfill from locations where seeps have been observed. Sampling location SEEP-2 will be checked and sampled if flowing. A seep sediment sample (identified as seep sediment sample) will also be collected at each seep location. A total of 6 leachate seep sediment samples (LT-1 through LT-5 and LT-9) will be collected. The aqueous seep samples will be collected whenever sufficient liquid is present;sediment samples will be collected regardless of whether liquid is present at the time of sampling. Sampling locations are shown on Figure 3-2.

The leachate seep and seep sediment samples will be analyzed for TCL VOCs by EPA Method 5035/8260B and TAL elements, including metals by inductively coupled plasma by EPA Method 6010 and graphite furnace by EPA Method 7000 series. Field parameters that will be monitored at the time of sampling leachate seep location include pH, temperature, turbidity, specific conductance, Eh, and dissolved oxygen.

3.1.1.4 Water Level Gauging Program

Water levels will be gauged prior to each long-term monitoring sampling event to assess shallow and deep groundwater flow directions. Water level measurements will be collected from 22 existing monitoring wells, 2 extraction wells, and 5 EP-series piezometers during each sampling event at Sites 1 and 3 and recorded along with pertinent well details on the field record of well gauging forms.

In addition to the bi-annual well gauging task in April and September of every year, quarterly gauging will be conducted at the following wells and piezometer locations (EP-17, EP-18, EP-19, EP-20, EW-06, EW-07, MW-201R, and MW-234R) during the months of January, April, July, and October each year. After the groundwat er elevation data are collected by the field team, the Field Team Leader, or Site Manager, will review the newly collected data with the historical groundwater elevations collected at these wells to ensure that there are no discrepancies and to allow for field confirmation of any anomalous data. The quarterly groundwater elevation data must be transmitted to the MEDEP, EPA, and Brunswick Area Citizens for a Safe Environment within 10 business days of collection. The quarterly gauging data will also be presented in the monitoring event report. Gauging locations are shown on Figure 3-3.

3.1.2 Eastern Plume

3.1.2.1 Groundwater Sampling Program

A total of 6 shallow monitoring wells (MW-224, MW-231B, MW-313, MW MW-318, MW-332, and MW-1104) will be sampled to assess shallow groundwater quality at the Eastern Plume. Each of these shallow wells is sampled with diffusion samplers by using the aqueous diffusion sampling method.

A total of 25 deep monitoring wells (MW-105A, MW-205, MW-207AR, MW-225A, MW-229A, MW-230A, MW-231A, MW-303, MW-305, MW-306, MW-311, MW-315A, MW-319, MW-330, MW-33l, MW-333, MW-334, MW-335, MW-336, MW-337, MW-338A, MW-338B, MW-338C, MW-339, and MW-NASB-212) are sampled at the Eastern Plume. These deep monitoring wells are sampled with diffusion samplers by using the aqueous diffusion sampling method.

Three bedrock monitoring wells (MW-308, MW-309B, and MW-323) are sampled at the Eastern Plume. Two of these monitoring wells (MW-308 and MW-309B) are sampled using diffusion samplers via the aqueous diffusion sampling method. Well MW-323 is sampled via the low-flow sampling method.

Two shallow piezometers (P-103 and P-132) and one deep piezometer (P-106) are sampled as part of the Long-Term Monitoring plan at the Eastern Plume. P-132 is sampled by using diffusion sampling method, and P-103 and P-106 are sampled via the low-flow sampling method due to the small diameter of these two piezometers.

Four extraction wells (EW-01, EW-02A, EW-04, and EW-05A) are sampled as part of the Eastern Plume Long-Term Monitoring Program. These are active wells and the samples are collected as grab samples from the sample ports on the discharge lines at each of the extraction wells.

A summary of the Long-Term Monitoring Program for the Eastern Plume can be found in Table 3-2. The monitoring locations are presented on Figure 3-2.

Groundwater samples will be collected for TCL VOCs by EPA Method 8260B. Field parameters that will be measured at the time of sampling include pH, temperature, turbidity, and specific conductance, Eh, and dissolved oxygen.

3.1.2.2 Surface Water Sampling Program

A total of 5 surface water sampling locations (SW-10 through SW-14) are included in the Long-Term Monitoring Program. Sampling locations are shown on Figure 3-2. Surface water sampling locations will be analyzed for TCL VOCs by EPA Method 8260B. Field parameters will be monitored at the time of sampling, including pH, temperature, turbidity, and specific conductance. Optional field parameters, including Eh and dissolved oxygen, may also be recorded.

3.1.2.3 Stream Sediment Sampling Program

One stream sediment sampling location (SED-11) within the Eastern Plume on Mere Brook is included in the Long-Term Monitoring Program and identified on Figure 3-2. The sediment sample will be analyzed for TAL elements, including metals by inductively coupled plasma by

EPA Method 6010 and graphite furnace by EPA Method 7000 Series, organochlorine pesticides by EPA SW846 Method 8081, grain size by ASTM Method D422, and total organic carbon by Method CLP 9096.

3.1.2.4 Leachate Seep Sampling Program

A total of 2 leachate samples (SEEP-10 and SEEP-11) will be collected from within the Eastern Plume. Sampling locations are shown on Figure 3-2.

The leachate seep samples will be analyzed for TCL VOCs by EPA Method 8260B. Field parameters that will be monitored at the time of sampling leachate seep locations include pH, temperature, turbidity, and specific conductance. Optional field parameters, including Eh and dissolved oxygen, may also be recorded at seep locations.

3.1.2.5 Groundwater Extraction and Treatment System Sampling Program

A total of 2 groundwater treatment system plant samples will be collected, including 1 sample from the Eastern Plume influent and 1 sample of the effluent downstream of the treatment equipment (Table 3-2). Groundwater samples will be collected from the active extraction wells (Table 3-2) as presented in Section 3.1.2.1. Extraction wells EW-6 and EW-7 will be reactivated if water elevations within the landfill rise above the level of the waste, and would be reinstated into the Long-Term Monitoring Program if necessary. If extraction wells are returned to service, a sample will be collected from Sites 1 and 3 influent and analyzed for VOCs and TAL metals, and the groundwater extraction and treatment system effluent sample will be analyzed additionally for TAL metals. Monthly samples are collected from the groundwater extraction and treatment system influent and effluent under a separate program. These data are used to calculate VOC removal rates.

Treatment plant and extraction well samples will be analyzed for TCL VOCs by EPA Method 8260B. Field parameters that will be monitored at the time of sampling include pH, temperature, turbidity, and specific conductance, Eh, and dissolved oxygen.

3.1.2.6 Water Elevation Gauging Program

Water levels will be gauged prior to each long-term monitoring sampling event to assess shallow and deep groundwater flow directions. During each sampling event, water level measurements will be collected from 44 monitoring wells, 7 P-series piezometers, 4 extraction wells, and 19 EP-series piezometers (Table 3-2) and recorded, along with the observed well condition, on the field record of well gauging forms. Gauging will also be conducted at 6 surface water gauging points (GP-1A through GP-6) located along Merriconeag Stream and Mere Brook. Gauging locations are shown on Figure 3-3.

3.2 MONITORING FREQUENCY

Monitoring points at Sites 1 and 3 and Eastern Plume will be sampled bi-annually during April and September. These bi-annual sampling months were selected based on water elevation data which indicate these months represent historical high and low water conditions.

3.3 SAMPLING PROCEDURES

3.3.1 Groundwater Sampling Program

Groundwater samples will be collected at Sites 1 and 3 and Eastern Plume using dedicated, low-flow submersible or peristaltic pumps and aqueous diffusion sampling method. The low-flow sampling standard operating procedure and the aqueous diffusion sampling method standard operating procedure are provided in the Base-Wide Quality Assurance Project Plan (in progress). Well that are sampled with submersible pump will have the pump intakes positioned at the mid-point of the monitoring well. Note that during sampling, water level in a well will not be allowed to decline below the intake level of the sampling pump to prevent the well from being purged dry. The aqueous diffusion sampling standard operating procedure can also be found in Attachment 2 of the Base-Wide Quality Assurance Project Plan (in progress).

3.3.2 Surface Water and Stream Sediment Sampling Program

The procedure for collecting the surface water samples has been designed to permit collection of representative samples. Surface water samples will be collected first at each location without disturbing the stream bottom sediment to ensure that there will not be cross-contamination from suspended sediment. Downstream monitoring locations will be sampled first to ensure that cross-contamination from sampling-related suspended sediment does not occur. Stream sediment samples will be collected immediately following completion of the surface water sampling at each location. The surface water and stream sediment standard operating procedures are provided in Attachment 2 of the Base-Wide Quality Assurance Project Plan (in progress).

