FINAL
RECORD OF DECISION FOR FORMER PROPOSED GYMNASIUM SITE AND BUILDINGS T-62 AND T-68

U.S. ARMY SOLDIER SYSTEMS CENTER
NATICK, MASSACHUSETTS

Prepared for:

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SEPTEMBER 2007

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Prepared for:

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Natick, Massachusetts

Prepared by:

MACTEC Engineering and Consulting, Inc.
Portland, Maine

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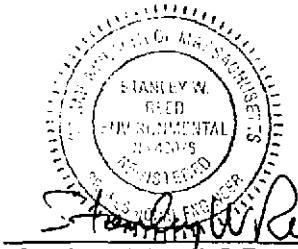
Project 3618 06 8042



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1.0 SITE NAME AND LOCATION

U.S. Army Soldier Systems Center
Kansas Street
Natick, Massachusetts

Area of Concern: Former Proposed Gymnasium Area
Site Screening Area: Buildings T-62 and T-68

The U.S. Army Soldier Systems Center (SSC, the "Site") is an active Army installation that was placed on the National Priorities List in May 1994. A Federal Facility Agreement between the U.S. Department of the Army and the U.S. Environmental Protection Agency (USEPA, EPA, EPA New England) identified eight Areas of Concern and three Site Screening Areas at SSC. This Record of Decision is for the Area of Concern - Former Proposed Gymnasium Area (also referred to as the Former Proposed Gymnasium Site [FPGS]), and the Site Screening Area - Buildings T-62 and T-68. The U.S. Department of the Army is the lead agency for cleanup activities at SSC. The CERCLIS ID number for the Site is MA1210020631.

2.0 STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial actions for the FPGS and Buildings T-62 and T-68 at SSC, in Natick, Massachusetts, which were chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980, as amended (CERCLA), 42 USC § 9601 *et seq.*, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300 *et seq.*, as amended. The SSC Garrison Manager and the Director of the EPA New England Office of Site Remediation and Restoration have been delegated the authority to approve this Record of Decision.

This decision was based on the Administrative Record, which has been developed in accordance with Section 113(k) of CERCLA, and which is available for review at SSC, the Massachusetts Department of Environmental Protection (Mass DEP), and the Morse Institute Library located in Natick, Massachusetts. The Administrative Record Index (Appendix B to this Record of Decision)

identifies each of the items comprising the Administrative Record upon which the selection of the remedial action is based.

The Mass DEP concurs with the selected remedy. (Appendix A).

3.0 DESCRIPTION OF THE SELECTED REMEDIES

No CERCLA remedial action can be taken at the FPGS.

No further CERCLA remedial action for soil is necessary at Building T-62 and at Building T-68.

4.0 STATUTORY DETERMINATIONS

Neither the Army nor EPA has authority under CERCLA to address the risk posed by the contaminants at the FPGS.

The supplemental HHRA concluded that there was a non-cancer risk associated with elevated concentrations of nitrate/nitrite and manganese in groundwater; however, there are no identified releases of nitrate/nitrite or manganese associated with Soldier System Center test or training activities at FPGS. The presence of those contaminants is not site-related; the presence of both contaminants is attributed to upgradient reliance on septic tanks and leach fields for residential wastewater disposal.

No site-related hazardous substances, pollutants, or contaminants remain at the FPGS above levels that allow for unlimited use and unrestricted exposure. Therefore, no statutory five-year review is required by the NCP (40 CFR 300.430(f)(4)(ii)). As a matter of policy, a five-year review may be conducted at the FPGS at the time that statutory five-year reviews are conducted for other areas of concern at SSC.

No further CERCLA remedial action for soil is necessary at Building T-62 and Building T-68. A previous response action completed in 2005 eliminated the need to conduct further remedial action for soil contamination. Buildings T-62 and T-68 have not been identified as a source of groundwater contamination. Contaminated groundwater in this portion of the SSC

facility is associated with the remaining portion of the T-25 Area, and is being captured and treated as part of the T-25 Area groundwater extraction and treatment system.

No site-related hazardous substances, pollutants, or contaminants remain at Buildings T-62 and T-68 above levels that allow for unlimited use and unrestricted exposure. Therefore, no statutory five-year review is required for Buildings 62 and 68 by the NCP (40 CFR 300.430(f)(4)(ii)).

5.0 AUTHORIZING SIGNATURE

This Record of Decision documents the selection of a remedial action for the Former Proposed Gymnasium Area and Buildings T-62 and T-68 by the U.S. Department of the Army and the U.S. Environmental Protection Agency, with the concurrence of the State of Massachusetts Department of Environmental Protection.

Concur and recommended for immediate implementation:

U.S. DEPARTMENT OF THE ARMY

By: _____ Date: 28 Sept 07

Gregory F. Ulsh
Colonel, U.S. Army
Commanding

This Record of Decision documents the selection of a remedial action for the Former Proposed Gymnasium Area and Buildings T-62 and T-68 by the U.S. Department of the Army and the U.S. Environmental Protection Agency with the concurrence of the State of Massachusetts Department of Environmental Protection.

Concur and recommended for immediate implementation:

U.S. ENVIRONMENTAL PROTECTION AGENCY

By: _____ Date: 9-28-07

James T. Owens, Director
Office of Site Remediation and Restoration
EPA New England

PART 2: THE DECISION SUMMARY

6.0 SITE NAME, LOCATION, AND BRIEF DESCRIPTION

U.S. Army Soldier Systems Center
Kansas Street
Natick, Massachusetts

Area of Concern: Former Proposed Gymnasium Area
Site Screening Area: Buildings T-62 and T-68

SSC is located approximately 17 miles west southwest of Boston in the Town of Natick, Middlesex County, Massachusetts (Figure 6-1). The facility occupies a small peninsula extending from the eastern shoreline of South Pond Lake Cochituate and encompasses approximately 74 acres. SSC has been a permanent U.S. Army installation since October 1954. The installation's mission includes research and development activities in food engineering; food science; clothing, equipment, and materials engineering; and aero-mechanical engineering.

The land surrounding SSC supports residential, commercial/retail, and light industrial uses. Although SSC and the surrounding area are served by a public water supply, it is important to note that with the exception of SSC (including military housing on Heritage Lane) and the Lakeview Garden Apartments on Kansas Street and Second Street, the area between North Main Street, Kansas Street, and South Pond Lake Cochituate is not served by public sewer. This unsewered area, which contains numerous residences that rely on septic tanks and leach fields for domestic waste water disposal, is hydraulically upgradient of SSC and the FPGS.

The FPGS is located on the eastern boundary of the SSC near the installation's main gate. The site is named for a historically proposed location for a SSC gymnasium; however, the site was never developed, and the gymnasium was never constructed.

The FPGS is located on a former wet meadow and occupies approximately 1.6 acres. The site is bordered by a 10-foot-high slope to the north along Kansas Street, South Pond Lake Cochituate to the east-southeast, and a parking area to the west-southwest (Figure 6-2). The 10-foot-high slope to the north of the site contains the main SSC sanitary sewer line and the main SSC water line. A

French drain is located on the southwestern portion of the site to drain seasonally high groundwater and surface water. The drain discharges to South Pond Lake Cochituate. The sanitary sewer line is the main facility effluent line and connects to the Town of Natick's sewer system. Historically, the Town of Natick's sewer system near the SSC facility has backed up during periods of heavy precipitation, and overflows from the system occurred. These discharges flowed down the slope and onto the surface of the FPGS. However, separation of the sanitary and storm sewers during the 1990s eliminated this situation.

A more complete description of the FPGS can be found in Section 1 of the RI Report (MACTEC Engineering and Consulting, Inc. [MACTEC], 2006b).

Buildings T-62 and T-68 are located immediately northwest of the Building 20 (warehouse) loading platform in the southwestern portion of the T-25 area (Figure 6-3). Both buildings have 20- by 20-foot floor plans and are constructed of corrugated metal walls and roof with a poured concrete slab floor and concrete block frost walls. Buildings T-62 and T-68 each have an overhead door on their east side and a concrete apron which connects the door opening to the paved area. Site plan drawings indicate that Building T-62 was built in 1974-1975 and Building T-68 in 1980-1981 (Argonne National Laboratory [Argonne], 1993).

The immediate area south, west, and north of the buildings is unpaved and grassed with a shallow paved drainage swale running between the buildings to a storm sewer and headwall located southwest of Building T-62. The area east of the buildings is bordered is an extensive paved area used for parking and to provide vehicle access to several surrounding buildings. Building 20 is located south and southeast of the buildings, and an elevated paved access road runs west and north of the buildings. The swale drains surface water runoff from the paved area to the storm sewer.

A more complete description of the Buildings T-62 and T-68 Area can be found in the Draft Site Investigation report and the Final Action Memorandum prepared for the Buildings T-62 and T-68 Area (MACTEC, 2004b, 2005).

7.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

This section summarizes site history, investigations and removal actions, and enforcement actions at the FPGS and Buildings T-62 and T-68.

7.1 HISTORY OF SITE ACTIVITIES

The FPGS has been used as a helicopter landing pad; and a petroleum, oil, and lubricant bladder test site; and a parking lot. The majority of the site is now grass-covered. As shown on Figure 6-2, a portion of the parking area to the west-southwest is also considered part of the FPGS. Currently, no SSC-related testing activities are conducted at the site.

Buildings T-62 and T-68 were used for hazardous materials and chemical storage until the summer of 1991. At present, the buildings are used for the storage of non-hazardous materials. No documented contaminant spills or releases were found during research performed for the Master Environmental Plan (Argonne, 1993).

7.2 HISTORY OF INVESTIGATIONS AND REMOVAL/REMEDIAL ACTIONS

The following subsections summarize the investigative and cleanup history of the FPGS.

7.2.1 History of Investigations and Removal Actions at the FPGS

1989 Geotechnical Explorations. Two borings were drilled in 1989 as part of the geotechnical investigation for the construction of the proposed gymnasium. Work was halted when soil retrieved from one of the borings emanated fuel odors. Soil samples showed evidence of fuel contaminants (1,4-dichlorobenzene at 3 parts per million).

Two water samples (SW1-10 and SW1-1) were collected from the outfall of the French drain by U.S. Army personnel in 1989. 1,2-Dichloroethene was detected in samples at concentrations of 40.6 to 45.5 micrograms per liter (µg/L).

1989 to 1990 Soil Gas Survey. Soil gas samples were collected in 1989 and 1990 by the Northeast Research Institute (NERI) under contract to U.S. Army Toxic and Hazardous Materials Agency. Results from the soil gas sampling program indicated low concentrations of benzene, ethylbenzene, toluene, and xylenes (BTEX), tetrachloroethene, and trichloroethene along the main SSC sewer line and within the FPGS (Dames & Moore, 1991). A small area of Freon and 1,1,1-trichloroethane was also detected near MW-5.

NERI also completed one soil boring in 1989 approximately 3 feet to the west of Army Boring No. 1. Two soil samples and one groundwater sample were collected from this boring for off-site laboratory analysis. BTEX and 1,4-dichlorobenzene were detected in the soil samples, and 1,4-dichlorobenzene and naphthalene were detected in the groundwater sample.

1990 Monitoring Well Installation and Surface Water Sampling. Dames & Moore, under contract to U.S. Army Toxic and Hazardous Materials Agency, installed four 4-inch monitoring wells (MW-4 through MW-7) in 1990. Eight soil samples were collected for off-site laboratory analysis for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), xylenes, Freon 113, and total and dissolved metals. Two rounds of groundwater samples were collected from the new wells, and a surface water sample was also collected from South Pond Lake Cochituate below the French drain outfall. The groundwater samples were analyzed for VOCs, SVOCs, pesticides, PCBs, xylenes, Freon 113, priority pollutant metals, chloride, sulfide, and total dissolved solids. The surface water sample was analyzed for each of the above parameters, except for chloride, sulfide, and total dissolved solids.

1997 to 1998 Remedial Investigation. The RI field program at the FPGS began in October 1997 and was completed with the RI Round 2 groundwater sampling (Quarterly Groundwater Sampling Event 16) in April 1998. The field activities completed during the RI at the FPGS included:

- A background and historical research task to further define past site activities, installation boundaries at the FPGS, and review historical air photos.
- Review of sanitary sewer video survey completed along the SSC main sewer line which parallels Kansas Street and the northern boundary of the FPGS.
- Three geophysical surveys to assess subsurface conditions and provide utility clearance.
- Collection of soil and groundwater samples from 33 locations using a direct-push sampling system for on-site laboratory analysis to define the nature and distribution of soil and groundwater contamination. Ten percent of the samples were submitted for confirmatory off-site laboratory analysis.
- Four soil borings were completed for geologic characterization and for the collection of off-site laboratory samples.

- Five monitoring wells were installed for future groundwater quality monitoring and piezometric elevation data.
- Two rounds of groundwater samples from the five new and four existing monitoring wells for off-site laboratory analysis to quantify the concentrations of site-related contaminants.
- Collection of eight surface water and sediment samples from two locations for off-site analysis to assess the nature and distribution of site-related contaminants.

The risk assessment performed as part of the RI identified potential risks from exposure to benzene and manganese in groundwater. The RI Report recommended that a limited soil removal action be performed in the vicinity of monitoring well MW-5 to remove soil contributing to groundwater benzene risk.

2002 Time Critical Removal Action. A Time Critical Removal Action was completed at the FPGS between March and August 2002. As part of the removal action, approximately 1,233 tons of contaminated soil were excavated from a 40- by 40- by 10-foot deep area to meet MCP Method 1 (S-1/GW-1) standards and transported to Aggregate Recycling Corporation, an asphalt batching facility, in Eliot, Maine. The excavation was centered in the vicinity of monitoring well MW-5 and performed to remove soils that were leaching contaminants, especially benzene, to groundwater. Other primary contaminants of concern were chlorobenzene, benzo(a)pyrene, and beryllium (Figure 7-1).

Confirmation soil samples were collected from the sidewalls and bottom of the excavation to verify that soil with contaminant concentrations in excess of the cleanup standards had been removed. The confirmation soil samples were analyzed for VOCs, SVOCs, and metals.

Upon completion of the removal action, the excavation was backfilled and compacted with non-contaminated sandy soil from an off-site borrow source. The area was then restored by spreading topsoil and applying grass seed for re-vegetation. Monitoring well MW-5 was located in the center of the excavation and therefore removed during excavation activities. Upon completion of the removal action, monitoring well MW-5 was re-installed as MW-5R at the same location and constructed in the same configuration as the original well.

The results of the removal action are documented in the Final Removal Action Closure Report prepared by Nobis Engineering, Inc. (Nobis, 2003).

2002 to 2005 Post Removal Action Groundwater Monitoring. Post-removal action groundwater monitoring was conducted at the FPGS between September 2002 and October 2005 as part of the Installation-Wide Quarterly Groundwater Monitoring Program, and is documented in the Quarterly Groundwater Monitoring Reports for Events 31 through 43 (Harding ESE, 2003a, 2003b, 2003c, 2004a, 2004b, 2004c, 2005a, 2005b; ICF, 2005a, 2005b, 2005c, 2006). As of October 2005 (Event 43), 13 consecutive quarterly rounds of groundwater data had been collected from monitoring well MW-5R, and eight consecutive quarterly rounds of groundwater data have been collected from the downgradient monitoring well MW-127A-2. The only constituent detected above a federal drinking water MCL was nitrate/nitrite nitrogen. Aluminum, iron, and/or manganese were detected in three groundwater samples collected from these wells at concentrations above secondary MCLs.

2006 Supplemental Remedial Investigation and Risk Evaluation. A supplemental RI report was prepared in 2006 to summarize removal activities and post-removal action groundwater monitoring, and present an HHRA conducted to evaluate post-removal action soil and groundwater conditions at the FPGS.

Prior to the soil removal action at the FPGS, the health risks associated with potential exposures to soil and groundwater were within the USEPA cancer risk range of $1x10^{-6}$ to $1x10^{-4}$ (and, in fact, below an excess lifetime cancer risk [ELCR] of $1x10^{-5}$) and equal to or below a non-cancer hazard index (HI) of 1 for all receptor scenarios except the residential land use scenario. Since risks for non-residential land use scenarios were within USEPA risk management criteria prior to removal activities at the FPGS, only the residential land use scenario was evaluated in the supplemental HHRA. A future residential land use scenario was evaluated as a conservative approach as compared to all other land use scenarios.

The ELCR for residential land use exposure to soil were within the USEPA cancer risk range, and non-cancer risks were below an HI of 1. The post-remediation cancer risk was lower than the pre-remediation cancer risk, and the HI was unchanged. The ELCR for groundwater was also within the USEPA cancer risk range, and was lower than the risk calculated for pre-removal conditions. The HI values for groundwater exceeded the threshold HI of 1. The primary contributors were

nitrate/nitrite and manganese. However, nitrate/nitrite and manganese are considered to be non-site-related.

The cumulative (child and adult) ELCR associated with soil and groundwater is $1x10^{-4}$ (the upper bound of the USEPA cancer risk range), which is lower than that calculated for pre-remediation conditions. The cumulative (child and adult) non-cancer risk associated with soil and groundwater is greater than an HI of 1. The primary contributors were nitrate/nitrite and manganese. However nitrate/nitrite and manganese are considered to be non-site-related.

