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RECORD OF DECISION

OPERABLE UNIT 3 – SMALL LANDFILL

NAVAL AIR STATION SOUTH WEYMOUTH
WEYMOUTH, MASSACHUSETTS

JANUARY 2002

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PART 1: DECLARATION FOR THE RECORD OF DECISION

1.0 SITE NAME AND LOCATION

Naval Air Station (NAS) South Weymouth
1134 Main Street
Weymouth, Massachusetts 02190
MA2170022022
Operable Unit 3 – Small Landfill

2.0 STATEMENT OF BASIS AND PURPOSE

This decision document presents the No Action with Groundwater Monitoring decision for Operable Unit (OU) 3, the Small Landfill at NAS South Weymouth, in Weymouth, Massachusetts, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), 42 USC § 9601 et seq., as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300 et seq., as amended. The regulatory program performed under the context of these combined laws and regulations is commonly referred to as "Superfund."

This decision is based on the Administrative Record, which has been developed in accordance with Section 113 (k) of CERCLA, and which is available for review at the Navy's northeastern office, Environmental Field Activity Northeast (EFANE), in Lester Pennsylvania. Public information repositories are also kept at the Tufts Library in Weymouth, Massachusetts; the Abington Public Library in Abington, Massachusetts; the Hingham Public Library in Hingham, Massachusetts; the Rockland Memorial Library in Rockland, Massachusetts; and the Department of the Navy Caretaker Site Office (CSO) in Weymouth, Massachusetts. The Administrative Record Index (Appendix D) identifies each of the items comprising the Administrative Record upon which the selection of this decision is based.

This decision has been selected by the U.S. Environmental Protection Agency (EPA) and the Navy. The Massachusetts Department of Environmental Protection (MADEP) has deferred its decision on concurrence at this time.

3.0 DESCRIPTION OF THE SELECTED DECISION

This Record of Decision (ROD) sets forth the No Action with Groundwater Monitoring decision for the Small Landfill at NAS South Weymouth. The site will be closed pursuant to applicable Massachusetts state law.

There are no principal or low-level threats at the Small Landfill. No action is necessary at the Small Landfill to protect human health and the environment. However, low levels of thallium were reported near the analytical detection limit in a single groundwater sample. Therefore, one year of groundwater monitoring will be performed to evaluate the potential existence and seasonal variability of thallium in groundwater. The one year of groundwater monitoring will include four consecutive quarterly rounds of sampling of the six existing monitoring wells for chemical analysis.

In the event that thallium is detected during the one year of groundwater monitoring, the Navy will discuss those results with EPA and MADEP, and then develop a plan of action, which may include, but not be limited to, additional groundwater monitoring, to further evaluate those results.

The Small Landfill, OU 3, is one of several operable units currently on record at NAS South Weymouth. The Small Landfill has been addressed independently from the rest of NAS South Weymouth so that the Navy can proceed with closure of this site as soon as it has met the requirements of the Superfund process. Because No Action with Groundwater Monitoring is proposed for the Small Landfill, the decision for this site can be completed within one year. The proposed No Action with Groundwater Monitoring for the Small Landfill is not

expected to have any impact on the strategy or progress for the rest of the sites at NAS South Weymouth.

Additional details on the strategy and schedule for the remediation for NAS South Weymouth are in the Site Management Plan (November 2001).

4.0 STATUTORY DETERMINATIONS

No cleanup action is necessary at the Small Landfill under CERCLA to ensure protection of human health and the environment. One year of groundwater monitoring will be performed to evaluate the potential existence and seasonal variability of inorganic chemicals in groundwater.

5.0 AUTHORIZING SIGNATURES

This ROD documents that No Action with Groundwater Monitoring is necessary to ensure protection of human health and the environment for the Small Landfill, Operable Unit 3 at NAS South Weymouth. This decision was selected by the Navy and EPA. The MADEP has deferred its decision on concurrence until results from the additional groundwater monitoring program have been submitted and evaluated. Future correspondence will be added to the administrative record after the ROD has been signed.

Concur and recommended for immediate implementation:

Department of the Navy

By: _____ Date: 2/27/02
BRAC Environmental Coordinator
Caretaker Site Office
NAS South Weymouth
U.S. Navy

By: _____ Date: 2/25/02
Director, Environmental Restoration Division
Engineering Field Activity Northeast
Naval Facilities Engineering Command
U.S. Navy

U.S. Environmental Protection Agency, Region I

By: _____ Date: 3/8/02
Director, Office of Site Remediation and Restoration
Region I – New England
U.S. EPA

PART 2: THE DECISION SUMMARY

1.0 SITE NAME, LOCATION AND DESCRIPTION

NAS South Weymouth was placed on the National Priorities List (NPL) in May 1994 by EPA pursuant to CERCLA. NAS South Weymouth property is owned by the U.S. Government, and was operated by the Navy. It is located primarily in the town of Weymouth, Massachusetts (Figure 1). Portions of NAS South Weymouth extend into the adjacent towns of Abington and Rockland, Massachusetts. NAS South Weymouth was developed during the 1940s for dirigible aircraft used to patrol the North Atlantic during World War II. The facility was closed at the end of the war and was reopened in 1953 as a Naval Air Station for aviation training. NAS South Weymouth was in continuous use since that time until it was operationally closed on September 30, 1996, and administratively closed on September 30, 1997. The U.S. Department of the Navy is the lead agency, and EPA is the support agency, for CERCLA activities at NAS South Weymouth. The U.S. Department of Defense (DOD) is the sole source of cleanup funding for the property. There are several operable units within NAS South Weymouth NPL site (MA2170022022) that the Navy is addressing under CERCLA. This ROD relates to the Small Landfill, Operable Unit 3.