3.3.3 Leachate Seep and Seep Sediment Sampling Program

Seep samples will be collected first at each location, ensuring that there will not be cross-contamination from sampling-related suspended sediment. Seep sediment samples will be collected immediately following the collection of the leachate seep sampling at a particular location. Downstream monitoring locations will be sampled first to ensure that cross-contamination from sampling-related suspended sediment does not occur. The leachate seep and sediment sampling standard operating procedures are provided in Attachment 2 of the Base-Wide Quality Assurance Project Plan (in progress).

3.3.4 Groundwater Extraction and Treatment System Sampling Program

Samples will be collected from the groundwater extraction and treatment system and extraction wells using the sample port located at each sampling location. Sample bottles will be filled directly from the sample port following a preliminary purging to ensure stagnant liquid in the sample port tubing has been removed.

3.4 ENGINEERING INSPECTION

As part of the Long-Term Monitoring Program, detailed field inspections will be conducted at Sites 1 and 3 to identify evidence of landfill cover system degradation. The results and significant findings with proposed corrective actions resulting from the inspections will be summarized in the monitoring event and annual reports. The visual inspection at Sites 1 and 3 will identify whether the following conditions are present which may require repairs:

- Cap erosion
- Differential settlement resulting in soil cracking or ponded water
- Seeps
- Animal burrows
- Vegetative distress
- Presence of rooted species (trees and shrubs)
- Deteriorating equipment such as gas probes and monitoring wells.

Monitoring of landfill appurtenances will include:

- Inspecting the stormwater detention basin at Sites 1 and 3 for the presence of erosion or sloughing

- Inspecting the slope south of the landfill along Mere Brook for the presence of erosion or sloughing

- Identifying deteriorating equipment such as fencing and drainage structures (i.e., culverts and catch basins)

- Identifying settlement of parking lot or access roads.

Site observations will be made by an engineer or geologist familiar with the remedial design, corrective measures, and maintenance and repair activities at the site. Observations will be recorded in writing as quantitatively as practical, and supplemented with photographs if deemed appropriate by the inspector. If encountered, the length, width, depth, and location of erosion channels, depressions, or seeps will be recorded. If encountered, the location, size, and numbers of burrows will be noted. Vegetative stress will be described according to location, areal extent,

species, and nature of distress. The presence and location of rooted species, such as trees and shrubs, will be noted. Additionally, the condition of the security fence, posts, gates, locks, and signs will be observed and recorded.

Potential causes of any damage will be noted, and repair and preventative measures will be recommended. Observations will be summarized in tabular form and discussed in the monitoring event and annual reports.

The condition of groundwater monitoring wells and piezometers will be assessed at the time water level gauging is conducted. The condition of gas probes will be assessed during each bi-annual sampling event. Monitoring well, piezometer, and gas probe identification labels will be checked;covers and grouting inspected;and the general condition of the well, probe, and protective casing noted.

Engineering site inspections will be conducted two times per year (April and September). If visual inspections are conducted during snow-covered periods, the landfill will be inspected for obvious signs of settlement, sloughing, and erosion, in addition to inspection of fencing, drainage structures, and signage. If conditions detrimental to the landfill cover system, monitoring wells, piezometers, gas probes, and drainage structures are observed, an assessment of the existing conditions will be undertaken to identify appropriate corrective measures.

3.4.1 Landfill Gas Monitoring

The objective of landfill gas monitoring at the Sites 1 and 3 landfills is to monitor and identify subsurface gas migration. Measurements will be taken at the 3 gas probes (G-4 through G- 6) located along the north and west side of the Weapons Compound Area and at each of the 14 gas vents (GV-1 through GV-14) along the north and west side of the landfill. Measurements at each probe will include gas pressure (measured to the nearest 0.1 in. of water), percentage of methane, percentage of oxygen, and carbon dioxide. Barometric pressure measured at the NAS Brunswick meteorological station or by an onsite barometer will be recorded to the nearest 0.01 in. of mercury at the onset of each monitoring event. Gas observations will be summarized in tabular format. Gas probe and gas vent locations are shown on Figure 3-1.

Monitoring of the gas probes and gas vents will be conducted annually (September) at Sites 1 and 3 and the results will be included in the annual report.

3.5 PROGRAM MODIFICATIONS

Long-term monitoring was initiated in 1995, and will continue for up to 30 years at Sites 1 and 3 and until no longer necessary at the Eastern Plume. Periodic refinements to the Long-Term Monitoring Program will be conducted, subject to EPA five-year reviews. The first five-year review for Sites 1 and 3 and Eastern Plume was conducted in March 2000. If the results from long-term monitoring analytical results indicate that the monitoring program should be revised,

then such changes will be made after that evaluation is conducted and appropriate reviews are performed and approvals obtained. Recommendations as to a change in the monitoring program will be based on observed data trends.

3.5.1 Data Reduction and Analytical Data Quality Review

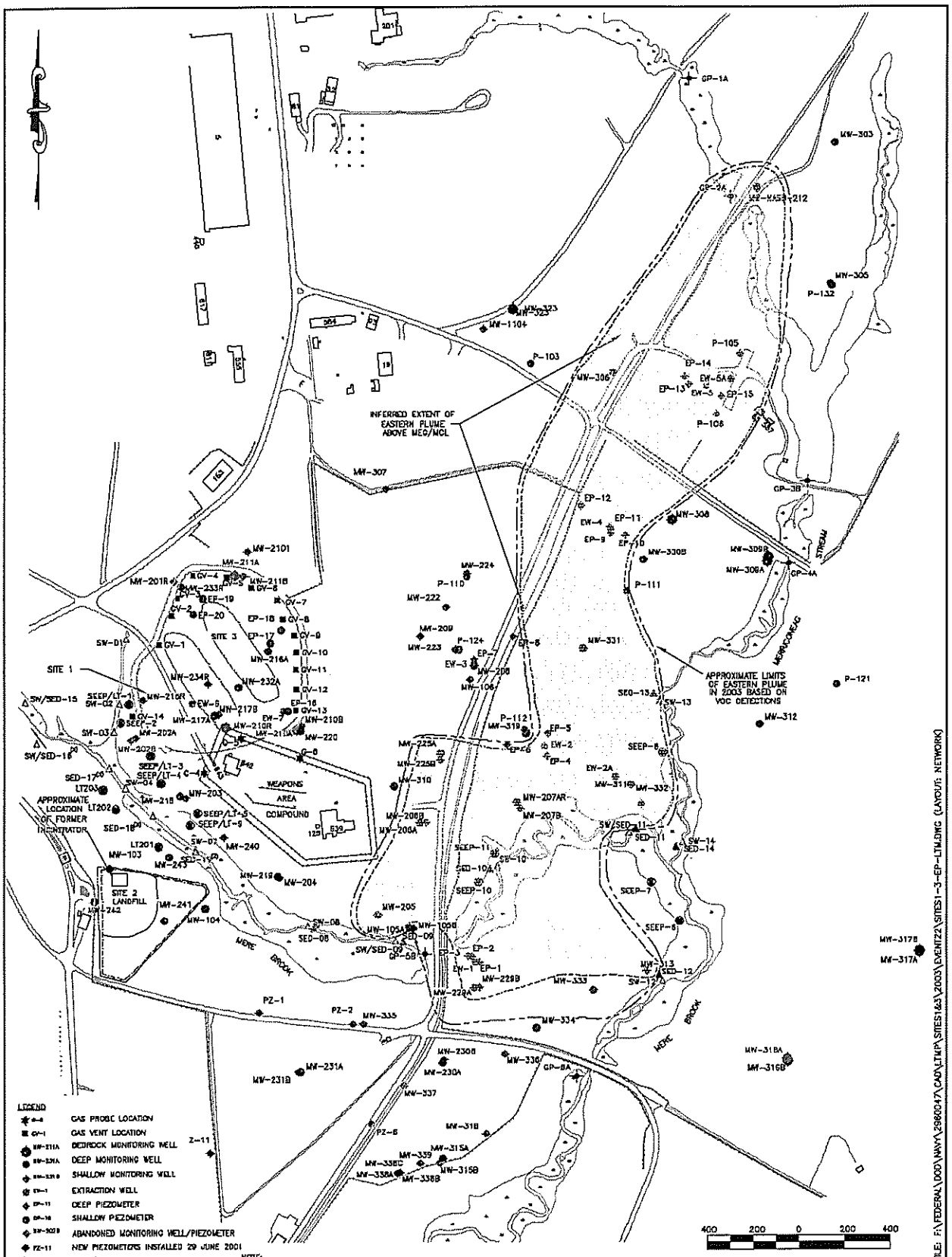
A review of laboratory data will be conducted, as specified in the Base-Wide Quality Assurance Project Plan (in progress). This review will include assessment of the precision, accuracy, representativeness, completeness, and comparability and analytical data quality objective requirements. The findings of the sample analytical data quality review will be included in the monitoring event report that will identify significant data discrepancies which may affect analytical data usability. Method detection limits will be included in monitoring event reports, as requested by EPA.