In addition, these risk estimates are based on hypothetical exposures (i.e., potable use of groundwater) that are not likely to occur in the future.

7.2.2 History of Investigations and Removal Actions at Buildings T-62 and T-68

1989 to 1990 Soil Gas Survey. A soil gas survey of the T-25 area was performed in December 1989 and January 1990 by NERI. Soil vapor results from sampling locations in the area of Buildings T-62 and T-68 suggested a potential source of benzene, toluene, and xylenes and possibly trichloroethene and tetrachloroethene. Results for benzene, toluene, and xylenes were somewhat ambiguous, however, as concentrations were elevated across much of the T-25 area, not just the Buildings T-62 and T-68 area. The data also suggested a potential source of trichloroethene and tetrachloroethene at the western edge of the Building 20 loading dock, but relative-ion counts, although greater than surrounding values, were not as great as those in other T-25 area locations.

1993 Preliminary Site Characterization. No documented contaminant spills or releases were found during the research conducted for the Master Environmental Plan (Argonne, 1993). However, staining observed on pallets and the history of chemical and waste storage at the site led to the conclusion that contaminant releases could have occurred to surface soils and/or the building foundations. The report identified the following potential contaminants based on past storage history and results of previous investigations: VOCs (benzene, trichloroethene, tetrachloroethene), polynuclear aromatic hydrocarbons (PAHs), PCBs, pesticides, and inorganics.

1993 T-25 Phase I Remedial Investigation. Two surface soil samples, RA-8 and RA-9, were collected in the vicinity of Buildings T-62 and T-68 as part of the 1993 T-25 Phase I RI (Arthur D.

Little, Inc. [A.D. Little], 1996). VOCs were not detected in either sample. Several PAHs, including benzo[a]anthracene, benzo[a]pyrene, indeno[1,2,3-c,d]pyrene, chrysene, benzo[k]fluoranthene, and dibenz[a,h]anthracene, were detected in RA-8 or RA-9 at concentrations exceeding MCP Method 1 (S-1/GW-1) criteria.

2004 Site Investigation. Based on the potential for contaminated surface soils and building materials as a result of known site history, an SI was performed at Buildings T-62 and T-68 in March 2004 (MACTEC, 2004b). The SI reached the following conclusions:

- Site related compounds included extractable petroleum hydrocarbons (EPH) (including PAHs), SVOCs, VOCs, inorganics, and pesticides in shallow subsurface soils in and around the unpaved area and drainage ditch at Building T-62 and T-68.
- Based on off-site analytical results, with exception to the pesticide compound 4,4'-DDT at surface soil location SS-69, PAHs were the only compounds present in subsurface soils at concentrations which exceed the MCP Method S-1 soil standard.
- PAH compounds were present beneath the concrete slab floor of Building T-62 at concentrations that exceed the MCP Method S-1 soil standards.
- PAH, VOC, and inorganic detections in subsurface soil exceed the human-health risk-based preliminary remediation goals (PRGs) established by EPA Region IX and could present a human-health risk exposure concern.
- EPH compounds found in the vicinity of the drainage ditch and in and around the unpaved area appeared to be present from run-off of the T-25 pavement areas adjacent to Buildings T-62 and T-68. Higher EPH concentration distributions were found predominantly in surficial soils.
- VOCs were detected at considerably lower concentrations in subsurface soils than earlier soil gas ion count data suggested, indicating that although the presence of VOCs might be an environmental concern, the exposure risk for VOCs at the Building T-62 and T-68 area was minimal.

2005 Removal Action. In September 2005, a removal action was initiated at Buildings T-62 and T-68 to remediate PAH- and EPH-contaminated soil with chemical concentrations above MCP Method 1 (S-1/GW-1) standards (MACTEC, 2006a). Figure 7-2 shows the approximate removal area. Excavation activities proceeded in two stages with the initial stage completed to 2 feet below ground surface [bgs]. Confirmation soil samples collected from the initial excavation area in accordance with the requirements specified in the Work Plan showed that four PAHs were detected at concentrations above MCP Method 1 (S-1/GW-1) criteria at two locations (SS-091 and SS-092).

Results for the other samples were below MCP Method 1 (S-1/GW-1) criteria. Based on these results, the excavation was deepened to remove the additional contaminated soil.

Soil samples were collected at nine locations (SS-094 through SS-102) at the bottom of the completed excavation (3 feet bgs) west and north of Building T-62. Of these nine samples, only one location (SS-097) exhibited concentrations of three PAHs slightly above the published MCP Method 1 (S-1/GW-1) criteria. The average concentration for these compounds in the confirmation soil samples was below the published MCP Method 1 (S-1/GW-1) criteria. The maximum detected concentrations of these PAHs were less than the then proposed revised MCP Method 1 (S-1/GW-1) criteria, which became effective in April 2006. Additionally, the 95-percent upper confidence level (UCL) on the mean concentration, which would represent the exposure point concentration (EPC) in a risk assessment, did not exceed the current published MCP Method 1 (S-1/GW-1) criteria. This information is presented in Table 4-2 of the Removal Action Completion Report (MACTEC, 2006a).

Additional excavation to the west of Building T-62 was not feasible without removing and replacing the four underground electrical conduits, and would likely have compromised the structural integrity of the foundation of Building T-62. The Army, USEPA, and Mass DEP considered the action levels to have been met, and the removal action was considered complete. The excavation areas were backfilled and compacted with clean fill from an off-site borrow source. During the removal action, approximately 172 tons of contaminated soil were excavated and approximately 4 tons of asphalt pavement were removed from the drainage ditch. The soil and asphalt pavement were transported to Aggregate Industries in Shrewsbury, Massachusetts for treatment/disposal.

7.3 HISTORY OF CERCLA ENFORCEMENT ACTIVITIES

SSC was added to the National Priorities List under CERCLA, as amended by the Superfund Amendments and Reauthorization Act, in May 1994 to evaluate and implement response actions to cleanup past releases of hazardous substances, pollutants, and contaminants. The CERCLIS ID number for the Site is MA1210020631. The FPGS and Buildings T-62 and T-68 are considered subareas to the entire Site.

A Federal Facility Agreement between the U.S. Department of the Army and the U.S. Environmental Protection Agency was signed in August 2006 to establish a procedural framework for ensuring that appropriate response actions are implemented at SSC (USEPA, 2006d). The U.S. Army is the lead agency responsible for environmental cleanup at this Site.

8.0 COMMUNITY PARTICIPATION

Notice of the availability of the Proposed Plan for the FPGS and Buildings T-62 and T-68 was published in The MetroWest Daily News on March 9, 2007. A public informational meeting and hearing on the proposed plan was held at the Frederick Conley Public Safety Training Center in Natick on March 15, 2007, and a public comment period was held from March 15 through April 16, 2007. At the public meeting, the Army presented the Proposed Plan and answered questions from the public prior to providing opportunity for formal comments on the proposed plan. Comments received during the public comment period and the Army's responses are contained in the Responsiveness Summary (Section 15.0) that is a part of this Record of Decision.

In addition, the community has been kept advised of investigative and cleanup activities at the FPGS and Buildings T-62 and T-68 through presentations by the Army at Restoration Advisory Board meetings held, following public notice, on an approximate monthly basis throughout the year.

The Proposed Plan and other FPGS and Buildings T-62 and T-68 documents were made available for public review in the Administrative Record that is maintained at SSC, the Mass DEP, and at the Morse Institute Library located at 14 East Central Street in Natick, Massachusetts.

9.0 SCOPE AND ROLE OF OPERABLE UNITS AND RESPONSE ACTION

A Federal Facility Agreement between the U.S. Department of the Army and EPA New England identified eight Areas of Concern and three Site Screening Areas at SSC (USEPA, 2006d). This Record of Decision is for the Area of Concern - Former Proposed Gymnasium Area, and the Site Screening Area - Buildings T-62 and T-68.

This Record of Decision selects the final remedy for soil and groundwater at the FPGS. Sediments at various areas of the SSC facility, including the FPGS, T-25 Area Outfall, the Main Stormwater

Outfall, and the Buildings 2 and 45 Parking Lot Outfall, as well as any potential risk to receptors associated with these sediments, are being addressed collectively as a Sediment Operable Unit. It is noted, however, that surface water and sediment in South Pond Lake Cochituate adjacent to the FPGS are not known to be contaminated as a result of activities at the FPGS.

This Record of Decision selects the final remedy for Buildings T-62 and T-68. Groundwater is not known to be contaminated as a result of activities at Buildings T-62 and T-68. It is noted, however, that groundwater beneath Buildings T-62 and T-68 is within the capture zone for T-25 Area groundwater extraction and treatment system.

The remaining identified Areas of Concern and Site Screening Areas at the SSC have been or are being addressed separately.

10.0 SITE CHARACTERISTICS

The following subsections summarize site characteristics at the FPGS and Buildings T-62 and T-68.

10.1 SITE CHARACTERISTICS AT THE FPGS

This subsection summarizes site characteristics at the FPGS. The FPGS is located on a former wet meadow and occupies approximately 1.6 acres. The site is bordered by a 10-foot-high slope to the north, South Pond Lake Cochituate to the east-southeast, and a parking lot to the west-southwest. More detailed information, including geologic cross sections and interpreted piezometric surface contours, are provided in Section 3.0 of the Final RI Report (MACTEC, 2006b).

10.1.1 FPGS Geology

The overburden geology at the FPGS consists of sand and gravel fill, as well as sand and silty sand, over peat. Below the peat layer are sands and silts with coarse sand lenses, and silty sands with clayey sections. The overburden, ranging in thickness from 49 to 83 feet, is underlain by a meta-siltstone phyllite bedrock. The peat layer, ranging in thickness from 4 to 10 feet, is a significant feature at the FPGS and appears to thin out to the northern portion of the site near Kansas Street.

10.1.2 FPGS Hydrogeology

The hydrogeologic condition at the FPGS can be characterized as an unconfined aquifer. The water table is found in the overburden soil and peat layer at depths ranging from 4 to 13 feet bgs across the FPGS. South Pond Lake Cochituate is the dominant hydrogeologic feature controlling both shallow and deeper groundwater flow in the vicinity of the FPGS. In general, the shallow and deeper groundwater flow directions at the FPGS are from the northwest, across the site, toward South Pond Lake Cochituate. Based on the RI data, it appears that the peat layer is the controlling feature relative to movement of shallow groundwater and associated migration of site-related contaminants.

10.1.3 FPGS Surface Water Hydrology

Surface water at the FPGS either infiltrates the ground surface or flows east and southeast to South Pond Lake Cochituate. There are no streams or surface water bodies at the FPGS. A subsurface drain system was installed in the southern portion of the FPGS to lower seasonally high groundwater conditions. The drain system discharges to South Pond Lake Cochituate.

10.1.4 Nature and Distribution of Soil Contamination at the FPGS

The RI indicated a small area of contaminated soil and peat, located within a radius of approximately 20 feet around monitoring well MW-5. The primary contaminants detected were benzene, chlorobenzene, benzo[a]pyrene, and beryllium. These constituents were detected at concentrations exceeding the MCP Method 1 (S-1/GW-1) standards. No other significant concentrations of site-related compounds were detected in soil samples collected at the FPGS (MACTEC, 2006b).

The 2005 removal action was performed to address contamination surrounding monitoring well MW-5. No VOCs, SVOCs, or metals were detected in the confirmation soil samples collected as part of the removal action at concentrations greater than the MCP Method 1 (S-1/GW-1) standards which were used as removal action cleanup levels.

10.1.5 Nature and Distribution of Ground Water Contamination at the FPGS

The RI indicated the presence of several VOCs (i.e., benzene, chlorobenzene, cis-1,2-dichloroethene, ethylbenzene, and xylenes) in groundwater in the vicinity of monitoring well MW-5. However, benzene was the only compound consistently detected at concentrations above an MCL. The RI results did not identify a plume or source of the benzene, which was detected only in groundwater samples collected from monitoring well MW-5. Aluminum, iron, and manganese were also detected above secondary MCLs (MACTEC, 2006b).

Post-removal action groundwater monitoring was conducted at the FPGS between September 2002 and October 2005 as part of the Installation-Wide Quarterly Groundwater Monitoring Program, and is documented in the Quarterly Groundwater Monitoring Reports for Events 31 through 43 (Harding ESE, 2003a, 2003b, 2003c, 2004a, 2004b, 2004c, 2005a, 2005b; ICF, 2005a, 2005b, 2005c, 2006). As of October 2005 (Event 43), 13 consecutive quarterly rounds of groundwater data had been collected from monitoring well MW-5R, and eight consecutive quarterly rounds of groundwater data have been collected from the downgradient monitoring well MW-127A-2. The only constituent detected above an MCL was nitrate/nitrite nitrogen. Aluminum, iron, and/or manganese were detected in three groundwater samples collected from these wells at concentrations above secondary MCLs.

There are no identified releases of nitrate/nitrite or manganese associated with SSC test or training activities at the FPGS, and neither is considered to be Site-related. The presence of nitrate/nitrite in groundwater at the FPGS is attributed to upgradient reliance on septic tanks and leach fields for residential wastewater disposal. An extensive area of Natick north and east (i.e., upgradient) of the FPGS is not served by public sewers.

The presence of manganese in groundwater at the FPGS is attributed to reductive dissolution from soil as a result of bacterial respiration. The source of organic carbon for the bacterial metabolism is attributed primarily to upgradient reliance on septic tanks and leach fields for residential wastewater disposal. Although leach fields remove most organic carbon from domestic wastewater, low concentrations can remain and support bacterial populations in downgradient areas.

10.1.6 Nature and Distribution of Surface Water and Sediment Contamination at the FPGS

Methyl-tert-butyl-ether was detected in surface water samples; however, the concentrations were below the laboratory reporting limit and health-based criteria. No other VOCs, SVOCs, or herbicides were detected in surface water samples collected from the FPGS. Two pesticides (4,4'-DDD and gamma-benzenehexachloride [γ-BHC, lindane]) were detected in the surface water samples, but at concentrations below Ambient Water Quality Criteria. Several metals were also detected in the surface water samples; however, the concentrations were below Ambient Water Quality Criteria, as well as SSC-specific background values (MACTEC, 2006b).

Sediment samples collected in South Pond Lake Cochituate contained VOCs (benzene and chlorobenzene), SVOCs, pesticides, total petroleum hydrocarbons, and metals. Several SVOCs and metals were detected at concentrations above the Ontario Ministry of the Environment Lowest Effect Level criteria (Persaud et al., 1996). PAHs were also detected at concentrations above SSC-specific background values. No PCBs were detected in the sediment samples collected from the FPGS (MACTEC, 2006b). As mentioned previously, surface water and sediment in South Pond Lake Cochituate adjacent to the FPGS are not known to be contaminated as a result of activities at the FPGS. Further, sediment adjacent to the FPGS is being evaluated as part of the Sediment Operable Unit.

10.2 SITE CHARACTERISTICS AT BUILDINGS T-62 AND T-68

Buildings T-62 and T-68 are located immediately northwest of the Building 20 loading platform in the southwestern portion of the T-25 area (see Figure 6-3). Both buildings have 20-foot by 20-foot floor plans and are constructed of corrugated metal walls and roof with a concrete floor. Buildings T-62 and T-68 each have an overhead door on their east side and a concrete apron which connects the door opening to the paved area. Site plan drawings indicate that Building T-62 was built in 1974-1975 and Building T-68 in 1980-1981 (Argonne, 1993).

10.2.1 Geology at Buildings T-62 and T-68

Soils encountered at the T-25 Area, which includes MW-2, consist of near surface poorly sorted gravel and cleaner sand which grades to siltier, finer sand at depth. A clayey silt layer located about 65 feet bgs has a hydraulic conductivity significantly lower than the overlying materials. Overburden thickness in the vicinity in the T-25 Area ranges from approximately 155 to 199 feet.

Information regarding the bedrock beneath SSC is limited. However, the bedrock is reported to consist principally of schists, gneisses, and phylites with intrusive diorites of the Esmond Dedham terrain (Shafer and Hartshorn, 1965). SSC appears to be bounded by a bedrock trough and basin at its western and eastern edges, respectively. These features are likely the result of glacial erosion. Bedrock outcrops have been observed along the eastern side of SSC, just beyond the northeast corner of the SSC boundary (Shafer and Hartshorn, 1965).

10.2.2 Hydrogeology at Buildings T-62 and T-68

Groundwater flow has been investigated extensively and modeled as part of the investigation and cleanup of the T-25 Area. The Final RI Report for the T-25 Area estimated that hydraulic conductivities range between 0.1 and 63 feet per day, with an average value of 20 feet per day ($7x10^{-3}$ centimeters per second). Groundwater flow is to the northwest.

10.2.3 Buildings T-62 and T-68 Surface Water Hydrology

The area surrounding Buildings T-62 and T-68 is predominantly paved or covered by buildings, while a narrow unpaved area exists immediately adjacent to the buildings. The extensive paved area is used for parking and to provide vehicle access to several surrounding buildings. A shallow paved drainage swale runs between the buildings to a storm sewer and headwall located southwest of Building T-62. The swale drains surface water runoff from the paved area to the storm sewer.