The Small Landfill is located in the northeastern portion of NAS South Weymouth (Figure 2). The Small Landfill is generally an open area located in a dry wooded portion of the NAS South Weymouth property. The surface of the site is relatively uneven, with some exposed debris. There are patches of trees, shrubs, and other vegetation among the exposed materials. The landfill is approximately 0.8 acres in size, and, at its deepest, is approximately 9 feet deep. The approximate volume of fill within the landfill is estimated to be 12,000 cubic yards.

A more complete description of the Small Landfill can be found in Section 3 of the Remedial Investigation (RI) Phase II Report (Tetra Tech, 2000).

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

Site History

The Small Landfill was used for five years during the 1980s for disposing debris, primarily concrete rubble and tree stumps. Materials found at the site during environmental investigations included aluminum, steel, rubber tubing, metal pipes and rods, bottles and cans, electrical wires, concrete, boulders, asphalt, railroad ties, plastic pipes and materials, and wood debris. There are no records of hazardous wastes, regulated under Subtitle C of the Resource Conservation and Recovery Act (RCRA), being disposed of at the Small Landfill.

History of Investigations

Previous investigations and the enforcement activities at the Small Landfill are summarized below:

- Installation Restoration (IR) Program, 1983. In response to the growing awareness of the potential effects of hazardous materials on human health and the environment, the DOD developed the IR Program to investigate and cleanup potential problem areas created by past events at federal facilities. The IR Program was the catalyst for environmental investigations at NAS South Weymouth.

- Preliminary Assessment (PA), Argonne National Laboratory, 1988. The PA included a records search, interviews, and a site walkover. The purpose of the PA was to identify and evaluate past waste practices at NAS South Weymouth and make an assessment of the associated potential for environmental contamination. As a result of the PA, five sites, including the Small Landfill, were recommended for further study.

- Site Inspection (SI), Baker Environmental, Inc., 1991. The SI included site walkovers, geophysical surveys, installation of groundwater monitoring wells, and the collection of soil, sediment, surface water, and groundwater samples at eight sites at NAS South Weymouth property. The purpose of the SI was for "screening" purposes to assess the potential for contaminant migration, provide data for Hazard Ranking

System (HRS) scoring, and to provide the information necessary to develop a comprehensive work plan for further study. The SI recommended that six of the eight sites, including the Small Landfill, be considered for further study.

- Phase I RI Study, Brown & Root Environmental, 1998. The Phase I RI included a literature search, geophysical survey, soil-vapor survey, immunoassay testing, ecological assessment, test pit excavation, monitoring well, well point and piezometer installation, hydraulic conductivity testing, groundwater gauging and water level measurements, stream gauging, and surface soil, subsurface soil, groundwater, sediment, surface water, and leachate sampling. This information was used to refine the Conceptual Site Model (CSM) and identify areas warranting further study. The Phase I RI report concluded that additional investigation was necessary at the Small Landfill.

- Phase II RI, Tetra Tech, 2000. The Phase II RI was conducted to address and fill data gaps from the Phase I RI and previous investigations to further verify the lack of hazardous substances and associated potential risks. The Phase II RI included further ecological assessment, groundwater gauging and water level measurements, and surface soil sampling. The completed RI study (Phase I and II) showed that, in general, chemicals detected in environmental media were very close to their analytical detection limits, or within the range of background conditions. Risk assessments showed that cleanup of environmental media was not warranted at the Small Landfill to protect human health or the environment.

A more detailed description of the site history can be found in Sections 1.0 and 2.0 of the RI Phase II Report.

History of CERCLA Enforcement Activities

In May 1994, NAS South Weymouth was listed on EPA's NPL, indicating that the NAS South Weymouth property was a priority for environmental investigation and cleanup. Environmental studies and activities at NAS South Weymouth have been conducted by the Navy in accordance with CERCLA and the NCP. Based on the designation of NAS South Weymouth property as an NPL site, a Federal Facility Agreement (FFA) was executed by the Navy and EPA. The FFA became effective in April 2000. This agreement establishes the Navy as the lead agency for the investigation and cleanup of designated sites within NAS South Weymouth property, with EPA providing oversight. The MADEP is not party to the FFA. In accordance with CERCLA and the NCP, MADEP has participated in ongoing discussions and strategy sessions, as well as to provide oversight and guidance through their review of IR Program documents. A Site Management Plan (SMP) with task schedules and deliverables is updated annually each June, and is published each October. The SMP, which serves as a management tool for planning, reviewing, and setting priorities for environmental investigative and remedial response activities to be conducted at NAS South Weymouth, was completed in 1999, and is updated annually. The SMP is available for review at the Navy's EFANE office in Lester, Pennsylvania; at the Tufts Library in Weymouth, Massachusetts; at the Abington Public Library in Abington, Massachusetts; at the Hingham Public Library in Hingham, Massachusetts; at the Rockland Memorial Library in Rockland, Massachusetts; and at the Department of the Navy, Caretaker Site Office, Weymouth, Massachusetts.

3.0 COMMUNITY PARTICIPATION

Throughout the site's history, community involvement has been ongoing. The Navy has kept the community and other interested parties apprised of site activities through informational meetings, fact sheets, press releases, public meetings, and regular contact with local officials. Also, the Navy meets on a regular basis to discuss the status and progress of the IR Program with the Restoration Advisory Board (RAB), which includes representatives from the neighboring community. Representatives from the Navy, EPA Region I, MADEP, and local government have attended all public meetings and hearings. Below is a brief chronology of public outreach efforts.