3.5.2 Laboratory Quality Assurance and Quality Control

As specified in the Base-Wide Quality Assurance Project Plan, appropriate laboratory quality assurance/quality control method blanks, trip blanks, rinsate blanks, and source water blanks will be collected and analyzed to provide the required level of quality control for the analytical data. The data will be evaluated and reported to the regulatory agencies. The data evaluation will consider the applicability of the data to the LTMP objectives and recommend which data are not of sufficient quality for use in quantitative interpretations (i.e., management decisions).

3.5.3 Corrective Measures

If problems or concerns are identified during field activities, visual inspections, and/or laboratory analysis or reporting, corrective measures will be identified and implemented by the Navy prior to the next scheduled sampling event. Should the problem repeat itself in a subsequent monitoring event, the Navy will recommend additional corrective action to the regulatory agencies, and the Navy may implement such action upon agreement with EPA and MEDEP. Conditions may exist which cannot be corrected (i.e., highly turbid water samples causing analytical equipment interference). In those instances, corrective measures may not be practicable.



LEGEND

- GAS PROBE LOCATION
- GAS VENT LOCATION
- BEDROCK MONITORING WELL
- DEEP MONITORING WELL
- SHALLOW MONITORING WELL
- EXTRACTION WELL
- DEEP PIEZOMETER
- SHALLOW PIEZOMETER
- ABANDONED MONITORING WELL/PIEZOMETER
- NEW PIEZOMETERS INSTALLED 29 JUNE 2001
- SEEP/SEEP SEDIMENT LOCATION
- SURFACE WATER/SEDIMENT LOCATION
- SURFACE WATER GAUGING POINT
- INFERRED AREA ABOVE STATE MEG/FEDERAL MCL CONCENTRATION
- FENCE
- APPROXIMATE LIMITS OF SLURRY WALL
- APPROXIMATE LIMITS OF SITES 1 AND 3
- APPROXIMATE LIMITS OF FORMER DISPOSAL TRENCHES
- APPROXIMATE BOUNDARY OF SITE 2 LANDFILL
- APPROXIMATE LIMITS OF EASTERN PLUME IN 2000
- INFERRED EXTENT OF EASTERN PLUME ABOVE MEG/MCL

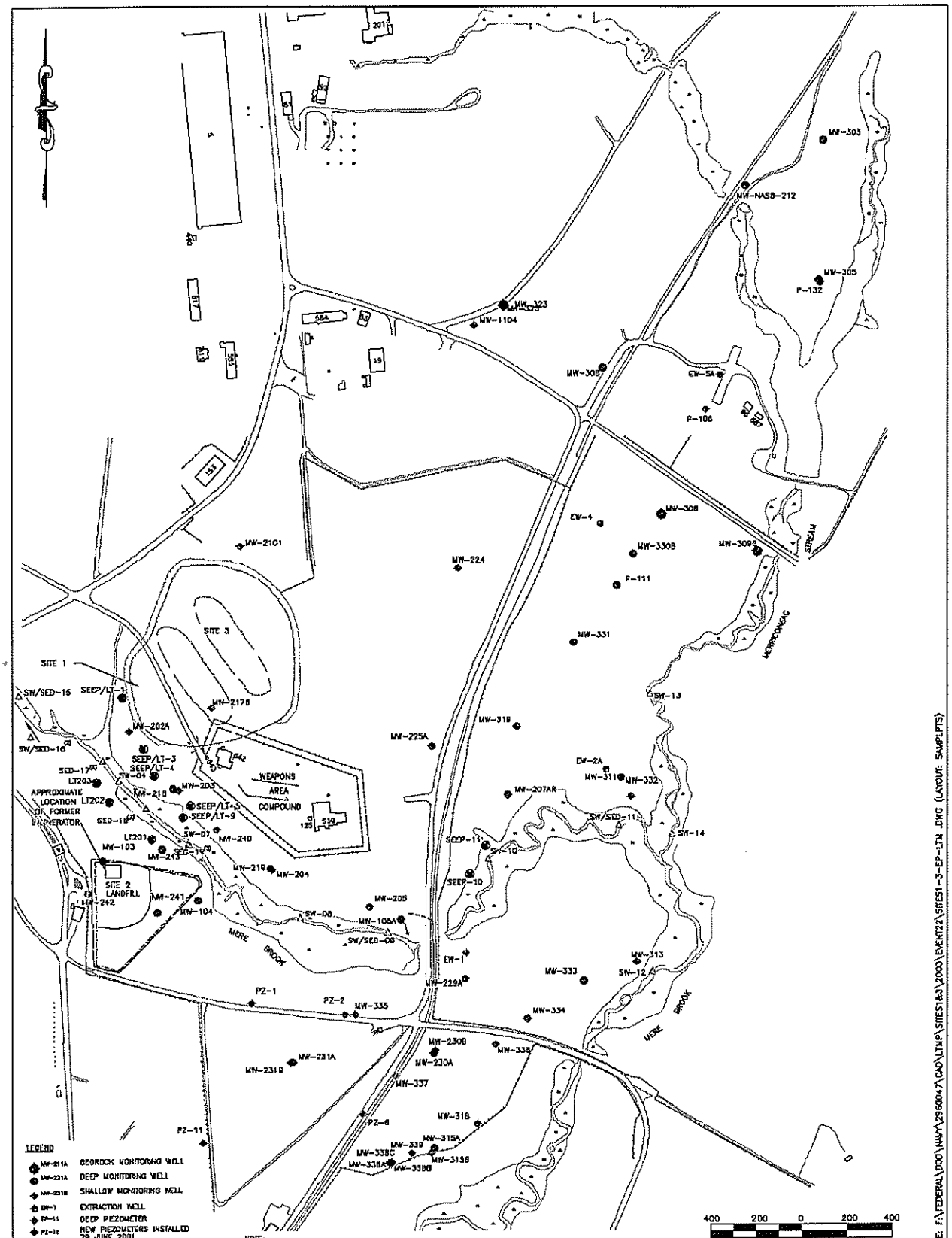
NOTE:

1. SITE PLAN TAKEN FROM THE INTERGRAPH VERSION 6 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995.
2. SW-18 LOCATED APPROXIMATELY 1,000 FT UPSTREAM OF SITES 1 AND 3.
3. INFERRED EXTENT OF EASTERN PLUME ABOVE MEG/MCL BASED ON MONITORING EVENT 22 DATA (MAY 2003).

FIGURE 3-1
LONG-TERM MONITORING NETWORK
SITES 1 AND 3 AND EASTERN PLUME
NAVAL AIR STATION, BRUNSWICK, MAINE

DATE 11 MARCH 2004	PROJECT NUMBER 29600147
DRAWN BY ACE	SCALE 1"=400'
CHECKED BY SAP	FILE NAME SITES1-3-EP-LTM.DWG
PROJECT MANAGER AE	DRAWING NUMBER -
	SHEET NUMBER -

FILE: F:\FEDERAL\DOD\NAVY\29600147\CAD\LTMP\SITES1&3\2003\EVENT22\SITES1-3-EP-LTM.DWG (LAYOUT: NETWORK)



NOTE:

1. SITE PLAN TAKEN FROM THE INTERGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995.
2. SW-16 LOCATED APPROXIMATELY 1,000 FT UPSTREAM OF SITES 1 AND 3.
3. INFERRED EXTENT OF EASTERN PLUME ABOVE MCG/MCL BASED ON MONITORING EVENT 20 DATA (APRIL 2002).

FIGURE 3-2
LONG-TERM MONITORING SAMPLING LOCATIONS
SITES 1 AND 3 AND EASTERN PLUME
NAVAL AIR STATION, BRUNSWICK, MAINE

DATE 11 MARCH 2004	PROJECT NUMBER 20600.47
DESIGNED BY ACE	SCALE 1"=400'
DRAWN BY SAP	FILE NAME SITES1-3-EP-LTM.DWG
CHECKED BY EMC	DRAWING NUMBER –
PROJECT MANAGER AC	SHEET NUMBER –

FILE: F:\FEDERAL\DOD\NAVY\29600047\CAD\LTMP\SITES1&3\2003\EVENT22\SITES1-3-EP-LTM.DWG (LAYOUT: SAMPLPTS)