10.2.4 Nature and Distribution of Contamination at Buildings T-62 and T-68

The SI relied on three investigative approaches to assess the nature and extent of contamination at Buildings T-62 and T-68: sampling of concrete chips from the building's floors, sub-slab soil sampling, and collection of surface soil samples from the unpaved area surrounding the buildings. Analytical data from the eight concrete samples representing both buildings include detections of SVOCs, pesticides, and inorganics (MACTEC, 2004b). PCBs and volatile petroleum hydrocarbons (VPH) results were qualified as non-detect below the practical quantitation limit. SVOC and the majority of pesticide results were either non-detects or estimated values (qualified as "J") below the practical quantitation limit. Only 4,4'-DDE (maximum concentration 0.00653 milligrams per kilogram [mg/kg]), 4,4'-DDT (maximum concentration 0.0103 mg/kg), and gamma-chlordane (maximum concentration 0.00773 mg/kg) were reported at concentrations greater than the practical quantitation limit. The only detection for EPH target analytes was for C19-C36 range aliphatics in samples CX005X00 (10.2 mg/kg) and CX006X00 (15.5 mg/kg) in Building T-68. These detections were just above the EPH method practical quantitation limit of 10 mg/kg. A total of 20 inorganics was reported. These low levels of contamination are consistent with the visual inspection of the concrete slab floors in Buildings T-62 and T-68 prior to sampling, which revealed no apparent signs of staining. Tables 3-1 and 3-4 of the Draft SI Report (MACTEC, 2004b) summarize the concrete chip analytical data.

Analytical data from the four sub-slab soil samples include detections of select VOCs, SVOCs, pesticides, inorganics, and EPH. VOC results were qualified "J" (i.e., estimated value below the practical quantitation limit). The majority of SVOC and pesticide results were either non-detects or estimated values (qualified as "J") below the practical quantitation limit. Only 4,4'-DDE (maximum concentration 0.0422 mg/kg), 4,4'-DDT (maximum concentration 0.172 mg/kg), alpha-benzenehexachloride (α-BHC) (maximum concentration 0.00074 mg/kg), endosulfan sulfate (maximum concentration 0.00207 mg/kg), and heptachlor (maximum concentration 0.00082 mg/kg) were reported at concentrations greater than the practical quantitation limit. PCB and VPH results were qualified as non-detect below the practical quantitation limit. Numerous EPH target compounds were reported at concentrations above the practical quantitation limit. The highest concentrations of organic compounds were reported in sub-slab samples from Building T-68. A total of 20 inorganics was reported. Visual inspection of the concrete slab floors in Buildings T-62 and T-68 prior to sampling revealed no apparent signs of staining and indicated that the floors were level, free of depression areas, of overall good integrity, and free of cracks that might serve as

release pathways to the subsurface. Tables 3-2 and 3-5 of the Draft SI Report (MACTEC, 2004b) summarize the sub-slab soil analytical data.

Analytical data from eighteen surface soil samples include detections of VOCs, SVOCs, pesticides, inorganics, and EPH. Only one VOC (tetrachloroethene at 0.033 mg/kg at sample location SS-73) was reported at a concentration greater than its practical quantitation limit. The majority of SVOC and pesticide results were either non-detects or estimated values (qualified as "J") below the practical quantitation limit. However, several PAHs were reported in samples from locations SS-69, SS-70, SS-072, and SS-73 at relatively high concentrations (e.g., maximum of 40.9 mg/kg for fluoranthene at location SS-72). Consistent with the SVOC data, several PAHs were also reported as EPH target compounds. C11-C22 range aromatics were reported at concentrations as great as 279 mg/kg. PCB and VPH results were qualified as non-detect below the practical quantitation limit. In general, concentrations were higher in 0 to 0.5-foot deep samples than in 1.5- to 2.0-foot deep samples (Figures 3-2 and 3-3 of the Draft SI Report). A total of 20 inorganics was reported. Tables 3-3 and 3-6 of the Draft SI Report (MACTEC, 2004b) summarize the surface soil analytical data. The source of PAH contamination is interpreted to be run-off from the paved areas adjacent to Buildings T-62 and T-68.

As discussed in Subsection 7.2.2, the 2005 removal action resulted in remaining soil concentrations whose 95-percent UCL did not exceed published MCP Method 1 (S-1/GW-1) criteria.

Subsurface soil and site-related groundwater contamination has not been identified at Buildings T-62 and T-68. There is no contaminated surface water or sediment associated with Buildings T-62 and T-68.

11.0 CURRENT AND POTENTIAL FUTURE LAND AND GROUNDWATER USES

This subsection discusses current and potential land and groundwater uses at the FPGS and Buildings T-62 and T-68

11.1 CURRENT AND POTENTIAL FUTURE LAND AND GROUNDWATER USES AT THE FPGS

The majority of land area at the FPGS is currently landscaped/grassed and used as open space, although approximately 0.4 acres along the southwest boundary is part of a larger paved parking lot. SSC is served by a public water supply, and there is no current use of groundwater at the FPGS. SSC and the FPGS are, however, within an area that Massachusetts has designated as a Zone II for the Town of Natick Springvale Water Supply Wells, located approximately 3,700 feet to the northwest of the FPGS.

SSC has no plans to develop or alter current land use at the FPGS and no plans to extract or use site groundwater. It is unlikely that FPGS groundwater will be used for residential use in the future. The SSC Master Plan and Town of Natick ordinance prohibit future installation of groundwater wells or potable use of groundwater at the FPGS. The SSC Master Plan (R&K Engineering, Inc., 2004) states:

> "Installation of any new potable water supply well on SSC is prohibited. Installation of any new water supply well on SSC for the purpose of supplying non-potable water shall be evaluated with respect to potential impact on the operating groundwater treatment system and potential human and environmental health risk prior to installation or use. This restriction shall be in effect as long as site conditions pose an unacceptable risk to human health or the environment and until SSC has received USEPA Certification of completion of the response actions for contaminated groundwater."

The Town of Natick Board of Health Regulations Chapter 5, also prohibit potable use of groundwater in the area vicinity of the FPGS as follows:

> Section 31.1: "Private wells for drinking water shall not be allowed where a public water supply is available in sufficient quantity and pressure so as to meet U.S. and Massachusetts drinking water standards."
>
> Section 32.2: "Private drinking water wells shall not be allowed in any case in an area bounded North Main Street, Lake Cochituate, West Central Street, and the Massachusetts Turnpike."

In addition, a Cooperative Agreement between the Department of the Army and the Town of Natick (Cooperative Agreement Number DAAD16-01-2-0003, March 23, 2001) provides the following language:

"Pursuant to a Memorandum of Understanding executed by the parties to this Agreement in December of 1999, the Town's Board of Health has enacted a regulation to prohibit the development of any private drinking water wells within the Town in the area bounded by Evergreen Road to the north, State Route 27 and Washington Avenue to the east, State Route 135 to the south, and Speen Street to the west. The Town will ensure that such regulation will remain in effect at least until remediation of the T-25 Site is completed as evidenced by the approval of the Remedial Action Completion Report by USEPA; or alternatively, the Army and the Town agree that such regulation is no longer required."

11.2 CURRENT AND POTENTIAL FUTURE LAND AND GROUNDWATER USES AT BUILDINGS T-62 AND T-68

The land surrounding Buildings T-62 and T-68 is predominantly paved and used for vehicle parking and container storage and handling. SSC is served by a public water supply, and there is no current use of groundwater at Buildings T-62 and T-68. SSC and Buildings are, however, within an area that Massachusetts has designated as a Zone II for the Town of Natick Springvale Water Supply Wells, located approximately 2,000 feet to the northwest of Buildings T-62 and T-68.

SSC has no plans to develop or alter current land use at Buildings T-62 and T-68 and no plans to extract or use site groundwater. It is considered unlikely that Buildings T-62 and T-68 groundwater will be used for residential use in the future.

12.0 SUMMARY OF SITE RISKS

12.1 SUMMARY OF POTENTIAL RISKS AT THE FPGS

An HHRA and a Baseline Ecological Risk Assessment (BERA) were completed as part of the FPGS RI to evaluate potential risks associated with exposure to media with site-related contaminants of potential concern (MACTEC, 2006b). The supplemental RI report (MACTEC, 2006c) contained an updated HHRA to evaluate the residual health risks associated with soil and groundwater following the soil removal action completed at the FPGS August 2002. The results of the HHRA and BERA are presented in Sections 6.0 and 7.0, respectively, of the RI Report for the FPGS (MACTEC, 2006b). The results of the updated HHRA are contained in Section 4.0 of the supplemental RI report (MACTEC, 2006c).

12.1.1 Post-Removal Action Human-Health Risk Assessment at the FPGS

This subsection summarizes the HHRA performed based on post-remediation conditions at the FPGS. The HHRA was performed using the confirmation soil sample results from the removal action and the post-remediation groundwater data (Quarterly Groundwater Monitoring Events 31 through 43) collected from monitoring wells at the FPGS. The supplemental HHRA used the risk assessment methodology and site-specific risk characterization approaches presented in Subsections 6.1 and 6.2, respectively, of the RI Report (MACTEC, 2006b). Updates to the risk assessment methodology that resulted from new or revised USEPA risk assessment guidance and that are incorporated in the supplemental HHRA and are noted in the following subsections.

12.1.1.1 Hazard Identification at the FPGS

The data used in the supplemental HHRA represented post-remedial conditions for soil and groundwater at the FPGS. The specific sources of the analytical data and selection of chemicals of potential concern (COPCs) for soil and groundwater are discussed below.

Soil. The purpose of the supplemental HHRA was to characterize risks associated with the existing site conditions. Therefore, the source of the soil data was confirmation soil samples collected from the bottom and sidewalls of the remedial excavation area, plus the RI soil sampling data from sample locations that were not remediated. Soil data sets were developed for surface soil (unpaved soil 0 to 2 feet bgs) and subsurface soil (2 to 10 feet bgs). Confirmatory soil samples collected from intervals that began at the ground surface were included in the surface soil data set. Confirmatory soil samples collected between 10 and 10.5 feet bgs were included in the 2 to10 feet bgs data set.

The soil data summary and COPC selection are presented in Tables 12-1 (surface soil) and 12-2 (subsurface soil). Data summary methods and COPC selection were completed using the technical approach described in Section 6.0 of the Final RI Report (MACTEC, 2006b), with the following modifications:

- For samples that have field duplicates, the higher of the detected concentrations among the original and field duplicate were used in the risk assessment.

- For samples that underwent laboratory re-analysis, the higher of the reported concentrations and lower of the detection limits between the original and re-analysis samples were used in the risk assessment.

- The most up-to-date available risk-based screening values were used to select COPCs; these are the USEPA Region IX PRGs (USEPA, 2004c).

The COPCs selected in surface soil were acetophenone, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, isodrin, aluminum, arsenic, manganese, mercury, thallium, vanadium, and diesel range organics. The COPCs selected in subsurface soil were acetophenone, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, isodrin, aluminum, arsenic, manganese, thallium, and vanadium. Acetophenone, isodrin, and diesel range organics were retained as COPCs because there are no Region IX PRG values for these chemicals, whereas the other analytes were retained as COPCs because they were detected at concentrations in excess of the Region IX PRGs.

Groundwater. The source of groundwater data is samples collected from 11 monitoring wells that were sampled up to 13 times between September 2002 and October 2005. All samples were analyzed for VOCs, and a limited number of samples were analyzed for natural attenuation parameters and inorganics. Monitoring well MW-127A-2 was analyzed for pesticides, PCBs, and metals in the February and March 2004 sampling events. Monitoring wells MW-4, MW-5R, MW101A-2, and MW102B-2 were analyzed for total and/or dissolved manganese. These wells include all but four of the groundwater wells that were evaluated in the final RI risk assessment. Wells MW-10B, MW-14B, MW-19A-2, and MW-103A-4 were not included in the groundwater data set evaluated in this supplemental HHRA because the most recent data for these four wells were from July 1999 (sampled for VOCs during that round of sampling). The VOC data for the other monitoring well locations evaluated in the updated risk assessment data set were more recent and represented post-remedial groundwater conditions.

The groundwater data summary and COPC selection is presented in Table 12-3. Data summary methods and COPC selection were completed using the technical approach described in Section 6.0 of the Final RI Report (MACTEC, 2006b), with the following modifications:

- For samples that have field duplicates, the highest of the detected concentrations among the original and field duplicate were used in the risk assessment.

- For samples that underwent laboratory re-analysis, the highest of the reported concentrations and lowest of the detection limits between the original and re-analysis samples were used in the risk assessment.

- The most up-to-date available risk-based screening values and applicable or relevant and appropriate requirements (ARARs) were used to select COPCs; these are the USEPA Region IX PRGs (USEPA, 2004c) and USEPA MCLs (USEPA, 2004b).

The COPCs selected in groundwater were tetrachloroethene, trichloroethene, dieldrin, manganese, and nitrate/nitrite. These analytes were retained as COPCs because they were detected at concentrations in excess of the PRGs. Benzene was detected at a maximum concentration (0.00036 milligrams per liter [mg/L]) slightly higher than the tapwater PRG (0.00035 mg/L). However, the maximum concentration was associated with a sample collected in February, 2004 from well MW-127A-2, and six subsequent rounds of samples collected from that well were non-detect for benzene. Benzene was not detected at a concentration greater than the PRG in any of the other monitoring wells. Therefore, benzene was not retained as a COPC in groundwater.

12.1.1.2 Exposure Assessment at the FPGS

In the exposure assessment, the site conceptual model and information concerning the current and anticipated future land uses are used to identify receptors, possible exposure points, and potentially complete exposure pathways. This subsection presents the results of the exposure assessment for the FPGS.

Potential Receptors and Exposure Pathways. The FPGS is largely comprised of an open grassy area with several ornamental trees. The site is located near the SSC main gate, and is bordered by South Pond Lake Cochituate, Sixth Avenue, Kansas Street, and a paved parking lot. The shoreline of South Pond Lake Cochituate is a wooded area; vegetation extends from the water line, up a steep embankment, to the grassy area. Little Roundy Pond and military family housing for SSC personnel are located to the northeast of the FPGS, outside of the controlled access area. Civilian residential areas exist along the entire upland boundary at SSC. The Town of Natick Springvale Water Supply Wells are located approximately 3,700 feet to the north and northwest of the FPGS (see Figure 6-1).

The FPGS does not have a specific use. There are no buildings at the site, and no groundwater supply wells are located at the site. The FPGS is posted with a sign indicating that recreational

activities are prohibited. However, the landscaping is maintained by SSC facility workers. Although the northwestern-most portion of the FPGS is located only 50 feet from the SSC property line, and less than 100 feet from the nearest residence, unauthorized access to the site by persons not associated with SSC (i.e., trespassers) would be difficult. This is due to the proximity of the site to the SSC main gate (which is guarded), and because the site and facility are fenced. In addition, the dense vegetation and steep embankment between the FPGS and in South Pond Lake Cochituate make access to the site from the shoreline difficult.

The shoreline in the vicinity of the FPGS is wooded, and there is no beach or area to land a boat. South Pond Lake Cochituate is approximately 1 foot deep near the shoreline of the FPGS, and drops to approximately 10 feet deep 20 feet off the shoreline of the FPGS. The lake is actively used for water sports (e.g., water skiing).

The future use of SSC is anticipated to remain the same as the current use (i.e., a research, development, and testing facility, with military residential housing). Due to the proximity of military housing to the FPGS, future expansion of this housing to include a portion of FPGS can not be excluded, although this is not planned. Also, since the site was at one time slated to be the location of a gymnasium, future use of the site for a new recreational or commercial building cannot be ruled out. The land in the vicinity of SSC is anticipated to remain mixed commercial/residential.

Contact with soil is primarily a concern when activities are performed that can generate dust (e.g., lawn mowing or excavating soil) or result in close body contact with the soil (e.g., excavation or high impact sports such as football). Through these activities, contact with the soil can occur through inhalation of dust that is blown into the air, absorption of chemicals through the skin from soil particles that adhere to the skin, and incidental ingestion of soil particles during hand-mouth contact. Contact with soil through these exposure routes may be more likely when the soil is devoid of vegetation or significant moisture content.

Groundwater is contacted when it is used as a source of potable water. The exposure routes associated with potable groundwater use include ingestion of groundwater as drinking water, dermal contact during bathing and other household uses (e.g., washing dishes, automobiles, etc.), and inhalation of volatile chemicals that may volatilize from the groundwater during these uses. Volatile inhalation exposures are most relevant when the water is heated and/or used in manner that aerates it (e.g., during showering). Groundwater may be contacted when used for industrial

purposes. The likelihood of groundwater contact would depend on the type of application in industry. For example, no contact would be expected with groundwater used in closed systems, but contact might be expected with groundwater used in open systems (e.g., water baths or for washing). For industrial uses, ingestion of groundwater would not be expected. However, dermal contact and inhalation of volatiles may occur.