- In September 1995, the Navy initiated a series of public meetings, at which the RAB process was explained and community members were asked to join the RAB. A sufficient number of volunteers were assembled and RAB meetings began in March 1996. Since that time, RAB meetings have been held on a monthly basis to keep the RAB and local community informed of IR activities. These meetings have provided updates of IR activities throughout the process.

- The Navy published a notice and brief analysis of the Proposed Plan in the Patriot Ledger on April 20, 2001; in the Weymouth News on April 25, 2001; in the Hingham Journal on April 26, 2001; and in the Abington/Rockland Mariner on April 27, 2001. In addition, the Navy made the plan available to the public at the Tufts Library in Weymouth, Massachusetts; at the Abington Public Library in Abington, Massachusetts; at the Hingham Public Library in Hingham, Massachusetts; at the Rockland Memorial Library in Rockland, Massachusetts; and at the Department of the Navy, Caretaker Site Office, South Weymouth, Massachusetts.

- From April 28, 2001 to June 7, 2001, the Navy offered the Proposed Plan for public comment, in accordance with the requirements of the NCP and the SMP developed for the NAS South Weymouth Superfund program. Comments received during the public comment period are included as Appendix E1.

- On May 10, 2001, the Navy held an informational meeting to present the Navy's Proposed Plan to a broader community audience than, that which had already been involved, at the site. At this meeting, representatives from the Navy answered questions from the public. In addition, the Navy held a public hearing to discuss the Proposed Plan and to accept oral comments.

- A transcript of comments received at the public hearing is included as Appendix E2.

- The Navy has provided responses to both written and verbal comments received at the public hearing and during the comment period in the Responsiveness Summary, which is included in Part 3 of this ROD.

In addition, the Navy is providing an index of the administrative record available for public review at the Navy's EFANE office in Lester, Pennsylvania. Information repositories have also been established at several locations. Currently, information is available at the Tufts Library in Weymouth, Massachusetts, at the Abington Public Library in Abington, Massachusetts, at the Hingham Public Library in Hingham, Massachusetts, at the Rockland Memorial Library in Rockland, Massachusetts, and at the U.S. Department of the Navy, Caretaker Site Office, Weymouth, Massachusetts. This Administrative Record Index is included as Appendix D to this ROD.

4.0 SCOPE AND ROLE OF OPERABLE UNIT OR RESPONSE ACTION

OU 3 is one of several operable units at NAS South Weymouth (refer to Table 1). Each operable unit at NAS South Weymouth progresses through the CERCLA cleanup process independent of each other.

The ROD for the Small Landfill is one component of the Superfund program at NAS South Weymouth. It has proceeded on an independent track to enable the Navy to expedite site closure and property transfer. For the selected decision described in this ROD (No Action with Groundwater Monitoring), it is anticipated that the monitoring activities required by the ROD can be completed within 1 to 2 years after the ROD signatures are obtained. The proposed No Action with Groundwater Monitoring for the Small Landfill is not expected to have an impact on the strategy or progress for the rest of the sites at NAS South Weymouth. The site will be closed pursuant to applicable Massachusetts state law. Additional details on the strategy and schedule for the remediation of NAS South Weymouth are available in the SMP (November 2001).

Table 1
Summary of Operable Units

Site	IR Program Site Designation	Operable Unit Designation	Site Abbreviation	Site Description	Regulatory Status (as of June 2001)
West Gate Landfill	1	1	WGL	Disposal area used for a variety of C&D debris, municipal, and other waste materials.	PA, SI, Phase I RI completed. Phase II RI report being finalized. FS document being finalized.
Rubble Disposal Area (Upland)	2	2	RDA	Disposal area used for primarily building demolition debris.	PA, SI, RI completed. FS document being finalized.
Small Landfill	3	3	SL	Disposal area used primarily for concrete, metal, and wood.	PA, SI, RI completed. No FS necessary. PRAP issued recommending No Action with Groundwater Monitoring.
Fire Fighting Training Area	4	4	FFTA	Area designated for dispensing fuels for igniting and extinguishing fires.	PA, SI, Phase I RI completed. Phase II RI report being finalized.
Tile Leach Field	5	5	TLF	Sand bed used to receive and distribute treated industrial wastewater.	PA, SI, Phase I RI completed. Phase II RI report being finalized.
Fuel Farm	6	NA (MCP)	NA (MCP)	Tank farm and fuel dispensing area.	Site transferred into the MCP program based on exhibiting only fuel-related issues.
Sewage Treatment Plant	7	7	STP	Wastewater treatment plant used primarily for domestic wastewater.	PA, SI, Phase I RI completed. Phase II RI report being finalized.
Abandoned Bladder Tank Fuel Storage Area	8	8	ABTFS	Area in which temporary above-ground tanks were used for quick aircraft refueling.	PA, SI, Phase I RI completed. Phase II RI report being finalized.
Rubble Disposal Area (Wetland)	2	9	RDA	Steep sloping area adjacent to RDA.	Combined with OU 2. No separate actions being performed.