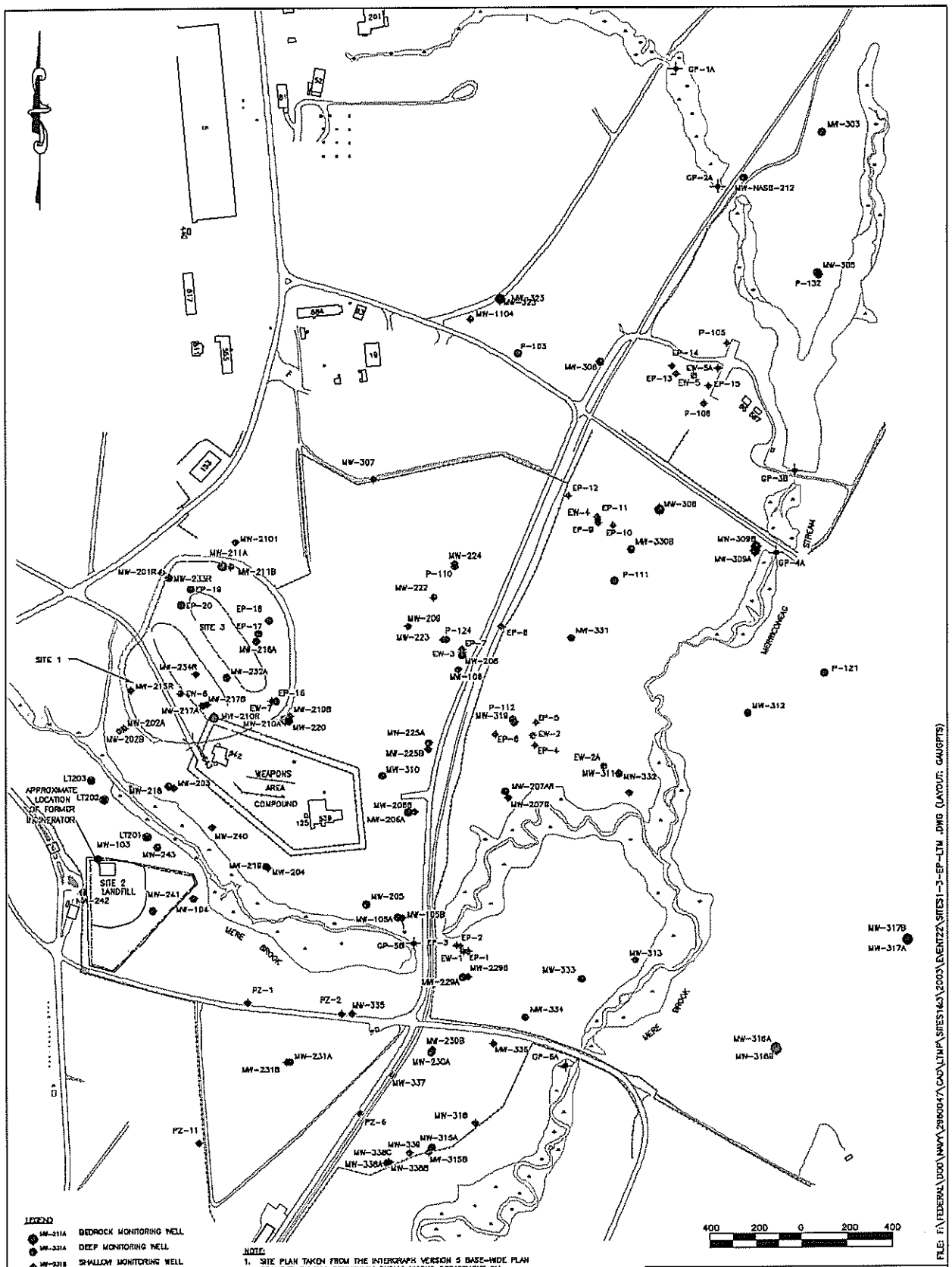

SITE 1
SITE 3
SITE 2 LANDFILL
WEAPONS AREA COMPOUND
APPROXIMATE LOCATION OF FORMER INCINERATOR
MERE BROOK
MERRIMANIC STREAM
GP-1A
GP-2A
GP-3B
GP-4A
GP-5B
GP-6A
MW-303
MW-NASB-212
MW-305
P-132
MW-323
MW-1104
P-103
MW-306
P-105
EP-14
EW-5A
EP-13
EW-5
EP-15
P-108
MW-307
EP-12
EW-4
EP-11
EP-9
EP-10
MW-308
MW-330B
MW-309B
MW-309A
P-111
MW-2101
MW-211A
MW-201R
MW-233R
MW-211B
EP-19
EP-20
EP-18
EP-17
MW-216A
MW-224
P-110
MW-222
MW-208
MW-223
P-124
EP-8
MW-331
EW-3
MW-206
MW-108
P-121
MW-234R
MW-232A
MW-215R
EW-6
MW-217B
EP-16
MW-217A
MW-210R
MW-210A
MW-210B
MW-220
MW-202A
MW-202B
P-112
MW-319
EP-5
EP-6
EW-2
EP-4
MW-312
MW-225A
MW-225B
MW-310
EW-2A
MW-311
MW-332
LT203
LT202
LT201
MW-218
MW-203
MW-207AR
MW-207B
MW-206B
MW-206A
MW-103
MW-243
MW-240
MW-219
MW-204
MW-241
MW-242
MW-104
MW-205
MW-105A
MW-105B
EP-2
EP-3
EW-1
EP-1
MW-229B
MW-229A
MW-313
MW-333
MW-317B
MW-317A
PZ-1
PZ-2
MW-335
MW-334
MW-316A
MW-316B
MW-230B
MW-230A
MW-231A
MW-231B
MW-337
PZ-6
PZ-11
MW-316
MW-315A
MW-336
MW-338C
MW-338A
MW-338B
MW-315B
400 200 0 200 400
LEGEND
BEDROCK MONITORING WELL
DEEP MONITORING WELL
SHALLOW MONITORING WELL
EXTRACTION WELL
DEEP PIEZOMETER
SHALLOW PIEZOMETER
SURFACE WATER GAUGING POINT
ABANDONED MONITORING WELL/PIEZOMETER
NEW PIEZOMETERS INSTALLED 29 JUNE 2001
APPROXIMATE LIMITS OF EASTERN PLUME IN 2003
INFERRED EXTENT OF EASTERN PLUME ABOVE MEG/MCL
FENCE
APPROXIMATE LIMITS OF SLURRY WALL
APPROXIMATE LIMITS OF SITES 1 AND 3
APPROXIMATE BOUNDARY OF SITE 2 LANDFILL
APPROXIMATE LIMITS OF FORMER DISPOSAL TRENCHES
NOTE:
1. SITE PLAN TAKEN FROM THE INTERGRAPH VERSION 5 BASE-WIDE PLAN PROVIDED BY NAS BRUNSWICK PUBLIC WORKS DEPARTMENT ON 13 OCTOBER 1995.
2. INFERRED EXTENT OF EASTERN PLUME ABOVE MEG/MCL BASED ON MONITORING EVENT 22 DATA (MAY 2003).
FIGURE 3-3
LONG-TERM MONITORING GAUGING LOCATIONS
SITES 1 AND 3 AND EASTERN PLUME
NAVAL AIR STATION, BRUNSWICK, MAINE
DATE 11 MARCH 2004
DESIGNED BY ACE
DRAWN BY BAP
CHECKED BY GMC
PROJECT MANAGER AE
PROJECT NUMBER 20800.47
SCALE 1"=400'
FILE NAME SITES1-3-EP-LTM.DWG
DRAWING NUMBER
SHEET NUMBER
FILE: F:\FEDERAL\DOD\NAVY\2860047\CAD\LTMP\SITES1&3\2003\EVENT22\SITES1-3-EP-LTM.DWG (LAYOUT: GAUGPTS)

TABLE 3-1 SUMMARY OF LONG-TERM MONITORING PROGRAM AT SITES 1 AND 3

Sample Type/Location	Monitoring Frequency	Slurry Wall	Sample Parameters				
			TCL VOC	TAL Elements	Field Parameters[a]	Gauged	
Shallow Monitoring Wells							
MW-201R	Bi-Annual	Outside	NR	NR	NR	X[c]	
MW-202A	Bi-Annual	Outside	X	X	X	X	
MW-203	Bi-Annual	Outside	X	X	X	X	
MW-204	Bi-Annual	Outside	X	X	X	X	
MW-210B	Bi-Annual	Outside	NR	NR	NR	X	
MW-211B	Bi-Annual	Inside	NR	NR	NR	X	
MW-215R	Bi-Annual	Inside	NR	NR	NR	X	
MW-217B	Bi-Annual	Inside	X[b]	X	X	X	
MW-234R	Bi-Annual	Inside	NR	NR	NR	X[c]	
MW-240	Bi-Annual	Outside	X	X	X	X	
MW-2101	Bi-Annual	Outside	X	X	X	X	
Deep Monitoring Wells							
MW-216A	Bi-Annual	Inside	NR	NR	NR	X	
MW-217A	Bi-Annual	Inside	NR	NR	NR	X	
MW-218	Bi-Annual	Outside	X	X	X	X	
MW-219	Bi-Annual	Outside	X	X	X	X	
MW-220	Bi-Annual	Outside	NR	NR	NR	X	
MW-232A	Bi-Annual	Inside	NR	NR	NR	X	
MW-233R	Bi-Annual	Inside	NR	NR	NR	X	
Bedrock Wells							
MW-210A	Bi-Annual	Outside	NR	NR	NR	X	
MW-210R	Bi-Annual	Inside	NR	NR	NR	X	
MW-211A	Bi-Annual	Inside	NR	NR	NR	X	
Extraction Wells							
EW-06	Bi-Annual	Inside	NR	NR	NR	X[c]	
EW-07	Bi-Annual	Inside	NR	NR	NR	X[c]	
Shallow EP-Series Piezometers							
EP-16	Bi-Annual	Inside	NR	NR	NR	X	
EP-17	Bi-Annual	Inside	NR	NR	NR	X[c]	
EP-18	Bi-Annual	Inside	NR	NR	NR	X[c]	
EP-19	Bi-Annual	Inside	NR	NR	NR	X[c]	
EP-20	Bi-Annual	Inside	NR	NR	NR	X[c]	

(a) Determination of field parameters in accordance with U.S. Environmental Protection Agency 600/4-79/020 using the following methods: pH (Method 150.1), temperature (Method 170.1), specific conductance (Method 120.1), turbidity (Method 180.1), dissolved oxygen (Method 360.1), and Eh. The field parameters also include the collection of the water level measurement.
(b) Groundwater sample collected by low-flow and diffusion sampler method.
(c) These monitoring locations must be gauged on a quarterly schedule during the months of January, April, July, and October.