Under the current land use conditions, possible exposures to surface soil are only realistic for SSC facility maintenance workers. This is because these are the only people who routinely visit the site and engage in activities that could result in exposure to surface soil (e.g., grass mowing). Trespassing by people living off-site is unlikely under current land use, but cannot be ruled out. The FPGS is accessible to residents living at SSC, although there are no attractions at the FPGS that would make visiting the FPGS more likely than other areas at SSC. Under future land use conditions, trespassing could be more likely if the facility changed land use and was not as actively guarded and patrolled. In addition, if the FPGS was developed for the location of a commercial/facility building or if existing housing was expanded to include the FPGS, commercial/industrial workers and residents could potentially be exposed to surface soils. Because there are no on-going or immediately planned excavation activities at the FPGS, exposures to subsurface soil are improbable under current land use. If the site was redeveloped in the future, construction and utility workers could be exposed to surface and subsurface soils. In accordance with USEPA Region I guidance (USEPA, 1995), it is assumed that residents could also be exposed to subsurface soil in the event that subsurface soils were relocated to the surface during development (excavation) activities. Possible exposures to COPCs in surface soils and subsurface soils could occur through incidental ingestion, dermal contact, and inhalation of soil-derived dusts.

Because SSC is supplied with potable and industrial water from the Town of Natick public water supply, groundwater at SSC is not currently used, and there are no plans to install supply wells in the future. Even if SSC closes in the future, it is unlikely that potable or industrial water supplies would be obtained from groundwater beneath the facility due to the availability of municipal water. However, groundwater beneath SSC is considered to be an aquifer that requires protection as a potable groundwater resource by the State of Massachusetts (i.e., is considered to be Category GW-1 groundwater). Therefore, the risk assessment evaluated *hypothetical* potable exposures to groundwater. Hypothetical potable use of groundwater would be associated with exposures to COPCs through groundwater ingestion, dermal contact, and volatile inhalation.

VOCs in groundwater beneath a building could, hypothetically, migrate from groundwater to air within the building. To evaluate the potential significance of this exposure pathway, maximum detected concentrations of VOC COPCs in groundwater were compared to USEPA draft screening-level concentrations for vapor intrusion (USEPA, 2002b) as well as a range of risk-based concentrations. As shown below, the maximum detected groundwater concentrations of all VOC COPCs are well below the draft screening levels and are within the USEPA acceptable risk range, indicating that VOCs would not pose a volatile migration concern.

Volatile Organic COPC in Groundwater [a]	Maximum Concentration (µg/L)	OSWER Guidance Screening Level [b] (µg/L)	1×10^{-6} Risk-based Screening Level (µg/L)	1×10^{-5} Risk-based Screening Level (µg/L)	1×10^{-4} Risk-based Screening Level (µg/L)
Tetrachloroethylene	3.2	5	0.4	4	40
Trichloroethylene	2.1	5	0.02[1] - 1.2 [2]	0.2 [1] - 12 [2]	2 - 120

[a] Although tetrachloroethene has been detected in monitoring well MW114B-2 located in the parking lot southwest of the FPGS, this well is not considered part of the FPGS, and data for that well were not considered in the risk assessment. It was grouped, however, with the FPGS during several quarterly groundwater monitoring events for convenience during sample collection.
[b] – Values from Table 2c of "Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils"; values based on lesser of an HI of 1 or ELCR of 1×10^{-6}.

Under the current and foreseeable future land use conditions, the following exposure pathways are assumed to be potentially complete for soil and groundwater.

Exposure Media	Exposure Point	Exposure Route	Receptor
Surface soil	Soil	Incidental ingestion, dermal contact	Trespasser, SSC worker, resident, commercial/industrial worker
	Air (dust)	Inhalation	Trespasser, SSC worker, resident, commercial/industrial worker
Subsurface soil	Soil	Incidental ingestion, dermal contact	Construction worker, resident
	Air (dust)	Inhalation	Construction worker, resident
Groundwater	Water	Ingestion, dermal contact	Potable use, industrial use (a)
	Air (vapors)	Inhalation	Potable use, industrial use (a)

(a) As described in *Exposure Scenarios*, below, potable use of groundwater is evaluated using a residential exposure scenario.

Exposure Scenarios. Exposure scenarios are used to quantitatively describe the COPC exposures that could theoretically occur for each evaluated land use and exposure pathway. The exposure scenarios are used in conjunction with EPCs to derive quantitative estimates of COPC intake. The COPC intakes are subsequently combined with dose-response data in the risk characterization to calculate estimates of cancer and non-cancer health risk. In accordance with USEPA risk assessment guidance (USEPA, 1989), exposure scenarios are developed to characterize potential exposures to the "most exposed" receptor population. Therefore, one exposure scenario is often selected to provide a conservative evaluation of the range of possible receptors and populations that could be exposed at the site.

As discussed in Section 6.2 of the Final RI Report (MACTEC, 2006b), prior to remediation, the health risks associated with potential exposures to soil and groundwater were within the USEPA cancer risk management range of $1x10^{-6}$ to $1x10^{-4}$ (and in fact, below an ELCR of $1x10^{-5}$) and equal to or below an HI of 1 for all receptor scenarios except the residential land use scenario. Since risks for non-residential land use scenarios were within USEPA risk management criteria prior to remedial activities at the FPGS, they would be lower now, following remediation. Therefore, only the residential land use scenario was evaluated in the supplemental HHRA. The residential land use scenario is conservative for all other land use scenarios.

The residential scenario evaluates possible exposures to populations who could reside at the site in the future and may come in contact with surface soil, subsurface soil, and groundwater used as a potable water source.

A child resident (ages 0 to 6 years) and child and adult residents over 6 years of age were evaluated to estimate risks associated with possible future residential exposures to soil. Under the reasonable maximum exposure (RME) scenario it was assumed that exposure occurs for 6 years (representing ages 0 to 6) for a child, and for 24 years for an adult (resulting in a total exposure duration of 30 years). Possible exposures to surface soil and subsurface soil for a resident were evaluated for ingestion, dermal contact, and inhalation of dust. RME values used to calculate risks for soil are presented in Table 12-4, and are based on default values for residential exposures (USEPA, 1994 and 2004a).

Although it is unlikely that any water supply wells will be installed at SSC in the future, the risk assessment evaluated hypothetical use of the groundwater as a source of potable water. Potable use of groundwater was evaluated using a residential scenario. This scenario assumes that residents use the groundwater as their sole source of household water. Because the FPGS groundwater is not migrating off SSC property, contact with FPGS groundwater would only occur if a private or municipal supply well was installed at the FPGS, which is an unlikely situation. Therefore, this exposure scenario evaluated a *hypothetical* future exposure.

Exposure was assumed to occur 350 days per year, for six years (child) and 24 years (adult) (USEPA, 1994). Exposures to groundwater were evaluated for the ingestion, dermal contact, and volatile inhalation exposure routes. Dermal contact and volatile inhalation were assumed to primarily occur during bathing and dish washing activities. Consistent with USEPA Region I guidance, volatile inhalation exposures were not quantitatively evaluated for potable groundwater use scenarios, but rather were qualitatively assessed in the risk characterization from tapwater ingestion risk estimates (USEPA, 1995). RME values for ingestion and dermal contact exposure parameters are primarily based on USEPA default values (USEPA, 1994; 2004a) and are presented in Table 12-5.

Exposure Points. The exposure point is the location where exposure to an exposure medium occurs. For soil, the exposure points were represented by the soil samples collected at the FPGS from surface soil (depths between ground surface and 2 feet bgs) and subsurface soil (soil from depths between 2 and 10 feet bgs [including soil samples collected between 10 and 10.5 feet bgs]). According to USEPA Region I guidance, each groundwater monitoring well was considered a separate exposure point (USEPA, 1995).

Exposure Point Concentrations. The EPCs are presented in Tables 12-6 and 12-7 (soil) and 12-8 (groundwater). In accordance with USEPA Region I guidance, the RME EPCs for all media except groundwater used as tapwater were the lesser of the 95 percent upper concentration limit (UCL) concentrations or the maximum detected concentrations (USEPA, 1995). The 95 percent UCLs were calculated using the USEPA ProUCL software (V. 3.02) in accordance with USEPA guidance for calculating EPCs (USEPA, 2002a).

For groundwater, the RME EPC is the concentration detected at each well head (USEPA, 1995). Evaluation of the maximum detected concentrations across all wells provides a conservative

assessment of potential exposures and also streamlines the risk assessment. A review of the groundwater data for tetrachloroethene and trichloroethene indicates that the majority of detected concentrations, and highest of the detected concentrations, were associated with monitoring well MW-5R. The trichloroethene and tetrachloroethene concentrations measured in well MW-5R showed no discernable trends in concentrations among the 13 rounds of samples collected over a three-year period. Tetrachloroethene detections ranged between 1.4 and 3.2 µg/L, with an arithmetic mean of 2.2 µg/L. Trichloroethene concentrations ranged between 0.16 (J-qualified values below the detection limits) and 2.1 µg/L, with an arithmetic mean of 0.87 µg/L. The arithmetic mean concentrations (also referred to as the temporal average concentrations) are representative of the concentrations to which a user of the groundwater at that location would be exposed over the long-term. Therefore, the EPCs for these two COPCs were represented by the arithmetic mean concentrations among all 13 rounds of sampling at MW-5R. For the other COPCs in groundwater, a limited number of samples have been collected. Therefore, the maximum detected concentrations were used as the EPCs.

Calculation of Intakes. Using the intake equations presented in Tables 12-4 and 12-5, the EPCs were combined with exposure parameters to calculate COPC intakes for the various exposure routes evaluated for each exposure scenario. The intake calculations for the FPGS are presented in Tables 12-9 through 12-12

12.1.1.3 Dose-Response Assessment at the FPGS

The dose-response assessment was performed using the methods described in Section 6.1 of the Final RI Report (MACTEC, 2006b). The only changes in the supplemental HHRA from the methodology presented in the Final RI Report were the sources of information used to identify dose-response values, and adjustments to account for early life susceptibility to certain carcinogenic COPCs.

12.1.1.4 Updates to Sources of Dose-Response Data at the FPGS

In accordance with recent USEPA guidance (USEPA, 2003), a hierarchy of sources for obtaining dose-response values was used that is different from the hierarchy presented in the Final RI Report (MACTEC, 2006b).

Tier 1- Integrated Risk Information System (IRIS) (http://www.epa.gov/iris/).

-In accordance with USEPA guidance, the main source of dose-response values is IRIS, which is a database established by USEPA containing validated data on many toxic substances found at hazardous waste Sites. This database, current as of December 2006 (USEPA, 2006a), was used to identify the slope factors (SFs), unit risks (URs), reference doses (RfDs), and reference concentrations (RfCs) applied in the updated risk assessment.

Tier 2- National Center for Environmental Assessment (NCEA) provisional peer reviewed toxicity values (PPRTVs) (http://hhpprtv.ornl.gov/).

- NCEA's PPRTVs are developed by the Superfund Technical Support Center (STSC) for the USEPA Superfund program. STSC's reassessment of USEPA Health Effects Assessment Summary Tables (HEAST) toxicity values, as well as development of PPRTVs in response to Regional or Headquarters Superfund program requests, are consistent with Agency practices on toxicity value development, use the most recent scientific literature, and are supported by both internal and external peer review, providing a high level of confidence in the use of these values in the Superfund Program. The PPRTVs used in the updated HHRA were obtained from the USEPA Region IX PRG Table (USEPA, 2004c) and the USEPA Region III Risk-Based Concentration Table (USEPA, 2006b).

Tier 3 - Other toxicity values:

- California EPA's (CAL EPA) toxicity values. CAL EPA develops cancer SF, UR, and RfC values. Cal EPA toxicity values are obtained on the Cal EPA website at http://www.oehha.ca.gov/risk/chemicalDB//index.asp. The CAL EPA toxicity values used in the updated HHRA were current as of August 2005 for cancer SFs and URs, and February 2005 for RfCs.

- Agency for Toxic Substances and Disease Registry (ATSDR) Minimal Risk Levels. ATSDR Minimal Risk Levels (MRLs) address non-cancer effects only, and are available on the ATSDR website at http://www.atsdr.cdc.gov/mrls.html. MRL values for chronic exposure were used as chronic RfD and RfC values. The MRL values used in the updated HHRA were current as of December 2005.

- Toxicity values remaining in current versions of HEAST (USEPA, 1997).

Dose-response values are presented in Tables 12-13 through 12-16.

12.1.1.5 Adjustment for Early Life Exposures to Carcinogens with a Mutagenic Mode of Action

USEPA has developed guidance for characterizing cancer susceptibility associated with early life exposures (e.g., young children) to potentially carcinogenic chemicals (USEPA, 2005). The approach developed by USEPA to characterize cancer risks for early life stages includes consideration of differences in physiology and behavior between children and adults, as well as differences in susceptibility to tumor development between children and adults. Physiological and behavioral differences are accounted for in the exposure assessment, whereby age-specific exposure parameters (e.g., body weights, ingestion rates, inhalation rates, contact frequencies) are applied to the various age groups evaluated in the risk assessment. Differences in susceptibility to tumor development are accounted for by considering the carcinogenic mode of action in accordance with the mode of action framework developed by USEPA (USEPA, 2005).

In accordance with the mode of action framework, for chemicals that initiate carcinogenesis by a mutagenic mode of action and for which data concerning differential susceptibility for early life stages is available, USEPA may develop cancer slope factors that are applicable to specific ages (e.g., infants and young children, adults). This approach has been used by USEPA to develop cancer slope factors for vinyl chloride. If chemical-specific data are not available to differentiate susceptibility among various life stages, the mode of action framework recommends application of age-dependant adjustment factors (ADAFs) to develop risk estimates. The ADAFs reflect USEPA's conclusion that cancer risks for chemicals that act by a mutagenic mode of action are generally higher from early-life exposure than from similar exposures later in life; the ADAFs developed by USEPA are as follows (USEPA, 2005):

- For exposure before 2 years of age (i.e., spanning a 2-year time interval from the first day of birth until a child's second birthday), the ADAF = 10
- For exposure between 2 and less than 16 years of age (i.e., spanning a 14-year time interval from a child's second birthday up until their sixteenth birthday), the ADAF = 3
- For exposures after turning 16 years of age, no adjustment is required (i.e., ADAF = 1)

USEPA has initially identified 12 chemicals for which the mode of action framework should be applied (USEPA, 2006c). Potentially carcinogenic PAHs are among the chemicals included on the list; five of those PAHs were retained as COPCs in this risk assessment (benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene).

USEPA indicates that the ADAFs should be applied to evaluate cancer risks associated with potential exposures to these PAH compounds. Therefore, the ADAFs identified above are used to characterize cancer risks for the carcinogenic PAH COPCs evaluated in this risk assessment.

In this risk assessment, exposure scenarios that include children (i.e., residential land use scenarios) are evaluated using two age groups (children less than 6, and adults), rather than the four age groups for which ADAFs were developed. The children less than 6 group encompasses the less than 2 and 2 to less than 6 ages identified in the mode of action framework, and the adult group encompasses the children 6 to less than 16 and 16 and older ages identified in the mode of action framework. To accommodate these differences, the ADAFs were applied in the updated risk assessment to the cancer risk calculations for PAHs as follows:

- For young children (ages less than 6), an ADAF of 5.3 was applied to the oral, dermal and inhalation intakes of the carcinogenic PAHs. The ADAF of 5.3 was derived as an age-weighted value for ages less than 2 (ADAF = 10) and 2 to less than 6 (ADAF = 3) as follows: [(2 yrs x 10) + (4 yrs x 3)] / 6 yrs = 5.3.

- For older children/adults, (ages 6 to less than 30), an ADAF of 1.8 was applied to the oral, dermal and inhalation intakes of the carcinogenic PAHs. The ADAF of 1.8 was derived as an age-weighted value for ages 6 to less than 16 (ADAF = 3) and ages 16 to less than 30 (ADAF = 1) as follows: [(10 yrs x 3) + (14 yrs x 1)] / 24 yrs = 1.8.

- The cancer risks for the young child and older child/adult were summed together to yield a total cancer risk estimate (aggregate risk) for the residential receptor.

12.1.1.6 Risk Characterization for the FPGS

This subsection presents the results of the risk characterization for the FPGS supplemental HHRA. Quantitative estimates of cancer and non-cancer health risk were calculated by combining the quantitative COPC intake estimates with the dose-response data, as described in Section 6.1 of the Final RI Report (MACTEC, 2006b). The relative significance of health risks were interpreted through comparison with cancer and non-cancer risk threshold criteria for CERCLA sites, as presented in the NCP (USEPA, 1990). Tables 12-9 through 12-12 provide the risk calculations. Tables 12-17 through 12-20 provide summaries of the risk estimates.

The RME risk estimates for the residential exposure scenario were estimated for the following possible exposures:

- Incidental ingestion, dermal contact, and fugitive dust inhalation exposures to soil
- Ingestion, dermal contact, and inhalation exposures to groundwater used as potable water

The following table provides a summary of the risk estimates presented in Tables 12-17 through 12-20.