Notes:
NA (MCP) = Site transferred to the state Massachusetts Contingency Plan (MCP) program.
IR = Installation Restoration (U.S. Department of Defense [DoD] Superfund compliance program)
C&D = Construction and demolition debris
OU = Operable Unit
PA = Preliminary Assessment
SI = Site Inspection
RI = Remedial Investigation (Phase I and II)
FS = Feasibility Study
PRAP = Proposed Remedial Action Plan

5.0 SITE CHARACTERISTICS

The Small Landfill is located at the eastern edge of NAS South Weymouth property, north of the approach end of the east-west runway, Runway 8-26 (Figure 1). The Small Landfill was used for five years during the 1980s for the disposal of primarily concrete rubble and tree stumps. Materials observed within the landfill include aluminum, steel, rubber tubing, metal pipes and rods, bottles and cans, electrical wires, concrete, boulders, asphalt, railway ties, plastic pipes and materials, and wood debris. A geophysical survey, performed in 1990, did not detect the presence of tanks, transformers, or other large metallic objects. In addition, there are no records of hazardous wastes being disposed of in the Small Landfill, therefore, fill within the landfill is considered to be non-hazardous.

The area of the Small Landfill, designated by the approximate extent of fill, is approximately 0.80 acres (35,000 square feet). Based on historic records and field data, the approximate depth of the Small Landfill is 9 feet. This depth varies, but is generally evenly distributed within the Small Landfill boundary. Based on these measurements, the approximate volume of fill within the Small Landfill is 12,000 cubic yards.

Topographically, the Small Landfill is mildly undulating, but not sloping. The vegetative cover of the Small Landfill is both grassy and forested with some exposed debris.

The Small Landfill is generally an upland, open area, in a terrestrial portion of NAS South Weymouth (refer to Figure 3). It is bounded to the north by forested land, to the west by upland forest and eventually forested floodplain, and to the south and east by gravel roads and trails. No wetland or water bodies are located adjacent to the site. The closest water body is Old Swamp River, which is located approximately 700 feet west of the Small Landfill.

Potential contaminants associated with the fill material within the Small Landfill include volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), nutrients, metals, and cyanide. All of these potential contaminants were included in the parameter lists for the soil and groundwater samples collected during the 1996 Phase I RI and/or 1999 Phase II RI sampling programs. In general, soil samples were collected to assess surface, shallow subsurface, and deeper subsurface soil conditions. Test pit excavations and soil boring drilling with soil sampling were performed to characterize the soil. In addition, monitoring wells were installed to assess groundwater conditions beneath the site. Refer to Figure 3 for sample locations. For the most part, chemicals detected at the Small Landfill were very close to detection limits reported by the laboratories. Chemicals that were reported at concentrations above the detection limits were generally consistent with background conditions.

The results of the risk assessment are presented below in Section 7.0, Summary of Potential Site Risks.

6.0 CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

The Small Landfill has not been used since the 1980s. The surface of the Small Landfill is both grassy and forested with some exposed debris. The Small Landfill is generally an upland, open area, in a terrestrial portion of NAS South Weymouth. It is bounded to the north by forested land, to the west by upland forest and eventually forested floodplain, and to the south and east by gravel roads and trails.

Land reuse plans are currently being discussed as of this writing (2002). Current discussions reveal that land reuse plans in the vicinity of the Small Landfill do not include residential or commercial development. The most likely reuse possibilities include open space or construction of a nearby access roadway. In the general vicinity of the Small Landfill (eastern portion of the NAS South Weymouth property), potential reuse possibilities include the potential use of a nearby aquifer as a potential drinking water source. The aquifer near the Small Landfill is classified as a Potentially Productive Aquifer (PPA), containing portions of both high and medium yields. This area is also considered a Potential Drinking Water Source Area (PDWSA) because the Aquifer Protection Zoning By-Law established for NAS South Weymouth property has delineated this aquifer as a Water Resources Protection District (WRPD) based on its potential size and potential usefulness as a drinking water source. A WRPD is an area designated by a municipality specifically for the protection of groundwater quality, and it is considered a potential drinking water source area.

7.0 SUMMARY OF POTENTIAL SITE RISKS

A baseline risk assessment was performed to estimate the probability and magnitude of potential adverse human health and environmental effects from exposure to contaminants associated with the site if no remedial actions were taken. It provides the basis for taking action and identifies the contaminants and exposure pathways that need to be addressed by the remedial action, if necessary. The human health risk assessment followed a four-step process: 1) hazard identification, which identified those hazardous substances that, given the specifics of the site, were of significant concern; 2) exposure assessment, which identified actual or potential exposure pathways, characterized the potentially exposed populations and determined the extent of possible exposure; 3) toxicity assessment, which considered the types and magnitude of adverse health effects associated with exposure to hazardous substances; and 4) risk characterization and uncertainty analysis, which integrated the three earlier steps to summarize the potential risks posed by hazardous substances at the site, including potential carcinogenic and non-carcinogenic risks and a discussion of the uncertainty in the risk estimates. A summary of those aspects of the human health risk assessment, followed by a summary of the environmental risk assessment is discussed below.

Ten of the sixty-two chemicals detected at the site were selected for evaluation in the human health risk assessment as chemicals of potential concern. The chemicals of potential concern were selected to represent potential site hazards based on toxicity, concentration, frequency of detection, and mobility and persistence in the environment and can be found in Tables 6-1 and 6-2 in the Phase II RI report (Tetra Tech, 2000). From this, a subset of the chemicals were identified as the chemicals of concern and summarized in Table 2. This Table contains the exposure point concentrations used to evaluate the reasonable maximum exposure (RME) scenario in the baseline risk assessment for the chemicals of concern. Estimates of average or central tendency case (CTC) exposure concentrations for the chemicals of concern can be found in Tables 6-17 through Table 6-33 in the Phase II RI report (Tetra Tech, 2000).