NOTE: TCL = Target Compound List.
VOC = Volatile organic compound (EPA SW-846).
TAL = Target Analyte List.
NR = Not required.

Sample Type/Location	Monitoring Frequency	Sample Parameters			Monitoring Event 23	
		TCL VOC	TAL Elements	Field Parameters[a]	Gauged	Sampled
Leachate Station Seep						
SEEP-1	Bi-Annual	X	X	X	NR	X
SEEP-3	Bi-Annual	X	X	X	NR	X
SEEP-4	Bi-Annual	X	X	X	NR	X
SEEP-5	Bi-Annual	X	X	X	NR	X
SEEP-9	Bi-Annual	X	X	X	NR	X
Leachate Station Sediment						
LT-1	Bi-Annual	X	X	NR	NR	X
LT-3	Bi-Annual	X	X	NR	NR	X
LT-4	Bi-Annual	X	X	NR	NR	X
LT-5	Bi-Annual	X	X	NR	NR	X
LT-9	Bi-Annual	X	X	NR	NR	X
Surface Water						
SW-4	Bi-Annual	X	X	X	NR	X
SW-7	Bi-Annual	X	X	X	NR	X
SW-8	Bi-Annual	X	X	X	NR	X
SW-9	Bi-Annual	X	X	X	NR	X
SW-15	Bi-Annual	NR	X	X	NR	X
SW-16	Bi-Annual	NR	X	X	NR	X
Sediment						
SED-9	Annual	NR	X	NR	NR	X[c]
SED-15	Annual	NR	X	NR	NR	X[c]
SED-16	Annual	NR	X	NR	NR	X[c]
SED-17	Annual	NR	X	NR	NR	X[c]
SED-18	Annual	NR	X	NR	NR	X[c]
SED-19	Annual	NR	X	NR	NR	X[c]

(d) Samples were analyzed for pesticides by EPA Method 8081A, and grain size and total organic carbon by Lloyd Kahn.

TABLE 3-2 SUMMARY OF LONG-TERM MONITORING PROGRAM AT EASTERN PLUME

Sample Type/Location	Monitoring Frequency	Well Location	Sample Parameters		Bi-Annual Gauging
			TCL VOC	Field Parameters[a]	
Shallow Monitoring Wells					
MW-105 B	Bi-Annual	Perimeter	NR	NR	X
MW-106	Bi-Annual	NA	NR	NR	X
MW-206 B	Bi-Annual	NA	NR	NR	X
MW-207 B	Bi-Annual	NA	NR	NR	X
MW-209	Bi-Annual	NA	NR	NR	X
MW-222	Bi-Annual	NA	NR	NR	X
MW-223	Bi-Annual	NA	NR	NR	X
MW-224	Bi-Annual	Perimeter	X[b]	X	X
MW-225 B	Bi-Annual	NA	NR	NR	X
MW-229 B	Bi-Annual	NA	NR	NR	X
MW-231B	Bi-Annual	Sentinel	X[b]	X	X
MW-307	Bi-Annual	NA	NR	NR	X
MW-318	Bi-Annual	Sentinel	X[b]	X	X
MW-332	Bi-Annual	Interior Plume	X[b]	X	X
MW-1104	Bi-Annual	Perimeter	X[b]	X	X
Deep Monitoring Wells					
MW-105 A	Bi-Annual	Perimeter	X[b]	X	X
MW-205	Bi-Annual	Interior Plume	X[c]	X	X
MW-206 A	Bi-Annual	NA	NR	NR	X
MW-207 A	Bi-Annual	Interior Plume	NR	Destroyed	X
MW-207 AR	Bi-Annual	Interior Plume	X[b]	X	X
MW-208	Bi-Annual	NA	NR	NR	X
MW-225 A	Bi-Annual	Perimeter	X[b]	X	X
MW-229 A	Bi-Annual	Perimeter	X[b]	X	X
MW-230 A	Bi-Annual	Sentinel	X[b]	X	X
MW-231A	Bi-Annual	Sentinel	X[b]	X	X
MW-303	Bi-Annual	Sentinel	X[b]	X	X
MW-305	Bi-Annual	Sentinel	X[b]	X	X
MW-306	Bi-Annual	Perimeter	X[b]	X	X
MW-310	Bi-Annual	NA	NR	NR	
MW-311	Bi-Annual	Interior Plume	X[b]	X	X
MW-312	Bi-Annual	NA	NR	NR	X

(a) Determination of field parameters in accordance with U.S. Environmental Protection Agency 600/4-79/020 using the following methods: pH (Method 150.1), temperature (Method 170.1), specific conductance (Method 120.1), turbidity (Method 180.1), dissolved oxygen (Method 360.1), and Eh. The field parameters also include the collection of the water level measurement.
(b) The groundwater sample was collected utilizing the diffusion sampler method.
(c) The groundwater sample was collected utilizing the low-flow sampling method.

NOTE:
- TCL = Target Compound List.
- VOC = Volatile organic compound.
- NR = Sampling is not required as per the draft final Long-Term Monitoring Plan (EA 2000b).
- NA = Not applicable. Well is not sampled, therefore, location is not indicated.
- EPA = U.S. Environmental Protection Agency.
- Perimeter = Located at the edge of the plume to monitor concentrations of plume boundary.
- Sentinel = Outside area of known contamination to be used to warn of plume migration.
- Interior Plume = Within area of known contamination to monitor plume migration.

Sample Type/Location	Monitoring Frequency	Well Location	Sample Parameters		Bi-Annual Gauging
			TCL VOC	Field Parameters[a]	
Deep Monitoring Wells (continued)					
MW-313	Bi-Annual	Sentinel	X[b]	X	X
MW-315A	Bi-Annual	Sentinel	X[b]	X	X
MW-319	Bi-Annual	Interior Plume	X[b]	X	X
MW-330	Bi-Annual	Perimeter	X[b]	X	X
MW-331	Bi-Annual	Interior Plume	X[b]	X	X
MW-333	Bi-Annual	Sentinel	X[b]	X	X
MW-334	Bi-Annual	Sentinel	X[b]	X	X
MW-335	Bi-Annual	Perimeter	X[b] [d]	X	X
MW-336	Bi-Annual	Sentinel	X[b] [d]	X	X
MW-337	Bi-Annual	Sentinel	X[b] [d]	X	X
MW-338A	Bi-Annual	Sentinel	X[b] [d]	X	X
MW-338B	Bi-Annual	Sentinel	X[b] [d]	X	X
MW-338C	Bi-Annual	Sentinel	X[b] [d]	X	X
MW-339	Bi-Annual	Sentinel	X[b] [d]	X	X
MW-NASB-212	Bi-Annual	Perimeter	X[b]	X	X
Bedrock Monitoring Wells					
MW-308	Bi-Annual	Sentinel	X[b]	X	X
MW-309 A	Bi-Annual	NA	NR	NR	X
MW-309 B	Bi-Annual	Sentinel	X[b]	X	X
MW-316A	Bi-Annual	NA	NR	NR	X
MW-316B	Bi-Annual	NA	NR	NR	X
MW-317A	Bi-Annual	NA	NR	NR	X
MW-317B	Bi-Annual	NA	NR	NR	X
MW-323	Bi-Annual	NA	X[c]	X	X
Shallow P-Series Piezometers					
P-103	Bi-Annual	NA	NR	NR	X
P-111	Bi-Annual	Perimeter	X[c]	X	X
P-121	Bi-Annual	NA	NR	NR	X
P-132	Bi-Annual	Sentinel	X[b]	X	X
Deep P-Series Piezometers					
PZ-1	Bi-Annual	NA	NR	NR	X
PZ-2	Bi-Annual	NA	NR	NR	X
PZ-6	Bi-Annual	NA	NR	NR	X
PZ-11	Bi-Annual	NA	NR	NR	X
P-105	Bi-Annual	NA	NR	NR	X
P-106	Bi-Annual	Interior Plume	X[c]	X	X
Extraction Wells					
EW-01	Bi-Annual	Interior Plume	X	X	X
EW-02A	Bi-Annual	Interior Plume	X	X	X
EW-04	Bi-Annual	Interior Plume	X	X	X
EW-05A	Bi-Annual	Interior Plume	X	X	X
Deep EP-Series Piezometers					
EP-01	Bi-Annual	NA	NR	NR	X
EP-02	Bi-Annual	NA	NR	NR	X
EP-03	Bi-Annual	NA	NR	NR	X
EP-04	Bi-Annual	NA	NR	NR	X
EP-05	Bi-Annual	NA	NR	NR	X
EP-06	Bi-Annual	NA	NR	NR	X
EP-07	Bi-Annual	NA	NR	NR	X