	Excess Lifetime Cancer Risk	**Hazard Index**
Surface Soil		
Child resident	$2x10^{-5}$	0.3
Adult resident	$4x10^{-6}$	0.03
Total resident [1]	$2x10^{-5}$	0.3
Subsurface Soil		
Child resident	$1x10^{-5}$	0.3
Adult resident	$4x10^{-6}$	0.03
Total resident [1]	$1x10^{-5}$	0.3
Groundwater		
Child resident [2]	$5x10^{-5}$	51
Adult resident [2]	$6x10^{-5}$	15
Total resident [1]	$1x10^{-4}$	51
Cumulative Resident – Groundwater and Surface Soil [3]	$1x10^{-4}$	51
Cumulative Resident – Groundwater and Subsurface Soil [3]	$1x10^{-4}$	51

[1] – Excess lifetime cancer risk is the sum of child and adult values; HI is the greater of the child and adult values.
[2] – In accordance with USEPA Region I guidance, risks associated with vapor inhalation during household use of water are approximated using the ingestion risk estimates for VOCs. Therefore, the total risks presented include a double-counting of the tapwater ingestion risks for VOCs.
[3] – Sum of risks and child HI values for soil and groundwater.

As indicated in this table, the ELCR of $2x10^{-5}$ for residential land use exposures to surface soil and $1x10^{-5}$ for residential land use exposure to subsurface soil are within the USEPA cancer risk management range of $1x10^{-6}$ to $1x10^{-4}$, and the highest HI values of 0.3 (child) and 0.03 (adult) are below an HI of 1. These cancer risks appear unchanged from the cancer risks that were calculated for the pre-remediation conditions ($1x10^{-5}$) in the Final RI Report. However, this is due to changes in the dose-response assessment that have been included in the Supplemental HHRA. If the cancer risks in the Final RI risk assessment were calculated using the updated dose-response assessment used in this Supplemental HHRA, it would be evident that cancer risks associated with

post-remediation soil conditions are lower than cancer risks associated with the pre-remediation soil conditions.

The ELCR for groundwater of $1x10^{-4}$ is also within the USEPA cancer risk management range of $1x10^{-6}$ to $1x10^{-4}$, and the cumulative risk associated with soil and groundwater is equal to the upper bound of the cancer risk management range. This cancer risk is lower than the cancer risk that was calculated for the pre-remediation conditions ($2x10^{-4}$) in the Final RI Report. The predominant contributor to cancer risk in groundwater is dieldrin, with a cancer risk of $5x10^{-5}$. Tetrachloroethene and trichloroethene contribute the balance of the cancer risk in groundwater ($6x10^{-5}$). The maximum concentrations of tetrachloroethene and trichloroethene are below the federal MCLs. (MCLs are not published for dieldrin.)

Cancer risks for trichloroethene were calculated using the upper-bound SF developed by NCEA of 0.4 per mg/kg/day. NCEA provisional dose-response values are not among the sources of dose-response values recommended by USEPA (USEPA, 2003). However, previous comments from USEPA Region I on risk assessments for Natick SSC have requested use of the NCEA provisional SF for characterization of trichloroethene risks. CAL EPA has published an SF for trichloroethene of 0.013 per mg/kg/day, which is considered a Tier 3 dose-response value (USEPA, 2003). The cancer risk associated with trichloroethene in groundwater that would be calculated using the CAL EPA SF would be less than $1x10^{-6}$.

The HI values for groundwater of 15 (adult) and 51 (child) exceed the non-cancer risk management threshold HI of 1. The contributors to the HI values are nitrate/nitrite (child hazard quotient [HQ] of 33) and manganese (child HQ of 17). The HI for all other COPCs is below 1. In the absence of specific analytical data indicating whether nitrate/nitrite is nitrate or nitrite, risks for nitrate/nitrite were characterized using the dose-response value for nitrite to be conservative. If the nitrate/nitrite were actually nitrate, the HI for the child would be approximately 3.

The Natick SSC background data set for groundwater is represented by monitoring wells that are located both on and off the Natick SSC property and are unaffected by releases associated with Natick SSC. The background data set includes some monitoring wells with high turbidity values. The maximum detected manganese concentration in FPGS groundwater is 4 mg/L, which is within the background range of 0.009 to 7 mg/L. Review of the Field Data Records for monitoring wells MW-5R and MW-127A-2 indicates these wells exhibit relatively high turbidity during purging

and sampling. Therefore, the elevated concentrations of manganese in groundwater at the FPGS may be associated with suspended solids and turbid samples.

Dose response values for isodrin (a pesticide) and diesel range organics, both retained as COPCs in soil, are not available from USEPA-approved sources. Therefore, risks associated with these two COPCs could not be quantitatively assessed. Isodrin was detected at a maximum concentration of only 5 micrograms per kilogram, suggesting that it is not a substantial contaminant at this Site. Diesel range organics were detected at a maximum concentration of only 90 mg/kg, which is less than the lowest soil cleanup standard for petroleum published by the Commonwealth of Massachusetts (100 mg/kg) in the MCP (Table 2, 310 CMR 40.0975(6)(a)).

12.1.1.7 Summary and Conclusions for the FPGS

The supplemental HHRA was performed to evaluate the residual health risks associated with soil and groundwater following the soil remediation at the FPGS that was completed in August 2002.

The COPCs selected in soil were acetophenone, benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a.h]anthracene, isodrin, aluminum, arsenic, manganese, mercury, thallium, and vanadium. The COPCs selected in groundwater were tetrachloroethene, trichloroethene, dieldrin, manganese, and nitrate/nitrite.

Prior to the soil remediation at the FPGS, the health risks associated with potential exposures to soil and groundwater were within the USEPA cancer risk range of $1x10^{-6}$ to $1x10^{-4}$ (and in fact, below an ELCR of $1x10^{-5}$) and equal to or below an HI of 1 for all receptor scenarios except the residential land use scenario. Since risks for non-residential land use scenarios were within USEPA risk management criteria prior to remedial activities at the FPGS, they would be lower now, following remediation. Therefore, only the residential land use scenario was evaluated in the supplemental HHRA. The future land use at the FPGS is anticipated to remain the same (i.e., automobile parking and grassed area). However, the future residential land use scenario was used as a conservative approach as compared to all other land use scenarios.

The ELCR for residential land use exposures to soil are within the USEPA cancer risk range, and non-cancer risks are below an HI of 1. The post-remediation cancer risk is lower than the pre-remediation cancer risk, and the HI is unchanged. The ELCR for groundwater is also within the

USEPA cancer risk range, and is lower than the risk calculated for pre-remediation conditions. The cumulative (child and adult) ELCR associated with soil and groundwater is $1x10^{-4}$ (the upper bound of the USEPA cancer risk range), which is lower than that calculated for pre-remediation conditions.

The non-cancer HI values for groundwater exceeded the risk management threshold HI of 1. The primary contributors were nitrate/nitrite and manganese. In the absence of specific analytical data differentiating between nitrate and nitrite, risks for nitrate/nitrite were characterized using the dose-response value for nitrate to be conservative. If nitrite were used, the HQ would decrease from 33 to approximately 3. The cumulative (child and adult) non-cancer risk associated with soil and groundwater is greater than an HI of 1. However, as discussed in Subsection 12.1.1.2, these risk estimates are based on *hypothetical* exposures (i.e., potable use of groundwater) that are not likely to occur in the future.

As discussed in Subsection 10.1.5, there are no identified releases of nitrate/nitrite or manganese associated with SSC test or training activities at the FPGS, and neither is considered to be Site related. The presence of nitrate/nitrite in groundwater at the FPGS is attributed to upgradient reliance on septic tanks and leach fields for residential wastewater disposal. An extensive area of Natick north and east (i.e., upgradient) of the FPGS is not served by public sewers.

The presence of manganese in groundwater at the FPGS is attributed to reductive dissolution from soil as a result of bacterial respiration. The source of organic carbon for the bacterial metabolism is attributed to primarily to upgradient reliance on septic tanks and leach fields for residential wastewater disposal. Although leach fields remove most organic carbon from domestic wastewater, low concentrations can remain and support bacterial populations in downgradient areas.

12.1.2 Ecological Risk Assessment

As part of the RI, a Tier I ERA was performed to evaluate potential impacts to ecological receptors at the FPGS from exposure to site contamination. Potential exposure to surface soil, surface water, and sediment were evaluated.

12.1.2.1 Surface Soils

Surface soil risks were classified as low, and incremental risks were insignificant. The surface soils are associated with a small area of relatively low quality habitat (i.e., maintained grass), and much higher quality terrestrial habitat is available in other areas nearby. Therefore, it was concluded that the surface soils at the FPGS pose no significant risk to resident or migratory wildlife species.

No additional surface soil data have been collected at the FPGS since the RI. Only subsurface soil and groundwater data have been collected as a result of the removal action and post-remediation monitoring activities. Therefore, there has been no change in the outcome of the BERA performed during the RI as a result of the removal action and subsequent post-remediation monitoring.

12.1.2.2 Surface Water

Surface water risks were also low, and incremental risks were insignificant. It was therefore concluded that the surface water at the FPGS is unlikely to pose a risk to ecological receptors.

Only subsurface soil and groundwater data have been collected as a result of the removal action and post-remediation monitoring activities. Therefore, there has been no change in the outcome of the BERA performed during the RI as a result of the removal action and subsequent post-remediation monitoring.

12.1.2.3 Sediment

Sediment risks ranged from low to high based on the conservative ecological screening benchmarks. Incremental risks based on maximum concentrations were potentially significant, but incremental risks based on average concentrations were insignificant. Maximum concentrations of PAHs were detected in a single sediment location collected directly below the outfall of the French drain. Therefore, the BERA concluded that PAHs and pesticides in sediments at the FPGS are unlikely to pose a risk to ecological receptors.

12.1.3 Basis for Remedial Action at the FPGS

Based on the results of the human-health and ecological risk assessments and the conclusion that nitrate/nitrite and manganese are not site-related, no further action is necessary at the FPGS.

12.2 SUMMARY OF POTENTIAL RISKS AT BUILDINGS T-62 AND T-68

As part of the SI, a screening-level human-health risk screening was completed for the Building T-62 and T-68 Area in accordance with the Draft Final Site Investigation Work Plan (MACTEC, 2004a). USEPA Region IX PRGs were used to select COPCs which were detected at concentrations that may pose more than a *de minimis* health risk (i.e., ELCR greater than 1 in 1,000,000 and non-cancer HQ greater than 1). A chemical was selected as a COPC if the maximum concentration exceeded the Region IX PRG for the direct contact residential exposure pathway. The risk screening identified several target inorganic analytes as COPCs in concrete chips. These analytes included aluminum, arsenic, chromium, iron, and manganese. It should be noted, however, that aluminum and iron are normal constituents of portland cement and concrete. Table 3-7 of the Draft SI Report lists soil COPCs exceeding Region IX PPGs.

Risk screening of soil analytical data identified several inorganic and PAH COPCs. Inorganic analytes that exceed the screening values included aluminum, arsenic, chromium, iron, manganese, and vanadium. PAHs which exceed the PRGs include benzo[a]anthracene, benzo[a]pyrene, benzo[b]fluoranthene, dibenz[a,h]anthracene, and indeno[1,2,3-cd]pyrene. The target VOCs tetrachloroethene and trichloroethylene exceeded the PRG only in the duplicate sample and not the associated primary sample collected from the 0.0 to 0.5 feet bgs at one location. The PRG was also exceeded for trichloroethene at a second location in the 0.0 to 0.5 feet bgs sample interval. The pesticide 4,4'-DDT exceeded the PRG in the 1.5 to 2.0 feet bgs sample interval at a third location.

As discussed in Subsection 7.2.1, the 2005 removal action targeted PAH- and EPH-contaminated soil with chemical concentrations exceeding MCP Method 1 (S-1/GW-1) standards. Confirmation soil samples were collected at nine locations at the bottom of the completed excavation (3 feet bgs) west and north of Building T-62. Of these nine samples, only one location exhibited concentrations of three PAHs slightly above the published MCP Method 1 (S-1/GW-1) criteria. The average concentration for these compounds in the confirmation soil samples was below the published MCP Method 1 (S-1/GW-1) criteria. The maximum detected concentration of these

PAHs was below the then proposed revised MCP Method 1 (S-1/GW-1) criteria, which became effective in April 2006. Additionally, the 95-percent UCL, which would represent the EPC in a risk assessment, did not exceed the current published MCP Method 1 (S-1/GW-1) criteria. This information is presented in Table 4-2 of the Removal Action Completion Report (MACTEC, 2006a).

Because Buildings T-62 and T-68 are surrounded by extensive pavement and only a very small unpaved area, it was concluded that ecological habitat was too limited to justify an ecological risk evaluation. No ecological risks have been identified at Buildings T-62 and T-68.

12.3 BASIS FOR REMEDIAL ACTION AT BUILDINGS T-62 AND T-68

Based on the results of the screening-level HHRA, no further action is necessary at Buildings T-62 and T-68.

13.0 DOCUMENTATION OF SIGNIFICANT CHANGES FROM PREFERRED ALTERNATIVE OF PROPOSED PLAN

The Army released a Proposed Plan for remedial action at the FPGS and Buildings T-62 and T-68 on March 15, 2007. The Proposed Plan identified No Further Action as the Preferred Alternative for the FPGS and Buildings T-62 and T-68. During the public comment period, the Army received one comment.

There have been no significant changes made to the preferred alternative for FPGS and Buildings T-62 and T-68 presented in the Proposed Plan.

14.0 STATE ROLE

The Mass DEP has reviewed this Record of Decision and has indicated its support for the selected remedies. The State has reviewed the RI and supplemental RI reports for the FPGS and the Site Investigation report and Removal Action Completion Report for Buildings T-62 and T-68 to determine if the selected remedies are in compliance with applicable or relevant and appropriate State environmental and facility siting laws and regulations. A copy of the letter of concurrence from the State of Massachusetts is attached as Appendix A of this Record of Decision.

PART 3: RESPONSIVENESS SUMMARY

15.0 RESPONSIVENESS SUMMARY

This Responsiveness Summary has been prepared to meet the requirements of Sections 113(k)(2)(B)(iv) and 117(b) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), which requires response to "... significant comments, criticisms, and new data submitted in written or oral presentations" on a proposed plan for remedial action. The purpose of this Responsiveness Summary is to document the Army's responses to questions and comments expressed during the public comment period by the public, potentially responsible parties, and governmental bodies in written and oral comments regarding the Proposed Plan for Buildings T-61 and T-68 and the Former Proposed Gymnasium Site at Soldier Systems Center, Natick, Massachusetts.

On March 9, 2007, the Army published a public notice announcing the Proposed Plan, the date for a public informational meeting, and the start and end dates of a 31-day public comment period in the MetroWest Daily News. The Army made the Proposed Plan available to the public at the public meeting or by request from SSC's Public Affairs Officer.

From March 15 through April 16, 2007, the Army held a 31-day public comment period to accept public comments on the Proposed Plan and on other documents released to the public. On March 15, 2001, the Army held an informal public information meeting at the Frederick Conley Public Safety Training Center located at 20 E Central St. in Natick to present the Army's Proposed Plan to the public and to provide the opportunity for open discussion concerning the Proposed Plan. The Army also accepted formal verbal or written comments from the public during a public hearing held as part of the meeting. A transcript of the hearing and formal public comments are appended (Appendix C) to this Record of Decision.

This Responsiveness Summary is organized into the following sections:

1. Overview of the Selected Remedies-This section briefly outlines the basis for the Army's selected remedy.

2. Background on Community Involvement-This section provides a brief history of community involvement and Army initiatives to inform the community of site activities.

3. Summary of Comments Received During the Public Comment Period and Army responses-This section provides Army responses to verbal and written comments received from the public. A transcript of the March 15, 2007, public hearing is included as Appendix C to this Record of Decision.

15.1 OVERVIEW OF THE SELECTED REMEDIES

15.1.1 Selected Remedy for the Former Proposed Gymnasium Site

The FPGS is occupies approximately 1.6 acres located on the eastern boundary of the SSC near the installation's main gate. The FPGS has been used as a helicopter landing pad, and a petroleum, oil, and lubricant bladder test site, and a parking lot. The majority of the site is now grass-covered. Currently, no SSC-related testing activities are conducted at the site, although a portion of the parking area to the west-southwest is also considered part of the FPGS.

The RI indicated a small area of contaminated soil and peat, located within a radius of approximately 20 feet around monitoring well MW-5. The primary contaminants detected were benzene, chlorobenzene, benzo[a]pyrene, and beryllium. These constituents were detected at concentrations exceeding the MCP Method 1 (S-1/GW-1) standards. No other significant concentrations of site-related compounds were detected in soil samples. In addition, the RI indicated the presence of several VOCs (i.e., benzene, chlorobenzene, cis-1,2-dichloroethene, ethylbenzene, and xylenes) in groundwater in the vicinity of monitoring well MW-5. However, benzene was the only compound consistently detected at concentrations above a MCL.

A Time Critical Removal Action was completed at the FPGS between March and August 2002 to remove soils that were leaching contaminants, especially benzene, to groundwater. Confirmation soil samples collected from the sidewalls and bottom of the excavation verified that soil with contaminant concentrations in excess of the cleanup standards had been removed.