Table 2
Summary of Chemicals of Concern Used in Human Health Risk Assessment

Exposure Point	Chemical of Concern	Maximum Concentration Detected	Units	Frequency of Detection	Exposure Point Concentration	Units	Statistical Measure
Surface Soil	Arsenic	5	ppm	7/8	3.84	ppm	95% UCL
	Benzo(a)anthracene	1.25	ppm	8/8	0.92	ppm	95% UCL
	Benzo(a)pyrene	0.94	ppm	8/8	0.91	ppm	95% UCL
	Benzo(b)fluoranthene	1.75	ppm	8/8	1.34	ppm	95% UCL
	Dibenz(a,h)anthracene	0.24	ppm	2/8	0.24	ppm	Max
	Manganese	359	ppm	8/8	257	ppm	95% UCL
Subsurface Soil	Aluminum	10,700	ppm	8/8	8,280	ppm	95% UCL
	Arsenic	2.40	ppm	5/8	1.77	ppm	95% UCL
	Benzo(a)pyrene	0.32	ppm	2/8	0.23	ppm	95% UCL
	Manganese	254	ppm	8/8	221	ppm	95% UCL
Groundwater	Heptachlor Epoxide	0.01	ppb	2/8	0.01	ppb	Max
	Thallium	4.80	ppb	1/8	4.80	ppb	Max
	Zinc	3560	ppb	2/8	3,560	ppb	Max

Notes:
ppm – parts per million (mg/kg)
ppb – parts per billion (µg/L)
95% UCL – 95% Upper Confidence Limit
Max – Maximum Concentration

Potential human health effects associated with exposure to the chemicals of concern were estimated quantitatively or qualitatively through the development of several hypothetical exposure pathways. These pathways were developed to reflect the potential for exposure to the chemicals of concern based on present uses, potential future uses, and location of the site. The risk evaluation for both current site use (on-site worker, trespassing child, and utility/construction worker), and hypothetical future site use (on-site resident and recreational child) assumed that potential human receptors would be exposed to chemicals of concern at the Small Landfill via incidental ingestion, dermal contact, or inhalation of fugitive dusts from soil. It also assumed that the hypothetical future resident would be exposed to groundwater via ingestion.

Average daily doses of chemicals of concern were estimated using conservative assumptions relative to the rates of potential contact with soil or groundwater, the frequency and duration of contact, and other parameters. Exposure assumptions are presented in Tables 6-10 through 6-15 in the Phase II RI report (Tetra Tech, 2000).

Excess lifetime cancer risks were determined for each receptor by multiplying a daily dose with the chemical-specific cancer potency factor. Cancer potency factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. The resulting risk estimates are expressed in scientific notation as a probability (e.g., 1×10^{-6} for 1/1,000,000, which indicates that an average individual is not likely to have greater that a one in a million chance of developing cancer over 70 years as a result of site-related exposure to the compound at the stated concentration). All risks estimated represent an "excess lifetime cancer risk", or the additional cancer risk above the background level from other causes. EPA's generally acceptable risk range for site-related exposure is $1x10^{-4}$ to $1x10^{-6}$. EPA protocol at the time of risk characterization considered carcinogenic risks to be additive when assessing exposure to a variety of substances. A summary of the potential carcinogenic toxicity data

relevant to the chemicals of concern is presented in Table 3. This table provides the carcinogenic risk information that is relevant to the contaminants of concern in both soil and groundwater. At the time of risk characterization, there were no slope factors available for the dermal route of exposure. Therefore, in accordance with EPA guidance, the oral slope factors for these chemicals were used to evaluate dermal exposure. Different absorption adjustment factors were used for the oral and dermal exposure routes.

Table 3
Potential Carcinogenic Toxicity Data Summary from Human Health Risk Assessment

Chemical of Concern	Oral Cancer Slope Factor (mg/kg)/day	Reference (Last Verified)	Inhalation Cancer Slope Factor (mg/kg)/day	Reference (Last Verified)	Weight of Evidence/ Cancer Guideline Description
Aluminum	NA	NA	NA	NA	NA
Arsenic	1.50E+00	IRIS (4/00)	1.50E+01	IRIS (12/99)	A
Benzo(a)anthracene	7.30E-01	(a)	3.10E-01	(a)	B2
Benzo(a) pyrene	7.30E+00	IRIS (4/00)	3.10E+00	RBC (10/99)	B2
Benzo(b)fluoranthene	7.30E-01	(a)	3.10E-01	(a)	B2
Dibenz(a,h)anthracene	7.30E+00	(a)	3.10E+00	(a)	B2
Manganese	NA	NA	NA	NA	D
Heptachlor Epoxide	9.10E+00	IRIS (4/00)	9.10E+00	IRIS (4/00)	B2
Thallium	ND	NA	ND	NA	ND
Zinc	ND	NA	ND	NA	D

Notes:
HEAST: Health Effects Assessment Summary Tables, published annually by the EPA (1997)
IRIS: Integrated Risk Information System, an online computer database of toxicological information (EPA, 2000)
NA: Not available
ND: Not determined
RBC: Region III Risk based concentration table
(a): CSF for Benzo(a)pyrene multiplied by appropriate Toxicity Equivalence Factor
A: Human carcinogen
B2: Probable human carcinogen – Indicates sufficient evidence in animals or no evidence in humans
D: Not classifiable as a human carcinogen