Sample Type/Location	Monitoring Frequency	Well Location	Sample Parameters		Bi-Annual Gauging
			TCL VOC	Field Parameters[a]	
Deep EP-Series Piezometers (continued)					
EP-09	Bi-Annual	NA	NR	NR	X
EP-10	Bi-Annual	NA	NR	NR	X
EP-11	Bi-Annual	NA	NR	NR	X
EP-12	Bi-Annual	NA	NR	NR	X
EP-13	Bi-Annual	NA	NR	NR	X
EP-14	Bi-Annual	NA	NR	NR	X
EP-15	Bi-Annual	NA	NR	NR	X
PZ-1	Bi-Annual	NA	NR	NR	X
PZ-2	Bi-Annual	NA	NR	NR	X
PZ-6	Bi-Annual	NA	NR	NR	X
PZ-11	Bi-Annual	NA	NR	NR	X
Surface Water					
SW-10	Bi-Annual	NA	X	X	NR
SW-11	Bi-Annual	NA	X	X	NR
SW-12	Bi-Annual	NA	X	X	NR
SW-13	Bi-Annual	NA	X	X	NR
SW-14	Bi-Annual	NA	X	X	NR
GP-1A	Bi-Annual	NA	NR	NR	X
GP-2A	Bi-Annual	NA	NR	NR	X
GP-3B	Bi-Annual	NA	NR	NR	X
GP-4A	Bi-Annual	NA	NR	NR	X
GP-5B	Bi-Annual	NA	NR	NR	X
GP-6A	Bi-Annual	NA	NR	NR	
Seep					
SEEP-10	Bi-Annual		X	X	NR
SEEP-11	Bi-Annual		X	X	NR
Sediment					
SED-11	Bi-Annual		X(e)	NR	NR

(d) These wells are being sampled via low-flow and multiple aqueous diffusion samplers for two rounds, then they will be sampled via the aqueous diffusion sampling method only.
(e) Sediment samples to be analyzed for Target Analyte List elements, organochlorine pesticides by EPA Method 8081, total organic carbon, and grain size.

4. MAINTENANCE PLAN

4.1 SITES 1 AND 3 AND EASTERN PLUME MAINTENANCE ACTIVITIES

This maintenance plan describes the inspection and maintenance activities which will be completed as part of long-term monitoring at these sites. Items identified during the site inspection that require routine corrective maintenance will be repaired within 60 days of submitting the inspection report to the regulatory agencies provided weather or access do not restrict repair activities. If the scope of the repairs cannot reasonably be accomplished within the 60-day period, a schedule would be provided with the inspection report submittal to the regulatory agencies. A review period of 14 days will be provided for EPA and MEDEP to provide input prior to the initiation of corrective maintenance work. Major repair schedules will be identified as part of the assessment of significant potential effects to the remedial action. Reports of maintenance activities will be provided to the EPA and MEDEP within 30 working days after completing the activity.

4.1.1 Cover Maintenance

The vegetative cover will be mowed at least once per year to prevent the growth of deep rooted, woody species, and to encourage the development of good grass growth. Animal burrows into the cover system will be repaired as needed. The effort required to repair such holes will depend on the depth of the burrow. Burrows into the vegetative soil and/or drainage layer(s) will be filled and seeded with suitable materials. Burrows which penetrate the geomembrane and geosynthetic clay liner hydraulic barrier will require filling to the geosynthetic clay liner surface and patching the geosynthetic clay liner and geomembrane. The vegetative layer will then be reconstructed and the disturbed area revegetated. This method of repair protects the integrity of the hydraulic barrier layer and will not significantly impact the drainage layer due to the small size of animal burrows with respect to the overall size of the site. Mitigation of animal problems will be accomplished by trapping and relocating or extermination.

4.1.2 Erosion Control Maintenance

Erosion of the cover system, identified during site inspections, will be repaired as needed in a manner that provides a long-term solution to erosion. The activities required to repair erosive damage to the cover system will depend on the extent of erosion into the cover. At a minimum, the eroded area will be excavated to the vertical and lateral extent of the lowest affected cover layer. The landfill cap will then be repaired and reconstructed following excavation.

Erosion of the runoff control structures (drainage ditches), identified during site inspections, will be repaired as needed in a manner and schedule similar to that described above. The activities required to repair erosive damage to the ditches will also depend on the extent of damage. The final grades of repaired areas will conform to the grades and slopes of the surrounding areas and comply with the limits of design grades and slopes.

4.1.3 Settlement and Subsidence Control Maintenance

Should excessive settlement or damage to the cap occur as a result of settlement, repair of the cap will be implemented as necessary to confirm that the cover system layers remain continuous, that a positive slope is maintained, and that surface water ponding does not occur. Subsidence will typically occur gradually, therefore, a semiannual or annual inspection frequency will be sufficient to identify settlement problems.

The corrective action for ponding caused by subsidence of the drainage ditches and the cover system will be excavation of the soil above the geomembrane and geosynthetic clay liner, removal of a section of geomembrane and geosynthetic clay liner, and placement of additional soil material below the hydraulic barrier layer. This material will be brought to the slopes and grade of the hydraulic barrier layer in the surrounding area to provide uninterrupted positive drainage over the surface of the hydraulic barrier layer. Following restoration of the hydraulic barrier grade, the geosynthetic clay liner and geomembrane will be repaired and tested per the construction specification, and the overlying layers will be reconstructed.

4.1.4 Maintenance of Ground-Water Monitoring System

During the 30-year post-closure period, monitoring wells may require replacement due to excessive weathering (rusting) of the steel protective casing, settlement, or physical damage. If needed, a new steel protective casing or entire well will be installed to the same depth and in a location as close as possible to the old well. The old well will be abandoned in-place by filling the polyvinyl chloride casing with cement-bentonite grout.

Annual routine maintenance of monitoring wells will include inspection and maintenance of identification markings on each well; and inspection and replacement as necessary of caps, locks, seals, and surface concrete pad. Erroneous water elevations or unusual turbidity readings are likely indicators of the need for further investigation of a well.

If a ground-water extraction or sampling pump becomes inoperable, the pump will be removed from the well and inspected for damage. If possible, the pump will be repaired and be reinstalled. If it is determined that the pump cannot be repaired, a new pump will be installed in the well.

4.1.5 Maintenance of Gas Monitoring System

The gas monitoring system will require annual maintenance consisting of inspection and replacement of the gas probe steel protective covers, inspecting the lock and replacing it as necessary, and inspecting the vent and probe identification labels and repairing them as necessary. Should a monitoring probe require replacement during the 30-year, post-closure period, a new probe will be installed in proximity to the old one. The old gas probe will be abandoned in-place by filling the polyvinyl chloride casing with cement-bentonite grout.

REFERENCES

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NASB Site		Pesticide 8081A	Maleic Hydrazide EPA 632	VOC 8260B	VOC 8260B (PDB)	VOC 8260B (MeOH)	VOC 8260B (sodium Bisulfate)	SVOC 8270C	TAL Metal 6010/ 7000 (unfiltered)	TAL Metal 6010/7000 (filtered)	TAL Metal 6010/ 7000 (solid)	TOC	TO-14	CN	Grain size
BLDG 95 (solid)		6	2												
Site 09				20	33	2	2	8	7						
Site 02, Site 1&3, Eastern Plume, GW Plant		14		101	56	15	15		53	5	29	14			14
1-Sample Event		20	2	121	89	17	17	8	60	5	29	14			14
Bi-annual Sample Event		40	4	242	178	34	34	16	120	10	58	28	0	0	28
O&M Sampling (annual total presented)				24					20				16	20	
Totals		**40**	**4**	**266**	**178**	**34**	**34**	**16**	**140**	**10**	**58**	**28**	**16**	**20**	**28**

Analytical	Total Number	Unit Cost	Extended Cost
Pesticide 8081A	40	$80.0	$3,200.0
Maleic Hydrazide EPA 632	4	$140.0	$560.0
VOC 8260B (MW and PDB)	444	$70.0	$31,080.0
VOC 5036/8260B (MeOH/NaHSO4))	34	$70.0	$2,380.0
SVOC 8270C	16	$155.0	$2,480.0
TAL Metal 6010/ 7000 (unfiltered)/unfiltered	150	$105.0	$15,750.0
TAL Metal 6010/ 7000 (solid)	58	$105.0	$6,090.0
TO-14	20	ATL	$0.0
cyanide	20	$20.0	$400.0
TOC	28	$25.0	$700.0
Grainsize	28	$50.0	$1,400.0
Couirer	78	$35.0	$2,730.0
ROM Total			***$66,770.0***

Assumptions:

Excludes Air Sampling

Excludes MNA sampling requirements and Mn(II)
Excludes any new MWs at EP (ca. 8?)
Based upon the LTMP Sampling Plan June 2003.
Excludes 1,4 Dioxane
Syringes VOC (s) provided by lab (Encores $8)

If a monitoring well is being considered for deletion from the sampling program for volatile organic compounds, ground-water samples from that well will be analyzed using Method 8260B modified for SIM for two sampling rounds, in order to achieve the detection limit of 0.15μg/L (State MEG for vinyl chloride). This method willnot be used at a well where vinyl chloride is known to be above 2 μg/L, as established using EPA Method 8260B.