Post-removal action groundwater monitoring was conducted at the FPGS between September 2002 and October 2005 as part of the Installation-Wide Quarterly Groundwater Monitoring Program, and is documented in the Quarterly Groundwater Monitoring Reports for Events 31 through 43. As of October 2005 (Event 43), 13 consecutive quarterly rounds of groundwater data had been collected from monitoring well MW-5R, and eight consecutive quarterly rounds of groundwater data have been collected from the downgradient monitoring well MW-127A-2. The only constituent detected above an MCL was nitrate/nitrite nitrogen. Aluminum, iron, and/or manganese were detected in three groundwater samples collected from these wells at concentrations above secondary MCLs.

There are no identified releases of nitrate/nitrite or manganese associated with SSC test or training activities at the FPGS, and neither is considered to be Site related. The presence of nitrate/nitrite in groundwater at the FPGS is attributed to upgradient reliance on septic tanks and leach fields for residential wastewater disposal. An extensive area of Natick north and east (i.e., upgradient) of the FPGS is not served by public sewers.

The presence of manganese in groundwater at the FPGS is attributed to reductive dissolution from soil as a result of bacterial respiration. The source of organic carbon for the bacterial metabolism is attributed to primarily to upgradient reliance on septic tanks and leach fields for residential wastewater disposal.

There is no CERCLA risk because the contaminants of concern originate off-site, and the Army is not responsible to clean up the groundwater at this area of concern at SSC. The selected remedy for the FPGS is No Further Action.

15.1.2 Selected Remedy for Buildings T-62 and T-68

Buildings T-62 and T-68 are located immediately northwest of the Building 20 loading platform in the southwestern portion of the T-25 area. Buildings T-62 and T-68 were used for hazardous materials and chemical storage until the summer of 1991. At present, the buildings are used for the storage of non-hazardous materials. No documented contaminant spills or releases were found during research performed for the Master Environmental Plan. The immediate area surrounding the buildings is unpaved and grassed with a shallow paved drainage swale running between the buildings to a storm sewer and headwall located southwest of Building T-62. The unpaved area is bordered to the east by an extensive paved area used for parking and to provide vehicle access to

several surrounding buildings, to the south by Building 20, and to the west and north by an elevated paved road. The swale drains surface water runoff from the paved area to the storm sewer.

Analytical data from surface soil samples collected during the Site Investigation include detections of VOCs, SVOCs, pesticides, inorganics, and EPH. Only one VOC (tetrachloroethene at 0.033 mg/kg) was reported at a concentration greater than its practical quantitation limit. The majority of SVOC and pesticide results were either non-detects or estimated values below the practical quantitation limit. However, several PAHs were reported at relatively high concentrations (e.g., maximum of 40.9 mg/kg for fluoranthene). Consistent with the SVOC data, several PAHs were also reported as EPH target compounds. C11-C22 range aromatics were reported at concentrations as great as 279 mg/kg. PCB and VPH results were qualified as non-detect below the practical quantitation limit. In general, concentrations were higher in 0 to 0.5 foot deep samples than in 1.5 to 2.0 foot deep samples. The source of PAH contamination is interpreted to be run-off from the paved areas adjacent to Buildings T-62 and T-68.

In September 2005, a removal action was initiated at Buildings T-62 and T-68 to remediate PAH- and EPH-contaminated soil with chemical concentrations above MCP Method 1 (S 1/GW-1) standards. Only one of nine confirmation soil samples collected from the final excavation area exhibited concentrations of PAHs above the published MCP Method 1 (S-1/GW-1) criteria. However, the average concentration for these compounds in the confirmation soil samples was below the published MCP Method 1 (S-1/GW-1) criteria. The maximum detected concentrations of these PAHs were less than the proposed revised MCP Method 1 (S-1/GW-1) criteria, which are anticipated to be promulgated in early 2006. Additionally, the 95-percent UCL, which would represent the exposure point concentration in a risk assessment, did not exceed the current published MCP Method 1 (S-1/GW-1) criteria.

Attainment of the MCP Method 1 (S-1/GW-1) criteria indicates that there are no unacceptable risks for future unrestricted land use at Buildings T-62 and T-68. The selected remedy for Buildings T-62 and T-68 is No Further Action.

15.2 BACKGROUND ON COMMUNITY INVOLVEMENT

Notice of the availability of the Proposed Plan for the FPGS and Buildings T-62 and T-68 was published in The MetroWest Daily News on March 9, 2007. A public informational meeting and hearing on the proposed plan was held at the Frederick Conley Public Safety Training Center in Natick on March 15, 2007, and a public comment period was held from March 15 through April 16, 2007. At the public meeting, the Army presented the Proposed Plan and answered questions from the public prior to providing opportunity for formal comments on the proposed plan. The Army made the Proposed Plan available to the public at the public meeting or by request from SSC's Public Affairs Officer. Comments received during the public comment period and the Army's responses are contained in Appendix C to this Record of Decision.

In addition, the community has been kept advised of investigative and cleanup activities at the FPGS and Buildings T-62 and T-68 through presentations by the Army at Restoration Advisory Board meetings held, following public notice, on an approximate monthly basis throughout the year.

All supporting documentation for the decision regarding the FPGS and Buildings T-62 and T-68 is contained in the Administrative Record for review. The Administrative Record is a collection of all the documents considered by the Army in choosing the plan of action for the FPGS and Buildings T-62 and T-68. On March 15, 2007, the Army made the Administrative Record available for public review at the SSC, the Mass DEP, and at the Morse Institute Library located at 14 East Central Street in Natick, Massachusetts. An index to the Administrative Record is available at the USEPA Records Center, Suite 1100 (HSC), 1 Congress Street, Boston, MA 02114-2023 and is provided as Appendix B of this Record of Decision.

15.3 SUMMARY OF COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND ARMY RESPONSES

The Army received verbal comments from one person during the public hearing on March 15, 2007. No written comments were received at the hearing or during the remainder of the public comment period. The following paragraphs summarize the comments and provide the Army's responses.

The commentor is listed below:

Provided comments at hearing

Marco Kaltofin: Community co-chair of the Restoration Advisory Board

1. Public Hearing Comment from Marco Kaltofin

Comment No. 1. My name is Marco Kaltofin, and I'm the community co-chair of the Restoration Advisory Board. I just wanted to say that it's nice to see one come to closure.

Response: The Army thanks Mr. Kaltofin and the other members of the Restoration Advisory Board for their efforts in helping the Army achieve closure at these two sites.

ACRONYMS AND ABBREVIATIONS

ADAF	age-dependant adjustment factor
A.D. Little	Arthur D. Little, Inc.
ARARs	applicable or relevant and appropriate requirement
Argonne	Argonne National Laboratory
ATSDR	Agency for Toxic Substances and Disease Registry
α-BHC	alpha-benzenehexachloride
γ-BHC	gamma-benzene hexachloride, lindane
BERA	baseline ecological risk assessment
bgs	below ground surface
BTEX	benzene, ethylbenzene, toluene, and xylenes
CAL EPA	California Environmental Protection Agency
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERCLIS	Comprehensive Environmental Response, Compensation, and Liability Information System
COPC	chemical of potential concern
CFR	Code of Federal regulations
ELCR	excess lifetime cancer risk
EPA	U.S. Environmental Protection Agency
EPC	exposure point concentration
EPH	extractable petroleum hydrocarbon
FPGS	Former Proposed Gymnasium Site
HEAST	Health Effects Assessment Summary Table
HHRA	human-health risk assessment
HI	hazard index
HQ	hazard quotient
IRIS	Integrated Risk Information System
MACTEC	MACTEC Engineering and Consulting, Inc.
Mass DEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level
MCP	Massachusetts Contingency Plan
µg/L	micrograms per liter
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MRL	Minimum Risk Level
NCEA	National Center for Environmental Assessment
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NERI	Northeast Research Institute
Nobis	Nobis Engineering, Inc.
PAHs	polynuclear aromatic hydrocarbon

ACRONYMS AND ABBREVIATIONS, continued

PCB	polychlorinated biphenyl
PPRTV	Provisional Peer Reviewed Toxicity Value
PRG	preliminary remediation goal
RfC	reference concentration
RfD	reference dose
RI	Remedial Investigation
RME	reasonable maximum exposure
SF	slope factor
SSC	U.S. Army Soldier Systems Center
STSC	Superfund Technical Support Center
SVOCs	semivolatile organic compound
UCL	upper concentration limit
UR	unit risk
USC	United States Code
USEPA	U.S. Environmental Protection Agency
VOCs	volatile organic compound
VPH	volatile petroleum hydrocarbon

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FIGURES

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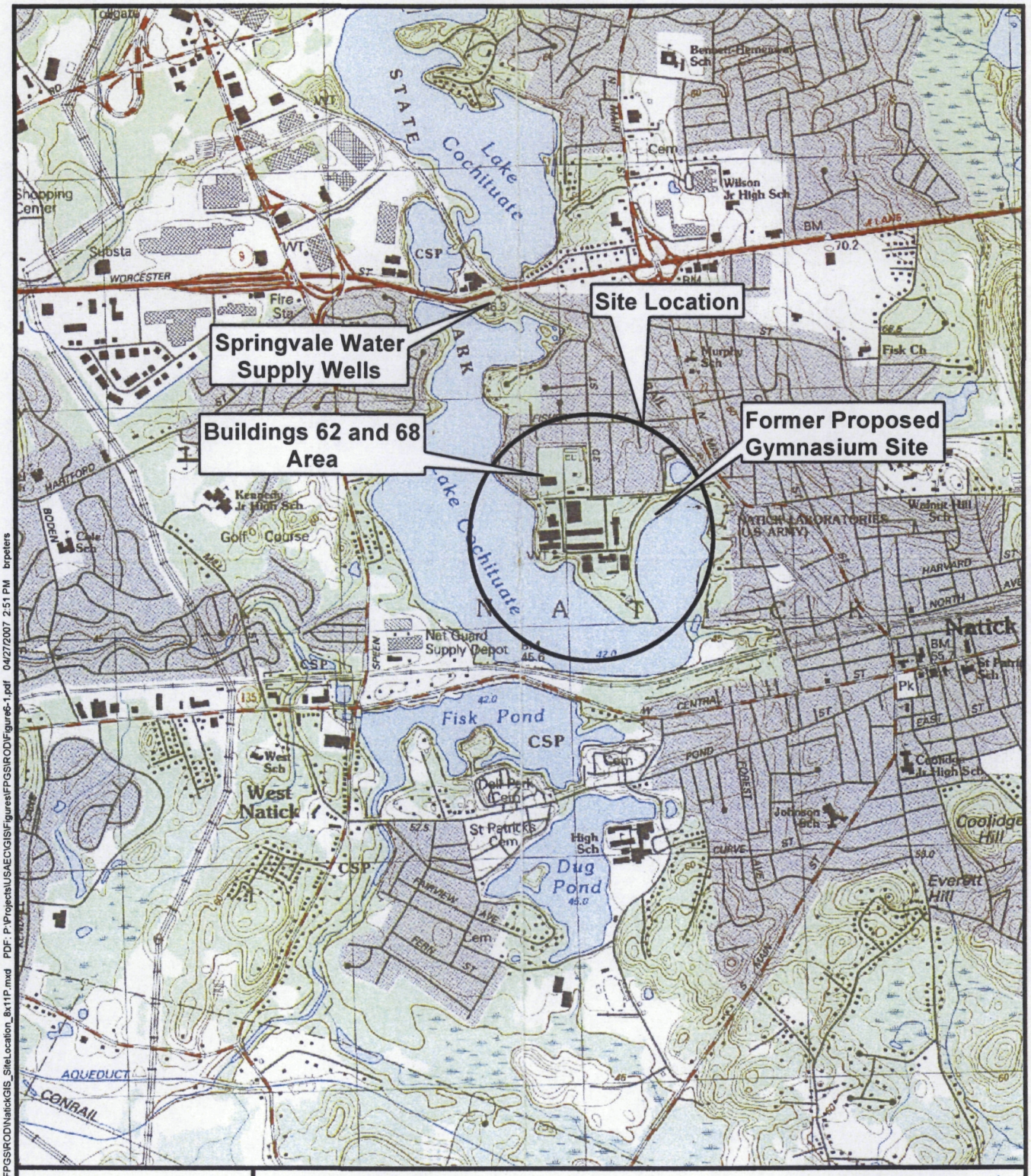

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0 1,000 2,000 Feet

Prepared by BRP | Checked by SWR

Figure 6-1

SSC Site Location Map

Soldier Systems Center
Natick, Massachusetts

MACTEC

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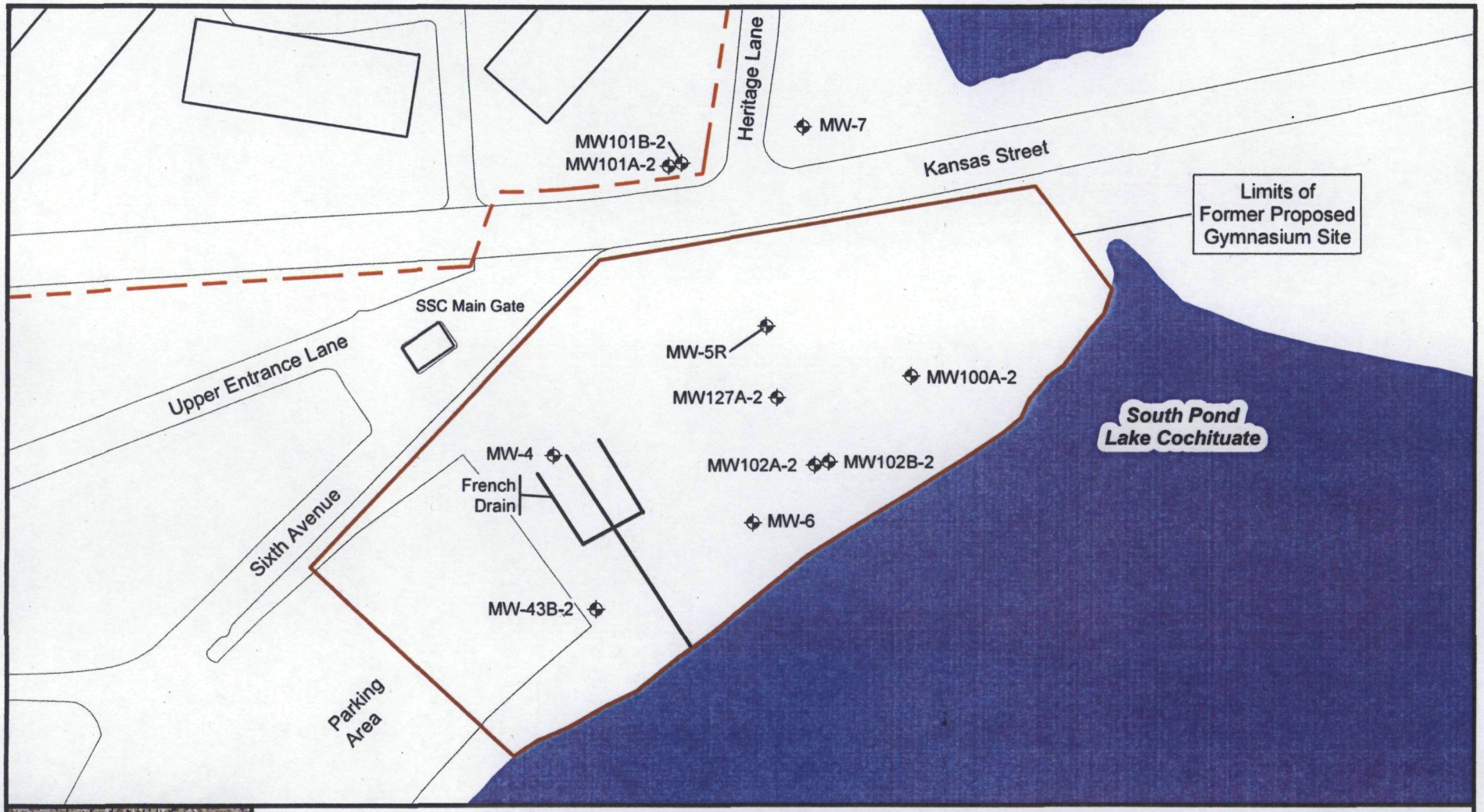

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Site Limits

Installation Boundary (Approximate)

N

0 50 100 Feet

Prepared by BRP | Checked by SWR

Figure 6-2

FPGS Site Features

Soldier Systems Center
Natick, Massachusetts

MACTEC

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0 20 40 Feet

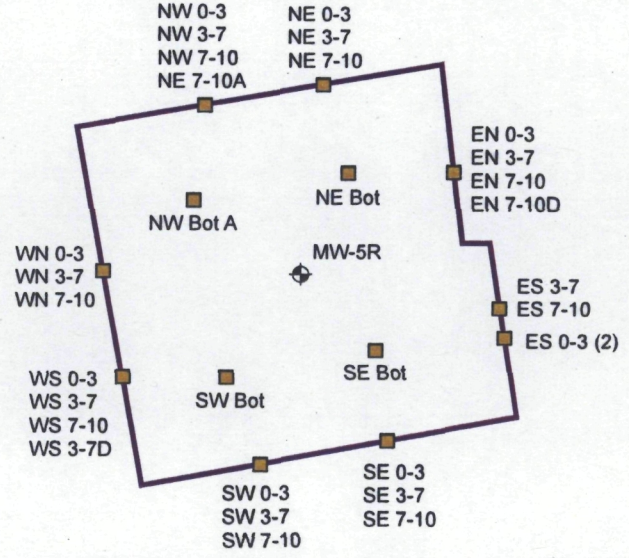
Prepared by BRP | Checked by SWR

Figure 6-3

Site Features
Buildings T-62 and T-68

Soldier Systems Center
Natick, Massachusetts

MACTEC



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- Confirmation Soil Sample Location
- Monitoring Well Location
- Excavation Area