In assessing the potential for adverse effects other than cancer, a hazard quotient (HQ) is calculated by dividing the daily dose by the reference dose (RfD) or other suitable benchmark. RfDs have been developed by EPA and represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. RfDs are derived from epidemiological or animal studies and incorporate uncertainty factors to help ensure that adverse health effects will not occur. An HQ less than or equal to 1 indicates that a receptor's dose of a single contaminant is less than the RfD, and that adverse non-carcinogenic effects from that chemical are unlikely. The HQs for each chemical of potential concern, for which the receptor is potentially exposed to via a specific pathway, are summed to yield the Hazard Index (HI) for that pathway. A total HI is then calculated for each receptor by summing the pathway-specific HIs. A HI less than or equal to 1 indicates that adverse non-carcinogenic effects are unlikely. A summary of the potential non-carcinogenic toxicity data relevant to the chemicals of concern is presented in Table 4. This table provides the non-carcinogenic risk information that is relevant to contaminants of concern in both soil and groundwater. Similar to the carcinogenic risk data, the dermal dose-response values applied during risk characterization were the same as the oral dose-response values for these chemicals.

The results of the risk assessment showed that potential carcinogenic risks under the current and future scenarios were within or below the acceptable risk benchmarks at the Small Landfill. However, potential risks under the future scenario were slightly above acceptable non-carcinogenic risk benchmarks for the residential receptor. This initial calculated exceedence was later attributed to non site-related factors (refer to the discussion that follows). Table 5 depicts the human health risk summary for the chemicals of concern in soil and groundwater evaluated to reflect current and potential future site use corresponding to the RME scenario. Refer to Section 6.0 of the Phase II RI report (Tetra Tech, 2000) for a more comprehensive risk summary.

The HI exceedance associated with the resident receptor is due to thallium and zinc in groundwater. Thallium and zinc contribute HQs of 5.5 and 1.7, respectively, in the RME scenario; and 1.6 and 0.14, respectively, in

the CTC scenario. Based on EPA Region I guidance, the exposure point concentrations (EPCs) in groundwater were the maximum detected concentrations for the RME scenario, and the arithmetic mean concentrations for the CTC scenario. Therefore, the presence of one sample containing a high concentration of a chemical could result in high EPCs for the RME scenario that are not reflective of site conditions.

The maximum zinc concentration of 3,560 µg/L was collected from one offsite well point (CWP-4), which is constructed of galvanized steel. In addition, this well point is located approximately 800 feet west-southwest of the landfill boundary (refer to Figure 4). Therefore it is likely that the high concentration of zinc in the sample is due to the zinc galvanized steel well-point construction and was inappropriately retained during the risk assessment. The maximum thallium concentration of 4.8 µg/L was detected in one monitoring well location (MW-25), which is located beyond the landfill boundary to the northwest, whereas all the other wells were non-detect for thallium. Therefore, the RME risk is driven by one relatively low hit of thallium. If the non-detects in the other wells were accounted for, the HQ from thallium would be considerably lower. Thallium was not detected in any of the subsurface soil samples collected from the Small Landfill. EPA issued a nationally distributed notice in April 2001 acknowledging the common reporting of thallium as a "false positive" based on laboratory interference. Therefore, the sole thallium detection in groundwater is likely attributed to laboratory interference and analytical variability at concentrations in the vicinity of detection limits (3 ug/L), rather than attributed to a site-related contribution. Verifying the lack of thallium in groundwater is a key objective of the one-year of monitoring included in this decision.

In addition to the human health risk assessment described above, an ecological risk assessment was also performed. The ecological risk assessment evaluated potential risks to ecological receptors that may occur in the presence of chemical stressors in environmental media. The ecological risk assessment was completed in three steps (1) problem formulation, (2) risk analysis, and (3) risk characterization. The chemicals of potential concern used in the ecological risk assessment are presented in Table 6.

Table 4
Potential Non-Carcinogenic Toxicity Data Summary from Human Health Risk Assessment

Chemical of Concern	Oral Dose-Response Value (mg/kg-day)	Target Organ/ Critical Effect at LOAEL	EPA Confidence Level	Reference (Last Verified)
Pathway: Ingestion and Dermal Contact				
Aluminum	1.00E+00	Neurotoxicity of off-spring	Low	NCEA (6/20/94)
Arsenic	3.00E-04	Hyperpigmentation, keratosis & possible vascular complications	Medium	IRIS (4/00)
Benzo(a)anthracene	3.00E-02	Kidney effects	Low	IRIS (4/00)(a)
Benzo(a) pyrene	3.00E-02	Kidney effects	Low	IRIS (4/00)(a)
Benzo(b)fluoranthene	3.00E-02	Kidney effects	Low	IRIS (4/00)(a)
Dibenz(a,h)anthracene	3.00E-02	Kidney effects	Low	IRIS (4/00)(a)
Manganese	1.40E-01	CNS effects	Medium	IRIS (4/00)
Heptachlor Epoxide	1.30E-05	Increased liver to body weight ratios	Low	IRIS (4/00)
Thallium	8.00E-05	No adverse effects	Low	IRIS (4/00)
Zinc	3.00E-01	Decrease in ESOD in females	Medium	IRIS (4/00)
Pathway: Inhalation				
Aluminum	1.00E-03	Neurotoxicity	NA	NCEA (7/30/93)
Arsenic	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA
Benzo(a) pyrene	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA
Manganese	1.43E-05	Increased respiratory symptoms and psychomotor disturbances	Medium	IRIS (4/00)
Heptachlor Epoxide	ND	NA	NA	NA
Thallium	ND	NA	NA	NA
Zinc	ND	NA	NA	NA