5.6 FIELD QUALITY ASSURANCE/QUALITY CONTROL

Appropriate laboratory QA/QC trip blanks, equipment rinsate blanks, source water blanks, and duplicate samples will be collected and analyzed to provide the required level of QC for the analytical data.

Trip blanks will be sent with each shipment of volatile organic compound samples to assess the potential for introduction of contaminants during sample transport. Equipment rinsate blanks will be collected by running de-ionized water across a decontaminated sample apparatus and into appropriate sample containers to determine if cross-contamination is taking place. One equipment rinsate blank will be collected per site per matrix.

Duplicate samples will be collected at a frequency of 2 out of every 20 samples collected to determine precision information on homogeneity.

TABLE 5-1 ANALYTICAL METHODS FOR GROUND WATER AND SEDIMENT

Parameter	Method	Reference Method
SAMPLE PREPARATION		
Water		
Metals Digestion	Acid Digestion -HNO_3/HCl	3010A
Metals Digestion	Acid Digestion - HNO_3/H_2O_2	3020A
Volatile Organics Preparation	Purge and trap	5030B
Semivolatile Organics Extraction	Continuous Extraction	3520A
Sediment		
Volatile Organics Preparation	Purge and trap	5035
ORGANICS		
Volatile Organics	GC/MS - Capillary Column Technique	8260B
Vinyl Chloride	GC/MS - Capillary Column Technique	8260B modified for SIM
Semivolatile Organics Extraction	GC/MS - Capillary Column Technique	8270C
Pentachlorophenol	GC/ECD	8151A
METALS		
Aluminum	Atomic Emission - ICP	6010B
Antimony	Atomic Emission - ICP-Trace	6010B
Arsenic	Atomic Emission - ICP-Trace	6010B
Barium	Atomic Emission - ICP	6010B
Beryllium	Atomic Emission - ICP	6010B
Cadmium	Atomic Emission - ICP	6010B
Calcium	Atomic Emission - ICP	6010B
Chromium	Atomic Emission - ICP	6010B
Cobalt	Atomic Emission - ICP	6010B
Copper	Atomic Emission - ICP	6010B
Iron	Atomic Emission - ICP	6010B
Lead	Atomic Emission - ICP-Trace	6010B
Magnesium	Atomic Emission - ICP	6010B
Manganese	Atomic Emission - ICP	6010B
Mercury	Cold Vapor - AA	7470A
Nickel	Atomic Emission - ICP-Trace	6010B
Potassium	Atomic Emission - ICP	6010B
Selenium	Atomic Emission - ICP-Trace	6010B
Silver	Atomic Emission - ICP	6010B
Sodium	Atomic Emission - ICP	6010B
Thallium	Graphite Furnace - AA	7841
Vanadium	Atomic Emission - ICP	6010B
Zinc	Atomic Emission - ICP	6010B

Reference: U.S. Environmental Protection Agency. 1997. Test Methods for Evaluating Solid Waste. Physical/Chemical Methods. EPA SW-846, 3rd edition including UPDATE III. U.S. EPA, Washington, D.C. June.

TABLE 5-1 ANALYTICAL METHODS FOR GROUND WATER, SURFACE WATER, SEEP, SEDIMENT, AND SEEP SEDIMENT

Parameter	Method	Reference Method
SAMPLE PREPARATION		
Metals Digestion	Acid Digestion – HNO_3/HCL	3010A
Metals Digestion	Acid Digestion – HNO_3/H_2O_2	3020A
Semivolatile Organics Extraction	Continuous Extraction	3520C
Pesticides Extration	Continuous Liquid–Liquid Extraction	3520C
Volatile Organics Preparation	Purge and Trap	5030B
ORGANICS		
Pesticides	GC/ECD	8081A
Semivolatile Organics	GC – Capillary Column Technique	8270C
Volatile Organics	GC/MS – Capillary Column Technique	8260B
METALS		
Aluminum	Atomic Emission – ICP	6010B
Antimony	Atomic Emission – ICP-Trace	6010B
Arsenic	Atomic Emission – ICP-Trace	6010B
Barium	Atomic Emission – ICP	6010B
Beryllium	Atomic Emission – ICP	6010B
Cadmium	Atomic Emission – ICP	6010B
Calcium	Atomic Emission – ICP	6010B
Chromium	Atomic Emission – ICP	6010B
Cobalt	Atomic Emission – ICP	6010B
Copper	Atomic Emission – ICP	6010B
Iron	Atomic Emission – ICP	6010B
Lead	Atomic Emission – ICP-Trace	6010B
Magnesium	Atomic Emission – ICP	6010B
Manganese	Atomic Emission – ICP	6010B
Mercury	Cold Vapor – AA	7470A/7471A
Nickel	Atomic Emission – ICP-Trace	6010B
Potassium	Atomic Emission – ICP	6010B
Selenium	Atomic Emission – ICP-Trace	6010B
Silver	Atomic Emission – ICP	6010B
Sodium	Atomic Emission – ICP	6010B
Thallium	Graphite Furnace – AA	7841
Vanadium	Atomic Emission – ICP	6010B
Zinc	Atomic Emission – ICP	6010B
GENERAL CHEMISTRY		
Total Organic Carbon	Carbon Analyzer	CLP 9060
Grain Size	Sieve Analysis	ASTM D422

Reference: U.S. Environmental Protection Agency. 1997. Test Methods for Evaluating Solid Waste. Physical/Chemical Methods. EPA SW-846, 3rd edition. including UPDATE III. U.S. EPA, Washington, D.C. June.

6. DATA COLLECTION, REDUCTION, AND REPORTING

6.1 LABORATORY DATA COLLECTION

For inorganic and general organic analyses where the instruments are not directly coupled to computerized data systems, the raw data are instrument responses in the form of meter, recorder, or printer output. The technician performing the analysis enters the bench-generated data into a bound laboratory workbook specific for each parameter. All entries are made inink. These data consist of instrumental responses (absorbencies, percent transmittances, etc.), standard and spike concentrations, sample numbers, and any other pertinent information. The workbooks are under the control of the group supervisor/manager who is responsible for their security. For computerized instruments, the output is in the form of printer output and files on magnetic disks, which are filed by sample delivery group.

For chromatographic organic analyses, the raw data are instrument responses inthe form of chromatograms, integrator output, or computer-generated data files. The chromatograms and printer output are stored in project-specific files. The data files are archived onmagnetic tape.

6.2 DATA REDUCTION

Data reduction includes all processes that change either the values or numbers of data items. The data reduction processes used in the laboratory include establishment of calibration curves, calculation of sample concentrations from instrument responses, and computation of QC parameters.

All field instruments are direct-reading instruments; that is, the data do not need to be reduced. No manual temperature compensation for pH or conductivity is necessary, neither is it necessary to calculate a cell constant for conductivity.

6.2.1 Calibration

Calibration of an analytical instrument involves the delineation of the relationship between a response of the instrument and the amount or concentration of an analyte introduced into the instrument. The graphical depiction of this relationship is often referred to as the calibration curve. The curve is prepared by measuring the responses of a series of solutions of the analyte (calibration standards) with known concentrations. In order to perform quantitative measurements, this relationship must be established prior to the analysis of any samples, and thus, is termed initial calibration.