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0 10 20 Feet

Prepared by BRP | Checked by SWR

Figure 7-1

FPGS Soil Removal Area

Soldier Systems Center
Natick, Massachusetts

MACTEC

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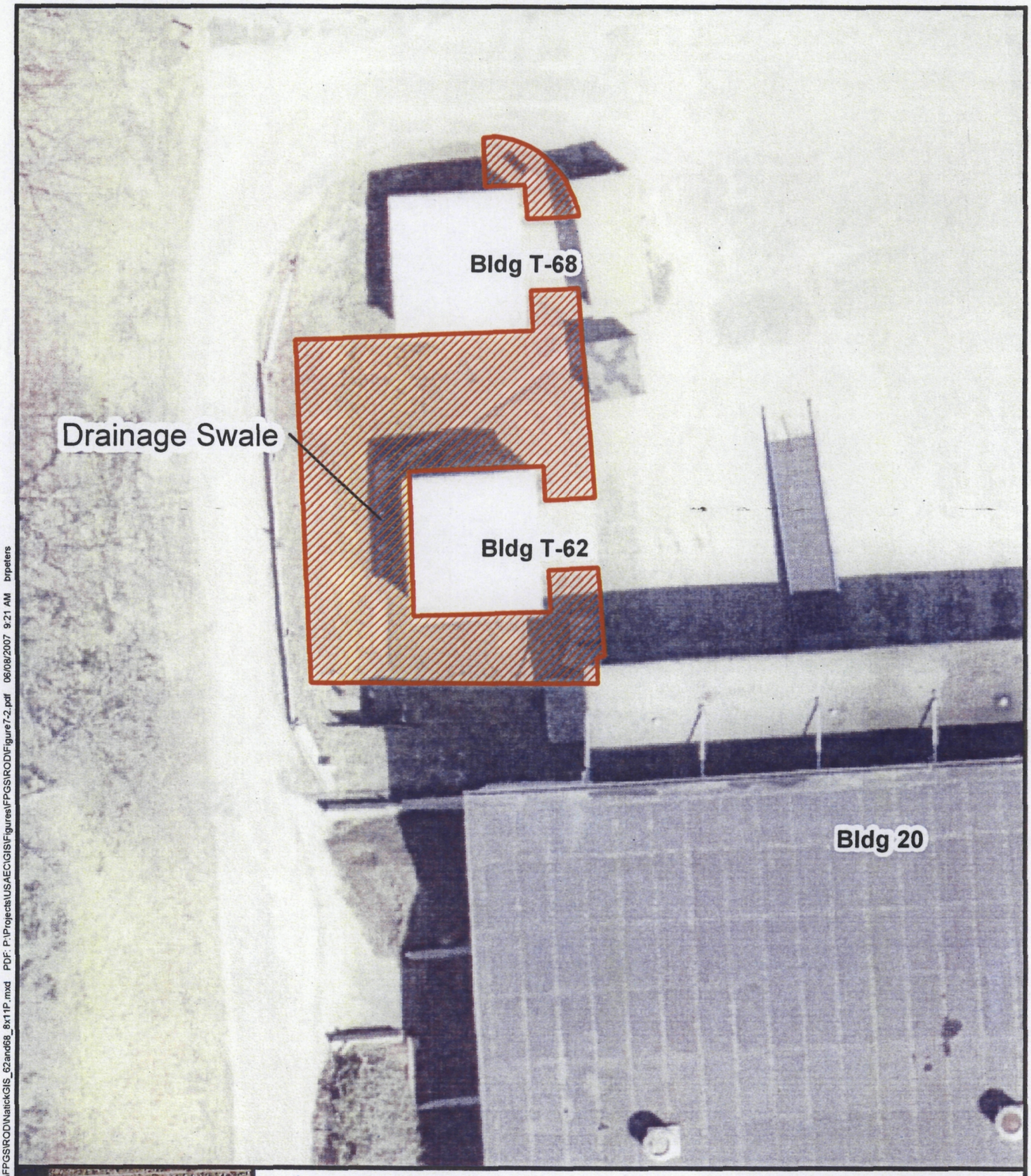

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Soil Removal Area

N

0 10 20 Feet

Prepared by BRP | Checked by SWR

Figure 7-2

Soil Removal Area
Buildings T-62 and T-68

Soldier Systems Center
Natick, Massachusetts

MACTEC

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TABLES

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Table 12-1
FPGS Selection of Chemicals of Potential Concern - Surface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Exposure Point	casno	Parameter	Range of Detected Concentrations (1)	Units	Location of Maximum	Frequency of Detection	Range of Non Detects	Concentration Used for Screening (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	Maximum > PRG	Selected as a COPC? (5)	Rationale
FPGS		**Volatile Organics**												
(0-2 ft)	78-93-3	2-Butanone	0.0042 - 0.042	mg/kg	NW 0-3	3 / 13	1E-05 : 0.01	0.042	2200 nc			No	No	BSL
	67-64-1	Acetone	0.024 - 0.15	mg/kg	NW 0-3	3 / 13	1E-05 : 0.02	0.15	1400 nc			No	No	BSL
	71-43-2	Benzene	0.0008 - 0.016	mg/kg	NW 0-3	2 / 13	1E-05 : 0.01	0.016	0.64 ca*			No	No	BSL
	108-90-7	Chlorobenzene	0.002 - 0.017	mg/kg	NW 0-3	2 / 13	1E-05 : 0.01	0.017	15 nc			No	No	BSL
	100-41-4	Ethyl benzene	0.001 - 0.001	mg/kg	NW 0-3	1 / 13	1E-05 : 0.01	0.001	400 sat			No	No	BSL
	98-82-8	Isopropylbenzene	0.0004 - 0.0004	mg/kg	NW 0-3	1 / 8	1E-05 : 0.01	0.0004	57 nc			No	No	BSL
	75-09-2	Methylene chloride	0.0006 - 0.002	mg/kg	NE 0-3	2 / 13	1E-05 : 0.01	0.002	9.1 ca			No	No	BSL
	108-88-3	Toluene	0.0001 - 0.001	mg/kg	NW 0-3	5 / 13	0.01 : 0.01	0.001	520 sat			No	No	BSL
	75-69-4	Trichlorofluoromethane	0.0003 - 0.003	mg/kg	NW 0-3	5 / 13	1E-05 : 0.01	0.003	39 nc			No	No	BSL
	1330-20-7	Xylenes, Total	0.004 - 0.004	mg/kg	NW 0-3	1 / 13	1E-05 : 0.01	0.004	27 nc			No	No	BSL
		Semivolatile Organics												
	121-14-2	2,4-Dinitrotoluene	0.28 - 0.28	mg/kg	SS-37	1 / 13	0.0004 : 0.43	0.28	12.0 nc			No	No	BSL
	91-57-6	2-Methylnaphthalene	0.018 - 0.018	mg/kg	TP-010	1 / 13	0.0004 : 0.43	0.018	5.6 nc			No	No	BSL
	83-32-9	Acenaphthene	0.012 - 0.15	mg/kg	TP-010	3 / 13	0.0004 : 0.43	0.15	370 nc			No	No	BSL
	98-86-2	Acetophenone	0.0069 - 0.012	mg/kg	WN 0-3	4 / 8	0.0004 : 0.38	0.012				NSL	Yes	NSL
	120-12-7	Anthracene	0.0089 - 0.27	mg/kg	TP-010	4 / 13	0.0004 : 0.43	0.27	2200 nc			No	No	BSL
	56-55-3	Benzo(a)anthracene	0.013 - 0.96	mg/kg	TP-010	8 / 13	0.0004 : 0.43	0.96	0.62 ca			Yes	Yes	ASL
	50-32-8	Benzo(a)pyrene	0.0085 - 0.9	mg/kg	TP-010	9 / 13	0.0004 : 0.43	0.9	0.062 ca			Yes	Yes	ASL
	205-99-2	Benzo(b)fluoranthene	0.021 - 1.7	mg/kg	TP-010	8 / 13	0.0004 : 0.43	1.7	0.62 ca			Yes	Yes	ASL
	191-24-2	Benzo(ghi)perylene	0.014 - 0.45	mg/kg	TP-010	7 / 13	0.0004 : 0.43	0.45	230 nc			No	No	BSL
	207-08-9	Benzo(k)fluoranthene	0.0083 - 0.58	mg/kg	TP-010	7 / 13	0.0004 : 0.43	0.58	6.2 ca			No	No	BSL
	65-85-0	Benzoic Acid	0.023 - 0.17	mg/kg	TP-010	5 / 5		0.17	100000 max			No	No	BSL
	117-81-7	Bis(2-Ethylhexyl)phthalate	0.012 - 1	mg/kg	NE 0-3	6 / 13	0.0004 : 0.38	1	35 ca*			No	No	BSL
	86-74-8	Carbazole	0.0094 - 0.2	mg/kg	TP-010	2 / 13	0.0004 : 0.43	0.2	24 ca			No	No	BSL
	218-01-9	Chrysene	0.013 - 1.1	mg/kg	EN 7-10	8 / 13	0.0004 : 0.43	1.1	62 ca			No	No	BSL
	53-70-3	Dibenz(a,h)anthracene	0.12 - 0.12	mg/kg	TP-010	1 / 13	0.0004 : 0.43	0.12	0.062 ca			Yes	Yes	ASL
	132-64-9	Dibenzofuran	0.075 - 0.075	mg/kg	TP-010	1 / 13	0.0004 : 0.43	0.075	15 nc			No	No	BSL
	84-74-2	Di-n-butylphthalate	0.011 - 0.13	mg/kg	TP-010	7 / 13	0.0004 : 0.43	0.13	610 nc			No	No	BSL
	206-44-0	Fluoranthene	0.0088 - 2.3	mg/kg	TP-010	11 / 13	0.0004 : 0.36	2.3	230 nc			No	No	BSL
	86-73-7	Fluorene	0.016 - 0.18	mg/kg	TP-010	3 / 13	0.0004 : 0.43	0.18	270 nc			No	No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.015 - 0.52	mg/kg	EN 7-10	6 / 13	0.0004 : 0.43	0.52	0.62 ca			No	No	BSL
	91-20-3	Naphthalene	0.037 - 0.037	mg/kg	TP-010	1 / 13	0.0004 : 0.43	0.037	5.6 nc			No	No	BSL
	85-01-8	Phenanthrene	0.01 - 1.3	mg/kg	TP-010	7 / 13	0.0004 : 0.43	1.3	230 nc			No	No	BSL
	108-95-2	Phenol	0.012 - 0.043	mg/kg	TP-010	2 / 13	0.0004 : 0.43	0.043	1800 nc			No	No	BSL
	129-00-0	Pyrene	0.009 - 1.5	mg/kg	TP-010	12 / 13	0.0004 : 0.0004	1.5	230 nc			No	No	BSL

Table 12-1
FPGS Selection of Chemicals of Potential Concern - Surface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Exposure Point	casno	Parameter	Range of Detected Concentrations (1)	Units	Location of Maximum	Frequency of Detection	Range of Non Detects	Concentration Used for Screening (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	Maximum > PRG	Selected as a COPC? (5)	Rationale
		Pesticides (mg/kg)												
	72-54-8	4,4'-DDD	0.00112 - 0.0233	mg/kg	TP-010	4 / 5	0.002 : 0.002	0.0233	2.4 ca			No	No	BSL
	72-55-9	4,4'-DDE	0.00109 - 0.0379	mg/kg	TP-010	5 / 5		0.0379	1.7 ca			No	No	BSL
	50-29-3	4,4'-DDT	0.00148 - 0.0233	mg/kg	TP-010	4 / 5	0.002 : 0.002	0.0233	1.7 ca*			No	No	BSL
	309-00-2	Aldrin	0.00071 - 0.00097	mg/kg	TP-002	4 / 5	0.002 : 0.002	0.000974	0.029 ca*			No	No	BSL
	319-84-6	Alpha-BHC	0.00103 - 0.00147	mg/kg	TP-010	5 / 5		0.00147	0.09 ca			No	No	BSL
	5103-71-9	Alpha-Chlordane	0.00015 - 0.00256	mg/kg	TP-010	5 / 5		0.00256	1.6 ca*			No	No	BSL
	319-85-7	Beta-BHC	0.00024 - 0.00024	mg/kg	SS-36	1 / 5	0.002 : 0.002	0.000243	0.32 ca			No	No	BSL
	60-57-1	Dieldrin	0.00083 - 0.00314	mg/kg	SS-36	2 / 5	0.002 : 0.002	0.00314	0.03 ca			No	No	BSL
	959-98-8	Endosulfan I	0.00073 - 0.00195	mg/kg	TP-010	5 / 5		0.00195	37 nc			No	No	BSL
	33213-65-9	Endosulfan II	0.00039 - 0.00039	mg/kg	TP-002	1 / 5	0.002 : 0.002	0.00039	37 nc			No	No	BSL
	1031-07-8	Endosulfan sulfate	0.00113 - 0.00122	mg/kg	SS-36	3 / 5	0.002 : 0.002	0.00122	37 nc			No	No	BSL
FPGS	72-20-8	Endrin	0.00081 - 0.00222	mg/kg	TP-010	3 / 5	0.002 : 0.002	0.00222	1.8 nc			No	No	BSL
(0-2 ft)	7421-93-4	Endrin aldehyde	0.0014 - 0.0014	mg/kg	TP-010	1 / 5	0.002 : 0.002	0.0014	1.8 nc			No	No	BSL
(cont)	53494-70-5	Endrin ketone	0.00036 - 0.00164	mg/kg	TP-010	3 / 5	0.002 : 0.002	0.00164	1.8 nc			No	No	BSL
	58-89-9	Gamma-BHC/Lindane	0.00152 - 0.00332	mg/kg	SS-36	3 / 5	0.002 : 0.002	0.00332	0.44 ca*			No	No	BSL
	5103-74-2	Gamma-Chlordane	0.00012 - 0.00228	mg/kg	TP-010	3 / 5	0.002 : 0.002	0.00228	1.6 ca*			No	No	BSL
	76-44-8	Heptachlor	0.00084 - 0.00098	mg/kg	TP-002	3 / 5	0.002 : 0.002	0.00098	0.11 ca			No	No	BSL
	1024-57-3	Heptachlor epoxide	0.00032 - 0.00046	mg/kg	SS-37	2 / 5	0.002 : 0.002	0.000457	0.053 ca*			No	No	BSL
	465-73-6	Isodrin	0.00031 - 0.00509	mg/kg	TP-010	4 / 5	0.002 : 0.002	0.00509				NSL	Yes	NSL
		Inorganics (mg/kg)												
	7429-90-5	Aluminum	4810 - 9820	mg/kg	TP-010	13 / 13		9820	7600 nc			Yes	Yes	ASL
	7440-36-0	Antimony	0.128 - 0.444	mg/kg	TP-010	3 / 13	1 : 9	0.444	3.10 nc			No	No	BSL
	7440-38-2	Arsenic	2.3 - 9.35	mg/kg	SS-37	13 / 13		9.35	0.39 ca*			Yes	Yes	ASL
	7440-39-3	Barium	11.6 - 27.2	mg/kg	NW 0-3	13 / 13		27.2	540 nc			No	No	BSL
	7440-41-7	Beryllium	0.192 - 0.495	mg/kg	WN 0-3	10 / 13	0.179 : 0.19	0.495	15 nc			No	No	BSL
	7440-43-9	Cadmium	0.184 - 0.295	mg/kg	TP-010	5 / 13	0.04 : 0.0519	0.295	3.7 nc			No	No	BSL
	7440-70-2	Calcium	948 - 2440	mg/kg	SS-38	13 / 13		2440				NSL	No	E
	7440-47-3	Chromium	6.49 - 17	mg/kg	NW 0-3	11 / 11		17	210 ca			No	No	BSL
	7440-48-4	Cobalt	3.52 - 8.1	mg/kg	NE 0-3	13 / 13		8.1	140 nc [a]			No	No	BSL
	7440-50-8	Copper	8.4 - 14.5	mg/kg	NW 0-3	13 / 13		14.5	310 nc			No	No	BSL
	7439-89-6	Iron	7450 - 17400	mg/kg	NW 0-3	13 / 13		17400	2300 nc			Yes	No	E
	7439-92-1	Lead	2.7 - 14.4	mg/kg	TP-010	13 / 13		14.4	400 nc			No	No	BSL
	7439-95-4	Magnesium	1970 - 4830	mg/kg	NW 0-3	13 / 13		4830				NSL	No	E
	7439-96-5	Manganese	93.5 - 241	mg/kg	SW 0-3	13 / 13		241	180 nc			Yes	Yes	ASL
	7439-97-6	Mercury	0.33 - 2.62	mg/kg	SW 0-3	2 / 13	0.05 : 0.1	2.62	2.3 nc			Yes	Yes	ASL
	7440-02-0	Nickel	7.37 - 13.8	mg/kg	WN 0-3	13 / 13		13.8	160 nc			No	No	BSL
	7440-09-7	Potassium	366 - 1290	mg/kg	SS-36	13 / 13		1290				NSL	No	E
	7782-49-2	Selenium	0.372 - 0.721	mg/kg	TP-010	6 / 13	0.335 : 0.42	0.721	39 nc			No	No	BSL
	7440-23-5	Sodium	45.7 - 188	mg/kg	TP-010	13 / 13		188				NSL	No	E
	7440-28-0	Thallium	0.712 - 0.749	mg/kg	TP-010	3 / 13	0.665 : 1	0.749	1 nc			Yes	Yes	ASL
	7440-62-2	Vanadium	11.9 - 29.8	mg/kg	NW 0-3	13 / 13		29.8	7.80 nc			Yes	Yes	ASL
	7440-66-6	Zinc	18.9 - 33.5	mg/kg	NW 0-3	13 / 13		33.5	2300.0 nc			No	No	BSL