Notes:
CNS: Central nervous system
ESOD: Erythrocyte superoxide dismutase
IRIS: Integrated Risk Information System, an online computer database of toxicological information (EPA, 2000)
LOAEL: Lowest observed adverse effects level
NA: Not available
NCEA: National Center for Environmental Assessment
ND: Not determined
(a): Dose response value for pyrene, the most toxic non-carcinogenic polynuclear aromatic hydrocarbons (PAHs), is used to evaluate non-carcinogenic effects of PAHs

Table 5 Summary of Human Health Risk Assessment			
Scenario Evaluated	**Media**	**Total Carcinogenic Risk (statistical chance)**	**Total Non-Carcinogenic Risk (hazard index)**
Site Worker			
Ingestion/Dermal Contact	Surface Soil	1.18E-06	4.46E-03
Site Worker Total		***1.18E-06***	***4.46E-03***
Construction Worker			
Ingestion/Dermal Contact	Surface Soil	7.48E-08	7.44E-03
	Subsurface Soil	2.51E-08	8.51E-03
Fugitive Dust	Surface Soil	5.40E-09	1.10E-01
	Subsurface Soil	2.38E-09	1.45E-01
Construction Worker Total		***1.11E-07***	***2.71E-01***
Trespassing Child			
Ingestion/Dermal Contact	Surface Soil	5.70E-07	4.57E-03
Trespassing Child Total		***5.70E-07***	***4.57E-03***
Future Resident			
Ingestion/Dermal Contact	Surface Soil	6.60E-06	7.80E-02
	Groundwater	1.35E-06	7.28E+00
Future Resident Total		***7.95E-06***	***7.36E+00***
Future Recreation			
Ingestion/Dermal Contact	Surface Soil	4.16E-06	7.33E-02
Future Recreation Total		***4.16E-06***	***7.33E-02***

Table 6
Summary of Chemicals of Concern Used in Ecological Risk Assessment – Surface Soil

Exposure Medium	Chemical of Concern	Minimum Concentration	Maximum Concentration	Units	Maximum Exposure Point Concentration	Units	Statistical Measure
Surface Soil	***Volatile Organic Compounds***						
	Carbon tetrachloride	0.007	0.007	ppm	0.007	ppm	95% UCL
	Tetrachloroethene	0.004	0.029	ppm	0.025	ppm	95% UCL
	Toluene	0.002	0.003	ppm	0.004	ppm	95% UCL
	Semivolatile Organic Compounds						
	Bis(2-ethylhexyl)phthalate	0.056	0.320	ppm	0.278	ppm	95% UCL
	Butylbenzylphthalate	0.052	0.710	ppm	0.662	ppm	95% UCL
	Carbazole	0.042	0.179	ppm	0.182	ppm	95% UCL
	Dibenzofuran	0.022	0.061	ppm	0.104	ppm	95% UCL
	Dimethylphthalate	0.045	0.140	ppm	0.156	ppm	95% UCL
	Di-n-octylphthalate	0.140	0.820	ppm	0.477	ppm	95% UCL
	Total PAHs	2.040	15	ppm	10	ppm	95% UCL
	Pesticides/PCBs						
	4,4'-DDD	0.005	0.018	ppm	0.022	ppm	95% UCL
	4,4'-DDE	0.006	0.036	ppm	0.032	ppm	95% UCL
	4,4'-DDT	0.016	0.100	ppm	0.079	ppm	95% UCL
	Alpha-chlordane	0.002	0.005	ppm	0.004	ppm	95% UCL
	Aroclor-1260	0.096	0.096	ppm	0.061	ppm	95% UCL
	Dieldrin	0.004	0.009	ppm	0.008	ppm	95% UCL
	Endosulfan II	0.002	0.002	ppm	0.002	ppm	95% UCL
	Endosulfan sulfate	0.002	0.002	ppm	0.002	ppm	95% UCL
	Endrin	0.002	0.010	ppm	0.007	ppm	95% UCL
	Endrin aldehyde	0.002	0.015	ppm	0.014	ppm	95% UCL
	Gamma-chlordane	0.002	0.005	ppm	0.004	ppm	95% UCL
	Methoxychlor	0.013	0.014	ppm	0.013	ppm	95% UCL
	Total PCBs	0.096	0.096	ppm	0.061	ppm	95% UCL
	Inorganic Analytes						
	Antimony	0.320	0.32	ppm	0.320	ppm	95% UCL
	Arsenic	2.500	5.0	ppm	3.840	ppm	95% UCL
	Barium	21	138	ppm	107	ppm	95% UCL
	Cadmium	0.220	0.22	ppm	0.220	ppm	95% UCL
	Chromium	8.500	15	ppm	14	ppm	95% UCL
	Chromium III	NA	NA	ppm	13	ppm	95% UCL
	Chromium IV	NA	NA	ppm	0.678	ppm	95% UCL
	Cobalt	2.800	4.4	ppm	4.100	ppm	95% UCL
	Cyanide	0.550	0.55	ppm	1.200	ppm	95% UCL
	Manganese	138	359	ppm	257	ppm	95% UCL
	Mercury	0.050	0.07	ppm	0.067	ppm	95% UCL
	Inorganic mercury	NA	NA	ppm	0.064	ppm	95% UCL
	Methyl mercury	NA	NA	ppm	0.003	ppm	95% UCL
	Zinc	36	105	ppm	78	ppm	95% UCL

Notes:
ppm - parts per million (mg/kg)
95% UCL – 95% Upper Confidence Limit
PCB – polychlorinated biphenyl
NA – specific chemical species not analyzed; exposure point concentration derived from literature-based assumptions

The ecological receptor groups evaluated included terrestrial vertebrates (e.g., small mammals, birds), terrestrial invertebrates (e.g., earthworms), and terrestrial plants (e.g., ruderal growth vegetation such as weeds and early successional species). The ecological exposure pathways evaluated included direct contact with and/or ingestion of surface soil by terrestrial invertebrate; direct contact with surface soil by terrestrial plants; wildlife ingestion of food items that are potentially contaminated as a result of accumulation of constituents from surface soil; and incidental ingestion of surface soil by wildlife. The exposure pathways used in the ecological risk assessment are presented in Table 7.