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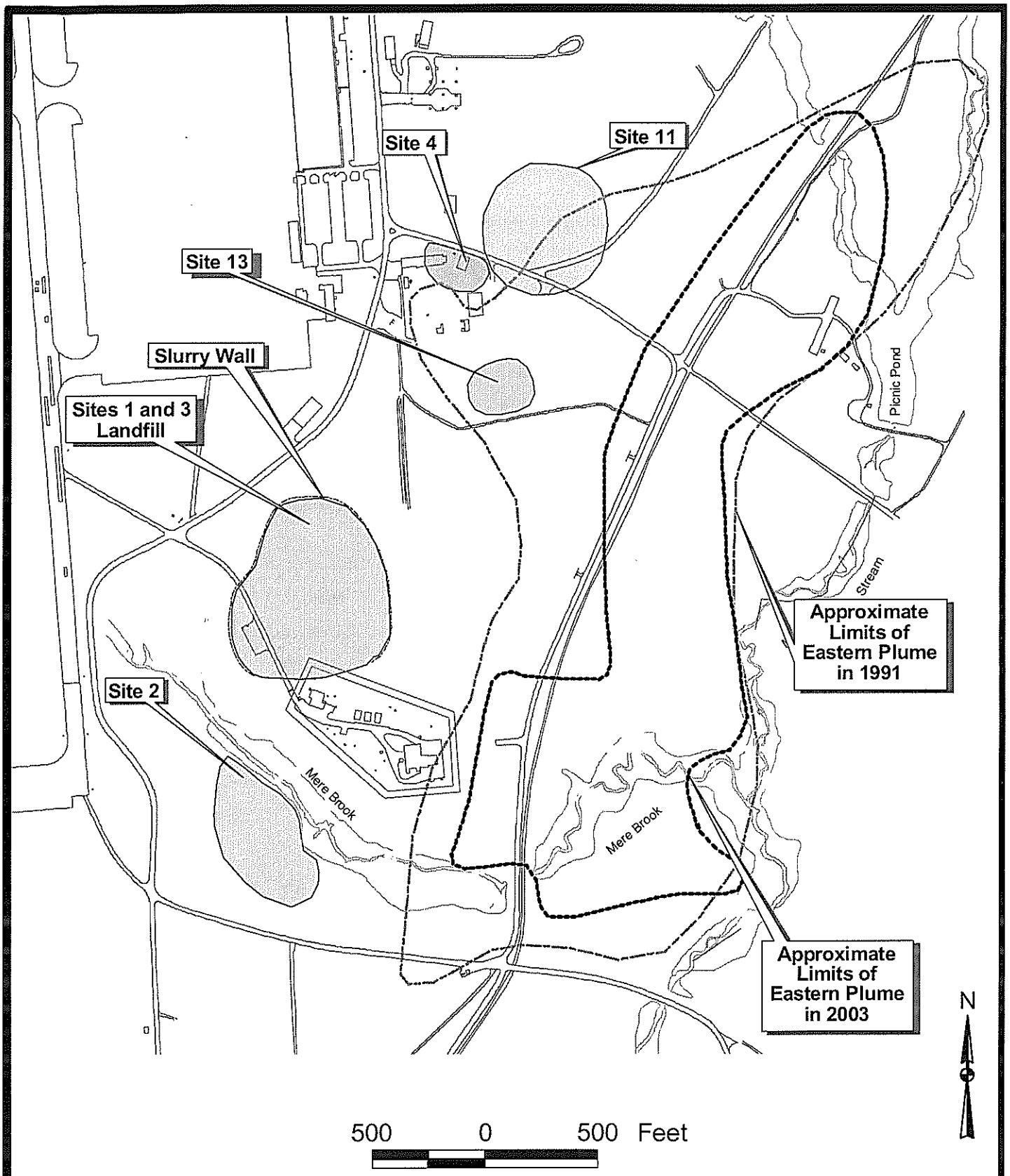
The choice of a calibration model for the analytical system depends upon the analytical technique. Table 4-2 gives the formulas for the calibration models discussed in this section. The simplest model, generally used for chromatographic methods, uses calibration factors or response factors



EA®	NAVAL AIR STATION BRUNSWICK, MAINE				FIGURE I-2 SITE PLAN FOR SITES I AND 3 AND EASTERN PLUME		
PROJECT MGR	DESIGNED BY	DRAWN BY	CHECKED BY	SCALE	DATE	PROJECT No	FILE No
ACE	DC	DC	ACE	AS SHOWN	12 MARCH 2004	29600.47	I:\NASB_GIS \NAVY.APR

TABLE 1-1 SUMMARY OF CHEMICALS OF CONCERN FOR SITES 1 AND 3 AND EASTERN PLUME

Media	Volatile Organic Compounds [a]	Semivolatile Organic Compounds	Pesticides	Inorganic Target Analytes
SITES 1 AND 3				
Groundwater	Chlorobenzene 1,1-Dichloroethane 1,2-Dichloroethene (total) 1,4 Dichlorobenzene Ethylbenzene Methylene chloride Toluene Total Xylenes Vinyl chloride	None	None	Aluminum Arsenic Barium Chromium Lead Manganese Nickel Sodium
Surface Water	None	None	None	Lead Manganese Zinc
Sediment	1,1,2,2-Tetrachloroethane	Bis(2-ethylhexyl)phthalate Polycyclic aromatic hydrocarbons	None	Arsenic Cadmium Chromium Copper Lead Manganese Mercury Nickel Vanadium Zinc
Leachate Seep Sediment	1,4-Dichlorobenzene 1,1-Dichloroethane 1,2-Dichloroethene Ethylbenzene 1,1,2,2-Tetrachloroethane Total Xylenes Trichloroethene Vinyl chloride	None	4,4'-Dichlorodiphenyl-trichloroethane	Antimony Arsenic Beryllium Cadmium Chromium Cyanide Lead Manganese Mercury Nickel Vanadium Zinc
EASTERN PLUME				
Groundwater	1,1-Dichloroethene 1,1-Dichloroethane *cis*-1,2-Dichloroethene[b] *trans*-1,2-tichloroethene[b] Tetrachloroethene 1,1,1-Trichloroethane Trichloroethene	None	None	None

a) It is noted that the total volatile organic compounds calculated in the monitoring event reports is the sum of all detected volatile organic compounds with exception of methylene chloride, acetone, and 2-butanone.
b) The *cis* and *trans* isomers for 1,2-dichloroethene are reported depending on the contract laboratory used for the sample analysis. Typically, the 1,2,-dichloroethene is reported as total.

TABLE 1-2 SUMMARY OF CHANGES TO THE LONG-TERM MONITORING PROGRAM AT SITES 1 AND 3

Sample Type/Location	Monitoring Frequency	Slurry Wall	Sample Parameters: TCL VOC	Sample Parameters: TAL Elements	Sample Parameters: Field Parameters[a]	Gauging
Shallow Monitoring Wells						
MW-201R [b]	Bi-Annual	Outside	NR	NR	NR	X
MW-202A	Bi-Annual	Outside	X	X	X	X
MW-202B	Bi-Annual	Outside	NR	NR	NR	X
MW-203	Bi-Annual	Outside	X	X	X	X
MW-204	Bi-Annual	Outside	X	X	X	X
MW-210B	Bi-Annual	Outside	NR	NR	NR	X
MW-211B	Bi-Annual	Inside	NR	NR	NR	X
MW-215R	Bi-Annual	Inside	NR	NR	NR	X
MW-217B	Bi-Annual	Inside	X	X	X	X
MW-234R[b]	Bi-Annual	Inside	NR	NR	NR	X
MW-240	Bi-Annual	Outside	X	X	X	X
MW-2101	Bi-Annual	Outside	X	X	X	X
Deep Monitoring Wells						
MW-216A	Bi-Annual	Inside	NR	NR	NR	X
MW-217A	Bi-Annual	Inside	NR	NR	NR	X
MW-218	Bi-Annual	Outside	X	X	X	X
MW-219	Bi-Annual	Outside	X	X	X	X
MW-220	Bi-Annual	Outside	NR	NR	NR	X
MW-232A	Bi-Annual	Inside	NR	NR	NR	X
MW-233R	Bi-Annual	Inside	NR	NR	NR	X

a) Determination of field parameters in accordance with U.S. Environmental Protection Agency 600/4-79/020 using the following methods: pH (Method 150.1) temperature (Method 170.1) specific conductance (Method 120.1) and turbidity (Method 180.1) Optional field parameters, including dissolved oxygen (Method 360.1) and Eh, are also recorded. The field parameters also include the collection of the water level measurement.

b) In addition to the bi-annual well gauging task in April and September of every year, quarterly gauging will be conducted at the following wells and piezometer locations: EP-17, EP-18, EP-19, EP-20, EW-06, EW-07, MW-201R, and MW-234R during the months of January, April, July, and October each year. After the groundwater elevation data are collected by the field team, the Field Team Leader, or Site Manager, will review the newly collected data with the historical groundwater elevations collected at these wells ensure that there are no discrepancies and to allow for field confirmation of any anomalous data. The quarterly groundwater elevation data must be transmitted to the MEDEP, EPA, and Brunswick Area Citizens for a Safe Environment within 10 business days of collection. The quarterly gauging data will also be presented in the monitoring event report.

NOTE: TCL = Target Compound List.
VOC = Volatile organic compound (EPA SW-846)
TAL = Target Analyte List.
NR = Not required.