Table 7
Summary of Potential Exposure Pathways Used in the Ecological Risk Assessment – Surface Soil

Potential Receptor	Sensitive Environment (Y/N)	Sensitive Species (Y/N)[1]	Exposure Routes Evaluated	Assessment Endpoints	Measurement Endpoints	Findings
Vertebrate Wildlife -*Mole* -*Mouse* -*Robin*	N	N	-Ingestion of soil -Ingestion of prey	Sustainability of terrestrial small mammal and avian populations that reflect the available habitat at the SL and can serve as a forage base for higher trophic level receptors.	-Food-chain analysis using conservative assumptions and site surface soil conditions. -Comparison to background conditions.	No evidence of potential ecological risks to vertebrate wildlife due to exposure to SL soil.
Terrestrial Invertebrates	N	N	-Ingestion of soil -Direct Contact	Sustainability of a terrestrial invertebrate community which reflects the available habitat at the SL and can serve as a forage base for higher trophic level receptors.	-Laboratory toxicity to invertebrates (earthworms) using site soil. -Comparison to preliminary soil screening values. -Comparison to literature-based toxicity data. -Comparison to background conditions.	No evidence of potential ecological risks to terrestrial invertebrates due to exposure to SL soil.
Terrestrial Plants	N	N	-Direct Contact	Sustainability of a terrestrial plant community that reflects the available habitat at the SL and can serve as a forage base for higher trophic level receptors.	-Laboratory toxicity to plants (lettuce seed) using site soil. -Comparison to preliminary soil screening values. -Comparison to literature-based toxicity data. -Comparison to background conditions.	No evidence of potential ecological risks to terrestrial plants due to exposure to SL soil.

Notes:
[1] Although a state-listed species of special of concern (eastern box turtle) may occur in the vicinity of the site, none were observed during the RI field investigation activities. Further, it is not anticipated that this site poses an unacceptable ecological risk to this species. Future site activities, however, should adhere to state-mandated avoidance, protection, and mitigation measures based on the potential presence of this species.
Y = Yes; N = No

The ecological assessment completed for the Small Landfill concluded that no potential ecological risks are expected at the Small Landfill. Refer to Section 7.0 of the Phase II RI report (Tetra Tech, 2000) for a more comprehensive ecological risk summary. In summary, the risk assessments performed did not identify potential human health or ecological risks (i.e., risks to the environment) in excess of regulatory thresholds associated with the Small Landfill.

8.0 DOCUMENTATION OF NO SIGNIFICANT CHANGES

The Navy presented a Proposed Plan for No Action with Groundwater Monitoring at NAS South Weymouth on May 10, 2001. The Navy reviewed all written and verbal comments submitted during the public comment period. It was determined that no significant changes to the decision, as originally identified in the Proposed Plan, were necessary. Therefore, No Action with Groundwater Monitoring will be implemented at the Small Landfill. The planned monitoring program will include one year of quarterly groundwater sampling, primarily to evaluate the potential existence and seasonal variability of thallium.

The Navy has already initiated the monitoring program. The Navy prepared a work plan addendum (Groundwater Sampling Program Work Plan Addendum, Small Landfill, NAS South Weymouth, Massachusetts), dated September 4, 2001, for the first round of groundwater sampling. This work plan was approved for implementation by EPA. Groundwater samples were collected on September 26 and 27, 2001, and the results were summarized in a brief letter report dated November 15, 2001. No thallium was detected at a detection limit of less than 0.5 µg/L (ppb). A summary of the thallium results from the first round of groundwater sampling is presented in Table 8. The Navy will perform the next three rounds of groundwater sampling using the same procedures as described in the September 4, 2001 work plan addendum. The Navy will then prepare an overall summary report for the one year of groundwater monitoring to demonstrate the presence or absence of thallium. Upon EPA review and approval, the report will be added to the administrative record to support this decision.

Table 8
Summary of Thallium Results – September 2001 Groundwater Sampling Event

Sample ID	Location	Sample Date	Thallium Concentration (µg/L)	
			Total	Dissolved
SLEB-1	SL-EB-01	09/27/2001	0.5 U	0.5 U
SLMW-08	SL-MW-08	09/27/2001	0.5 U	0.5 U
SLMW-09	SL-MW-09	09/27/2001	0.5 U	0.5 U
SLMW-09D (DUP)	SL-MW-09	09/27/2001	0.5 U	0.5 U
SLMW-10	SL-MW-10	09/27/2001	0.5 U	0.5 U
SLMW-23	SL-MW-23	09/27/2001	0.5 U	0.5 U
SLMW-24	SL-MW-24	09/27/2001	0.5 U	0.5 U
SLMW-25	SL-MW-25	9/26/2001	0.5 U	0.5 U

Notes:
U Indicates compound was analyzed for but not detected.

9.0 STATE ROLE

The MADEP has deferred its decision on concurrence until results from the additional groundwater monitoring program have been submitted and evaluated. Future correspondence will be added to the administrative record after the ROD has been signed.