Table 12-1
FPGS Selection of Chemicals of Potential Concern - Surface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Exposure Point	casno	Parameter	Range of Detected Concentrations (1)			Units	Location of Maximum	Frequency of Detection			Range of Non Detects			Concentration Used for Screening (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	Maximum > PRG	Selected as a COPC? (5)	Rationale
		Petroleum Hydrocarbons (mg/kg)																			
	HLA0026	Diesel Range Organics	15.7	-	90.2	mg/kg	SS-36	3	/	3				90.2					NSL	Yes	NSL

(1) Minimum or maximum concentration detected in data set. Samples included in data set are identified in Appendix C.
(2) The concentration used for screening is the maximum detected concentration, per USEPA Region I (USEPA, 1999).
(3) Values are the Preliminary Remediation Goals (PRGs) obtained from USEPA Region IX dated October 2004.
Values used for screening are the residential soil PRGs for the lesser of cancer risks equal to 1E-06 or non-cancer risks equal to a hazard index of 0.1, per USEPA Region I (USEPA, 1999).
PRG for pyrene is used as a surrogate for PAHs without published PRG values (phenanthrene, acenaphthylene, benzo(g,h,i)perylene).
PRG for naphthalene used for 2-methylnaphthalene.
nc - PRG is based on a non-cancer hazard quotient of 0.1.
ca - PRG is based on an excess lifetime cancer risk of 1 in 1 million.
ca* - where nc PRG < 100X ca PRG.
nc[a] - Value is based on a non-cancer endpoint because PRG at HI=0.1 is lower than PRG at cancer risk 1 in 1 million.
sat - PRG is based on soil saturation.
(4) There are no ARAR/TBC for soil.
(5) Analyte is selected as a COPC if the concentration used for screening exceeds the PRG or if no screening value is available.
BSL = Concentration used for screening is less than the screening toxicity value; the analyte was not selected as a COPC.
ASL = Concentration used for screening is greater than the screening toxicity value; the analyte was selected as a COPC.
E = The analyte is a human essential nutrient, and is not considered to be toxic at the concentration detected; the analyte was not selected as a COPC (USEPA, 1999).
FOD = Frequency of detection is below 5%.

mg/Kg = milligrams per kilogram
COPC = chemical of potential concern

Table 12-2
FPGS Selection of Chemicals of Potential Concern - Subsurface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Exposure Point	casno	Parameter	Range of Detected Concentrations (1)	Units	Location of Maximum	Frequency of Detection	Range of Non Detects	Concentration Used for Screening (2)	Screening Toxicity Value (3)	Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	Selected as a COPC? (5)	Rationale
FPGS		**Volatile Organics**											
(2-10 ft)	78-93-3	2-Butanone	0.0053 - 0.44	mg/kg	NW 7-10	13 / 24	0.00001 - 0.01	0.44	2200 nc			No	BSL
	67-64-1	Acetone	0.011 - 1.5	mg/kg	NW 7-10	19 / 24	0.00001 - 0.02	1.5	1400 nc			No	BSL
	71-43-2	Benzene	0.0008 - 0.33	mg/kg	NW 7-10	13 / 24	0.00001 - 0.01	0.33	0.64 ca*			No	BSL
	75-15-0	Carbon disulfide	0.0001 - 0.005	mg/kg	NW 7-10	14 / 24	0.00001 - 0.01	0.005	36 nc			No	BSL
	108-90-7	Chlorobenzene	0.001 - 0.07	mg/kg	WN 3-7	9 / 24	0.00001 - 0.053	0.07	15 nc			No	BSL
	156-59-2	Cis-1,2-Dichloroethene	0.003 - 0.013	mg/kg	WS 7-10	5 / 24	0.00001 - 0.01	0.013	4.3 nc			No	BSL
	100-41-4	Ethyl benzene	0.0006 - 0.01	mg/kg	NE BOT	3 / 24	0.00001 - 0.053	0.01	400 sat			No	BSL
	98-82-8	Isopropylbenzene	0.003 - 0.003	mg/kg	NE BOT	1 / 19	0.00001 - 0.053	0.003	57 nc			No	BSL
	108-87-2	Methyl cyclohexane	0.002 - 0.002	mg/kg	NE BOT	1 / 19	0.00001 - 0.053	0.002	200 nc			No	BSL
	75-09-2	Methylene chloride	0.0007 - 0.009	mg/kg	NE BOT	7 / 24	0.00001 - 0.053	0.009	9.1 ca			No	BSL
	108-88-3	Toluene	0.0001 - 0.008	mg/kg	NW 7-10	14 / 24	0.00001 - 0.01	0.008	520 sat			No	BSL
	75-69-4	Trichlorofluoromethane	0.0002 - 0.003	mg/kg	NE BOT	6 / 24	0.00001 - 0.053	0.003	39 nc			No	BSL
	1330-20-7	Xylenes, Total	0.0008 - 0.038	mg/kg	NE BOT	4 / 24	0.00001 - 0.053	0.038	27 nc			No	BSL
		Semivolatile Organics											
	91-57-6	2-Methylnaphthalene	0.03 - 0.03	mg/kg	EN 7-10	1 / 25	0.00035 : 1.6	0.03	5.6 nc			No	BSL
	83-32-9	Acenaphthene	0.034 - 0.046	mg/kg	TP-002	2 / 25	0.00035 : 1.6	0.046	370 nc			No	BSL
	208-96-8	Acenaphthylene	0.2 - 0.2	mg/kg	EN 7-10	1 / 25	0.00035 : 1.6	0.2	230 nc			No	BSL
	98-86-2	Acetophenone	0.0089 - 0.093	mg/kg	NW 7-10	6 / 20	0.00035 : 0.42	0.093				Yes	NSL
	120-12-7	Anthracene	0.0084 - 0.57	mg/kg	EN 7-10	4 / 25	0.00035 : 1.6	0.57	2200 nc			No	BSL
	100-52-7	Benzaldehyde	0.016 - 0.1	mg/kg	SE BOT	6 / 20	0.00035 : 1.6	0.1	610 nc			No	BSL
	56-55-3	Benzo(a)anthracene	0.022 - 1.2	mg/kg	EN 7-10	10 / 25	0.00035 : 1.6	1.2	0.62 ca			Yes	ASL
	50-32-8	Benzo(a)pyrene	0.011 - 0.84	mg/kg	EN 7-10	10 / 25	0.00035 : 1.6	0.84	0.062 ca			Yes	ASL
	205-99-2	Benzo(b)fluoranthene	0.032 - 1.2	mg/kg	EN 7-10	9 / 25	0.00035 : 1.6	1.2	0.62 ca			Yes	ASL
	191-24-2	Benzo(ghi)perylene	0.027 - 0.17	mg/kg	EN 7-10	3 / 25	0.00035 : 1.6	0.17	230 nc			No	BSL
	207-08-9	Benzo(k)fluoranthene	0.0096 - 0.36	mg/kg	EN 7-10	9 / 25	0.00035 : 1.6	0.36	6.2 ca			No	BSL
	65-85-0	Benzoic Acid	0.027 - 0.41	mg/kg	TP-002	5 / 5		0.41	100000 max			No	BSL
	92-52-4	Biphenyl	0.011 - 0.011	mg/kg	EN 7-10	1 / 20	0.00035 : 1.6	0.011	300 nc			No	BSL
	117-81-7	Bis(2-Ethylhexyl)phthalate	0.027 - 2.6	mg/kg	NW 7-10	13 / 25	0.00035 : 0.35	2.6	35 ca*			No	BSL
	86-74-8	Carbazole	0.36 - 0.36	mg/kg	EN 7-10	1 / 25	0.00035 : 1.6	0.36	24 ca			No	BSL
	218-01-9	Chrysene	0.024 - 1.1	mg/kg	EN 7-10	10 / 25	0.00035 : 1.6	1.1	62 ca			No	BSL
	53-70-3	Dibenz(a,h)anthracene	0.14 - 0.14	mg/kg	EN 7-10	1 / 25	0.00035 : 1.6	0.14	0.062 ca			No	FOD
	132-64-9	Dibenzofuran	0.038 - 0.14	mg/kg	EN 7-10	2 / 25	0.00035 : 1.6	0.14	15 nc			No	BSL
	84-74-2	Di-n-butylphthalate	0.0078 - 0.14	mg/kg	TP-008	9 / 25	0.00037 : 1.6	0.14	610 nc			No	BSL
	206-44-0	Fluoranthene	0.016 - 2.1	mg/kg	EN 7-10	14 / 25	0.00035 : 1.6	2.1	230 nc			No	BSL
	86-73-7	Fluorene	0.077 - 0.41	mg/kg	EN 7-10	2 / 25	0.00035 : 1.6	0.41	270 nc			No	BSL
	193-39-5	Indeno(1,2,3-cd)pyrene	0.013 - 0.52	mg/kg	EN 7-10	4 / 25	0.00035 : 1.6	0.52	0.62 ca			No	BSL
	91-20-3	Naphthalene	0.018 - 0.018	mg/kg	EN 7-10	1 / 25	0.00035 : 1.6	0.018	5.6 nc			No	BSL
	85-01-8	Phenanthrene	0.014 - 2.6	mg/kg	EN 7-10	13 / 25	0.00035 : 1.6	2.6	230 nc			No	BSL
	108-95-2	Phenol	0.06 - 0.16	mg/kg	TP-002	2 / 25	0.00035 : 1.6	0.16	1800 nc			No	BSL
	129-00-0	Pyrene	0.017 - 2	mg/kg	EN 7-10	14 / 25	0.00035 : 1.6	2	230 nc			No	BSL

Table 12-2
FPGS Selection of Chemicals of Potential Concern - Subsurface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Exposure Point	casno	Parameter	Range of Detected Concentrations (1)			Units	Location of Maximum	Frequency of Detection			Range of Non Detects			Concentration Used for Screening (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	Selected as a COPC? (5)	Rationale
		Pesticides (mg/kg)																		
	72-54-8	4,4`-DDD	0.00071	-	0.0129	mg/kg	TP-030	4	/	5	0.002	:	0.002	0.0129	2.4	ca			No	BSL
	72-55-9	4,4`-DDE	0.00098	-	0.00258	mg/kg	TP-030	5	/	5				0.00258	1.7	ca			No	BSL
	50-29-3	4,4`-DDT	0.00102	-	0.0107	mg/kg	TP-030	2	/	5	0.002	:	0.002	0.0107	1.7	ca*			No	BSL
	309-00-2	Aldrin	0.00183	-	0.00183	mg/kg	TP-008	1	/	5	0.002	:	0.002	0.00183	0.029	ca*			No	BSL
	319-84-6	Alpha-BHC	0.00132	-	0.00201	mg/kg	TP-028	4	/	5	0.002	:	0.002	0.00201	0.09	ca			No	BSL
	5103-71-9	Alpha-Chlordane	0.00032	-	0.00074	mg/kg	TP-028	5	/	5				0.000742	1.6	ca*			No	BSL
	319-85-7	Beta-BHC	0.00074	-	0.00149	mg/kg	TP-008	3	/	5	0.002	:	0.002	0.00149	0.32	ca			No	BSL
FPGS	319-86-8	Delta-BHC	0.00173	-	0.00173	mg/kg	TP-002	1	/	5	0.002	:	0.002	0.00173	0.09	ca			No	BSL
(2-10 ft)	60-57-1	Dieldrin	0.00145	-	0.00145	mg/kg	TP-030	1	/	5	0.002	:	0.002	0.00145	0.03	ca			No	BSL
(cout)	959-98-8	Endosulfan I	0.00063	-	0.00138	mg/kg	TP-030	5	/	5				0.00138	37	nc			No	BSL
	33213-65-9	Endosulfan II	0.00027	-	0.00027	mg/kg	TP-022	1	/	5	0.002	:	0.002	0.000271	37	nc			No	BSL
	1031-07-8	Endosulfan sulfate	0.00328	-	0.00328	mg/kg	TP-030	1	/	5	0.002	:	0.002	0.00328	37	nc			No	BSL
	72-20-8	Endrin	0.00173	-	0.00212	mg/kg	TP-002	2	/	5	0.002	:	0.002	0.00212	1.8	nc			No	BSL
	58-89-9	Gamma-BHC/Lindane	0.00278	-	0.00458	mg/kg	TP-028	2	/	5	0.002	:	0.002	0.00458	0.44	ca*			No	BSL
	5103-74-2	Gamma-Chlordane	0.00055	-	0.00069	mg/kg	TP-030	2	/	5	0.002	:	0.002	0.000686	1.6	ca*			No	BSL
	76-44-8	Heptachlor	0.00145	-	0.00145	mg/kg	TP-030	1	/	5	0.002	:	0.002	0.00145	0.11	ca			No	BSL
	1024-57-3	Heptachlor epoxide	0.00057	-	0.00057	mg/kg	TP-030	1	/	5	0.002	:	0.002	0.000566	0.053	ca*			No	BSL
	465-73-6	Isodrin	0.00093	-	0.00455	mg/kg	TP-008	3	/	3				0.00455					Yes	NSL
	72-43-5	Methoxychlor	0.134	-	0.134	mg/kg	TP-028	1	/	5	0.02	:	0.02	0.134	31	nc			No	BSL
		Inorganics (mg/kg)																		
	7429-90-5	Aluminum	2470	-	13800	mg/kg	EN 7-10	25	/	25				13800	7600	nc			Yes	ASL
	7440-36-0	Antimony	0.217	-	0.483	mg/kg	TP-030	3	/	25	1	:	34.1	0.483	3.10	nc			No	BSL
	7440-38-2	Arsenic	0.89	-	15.8	mg/kg	SE 7-10	24	/	25	6.02	:	6.02	15.8	0.39	ca*			Yes	ASL
	7440-39-3	Barium	11.2	-	86.5	mg/kg	NW 7-10	25	/	25				86.5	540	nc			No	BSL
	7440-41-7	Beryllium	0.18	-	0.57	mg/kg	EN 7-10	23	/	25	0.0693	:	0.24	0.57	15	nc			No	BSL
	7440-43-9	Cadmium	0.2	-	0.394	mg/kg	TP-008	6	/	25	0.04	:	0.643	0.394	3.7	nc			No	BSL
	7440-70-2	Calcium	945	-	23500	mg/kg	NW 7-10	25	/	25				23500					No	E
	7440-47-3	Chromium	3.43	-	27.2	mg/kg	SE BOT	22	/	22				27.2	210	ca			No	BSL
	7440-48-4	Cobalt	2.46	-	18.8	mg/kg	EN 7-10	24	/	25	4	:	4	18.8	140	nc [a]			No	BSL
	7440-50-8	Copper	5.39	-	26.3	mg/kg	NE BOT	25	/	25				26.3	310	nc			No	BSL
	7439-89-6	Iron	3710	-	25400	mg/kg	EN 7-10	25	/	25				25400	2300	nc			No	E

Table 12-2
FPGS Selection of Chemicals of Potential Concern - Subsurface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Exposure Point	casno	Parameter	Range of Detected Concentrations (1)			Units	Location of Maximum	Frequency of Detection			Range of Non Detects			Concentration Used for Screening (2)	Screening Toxicity Value (3)		Potential ARAR/TBC Value (4)	Potential ARAR/TBC Source	Selected as a COPC? (5)	Rationale
	7439-92-1	Lead	2.98	-	71.3	mg/kg	SE 7-10	25	/	25				71.3	400	nc			No	BSL
	7439-95-4	Magnesium	1340	-	8680	mg/kg	EN 7-10	25	/	25				8680					No	E
	7439-96-5	Manganese	74.6	-	377	mg/kg	EN 7-10	25	/	25				377	180	nc			Yes	ASL
	7439-97-6	Mercury	0.08	-	0.36	mg/kg	SW 3-7	4	/	25	0.05	:	0.25	0.36	2.3	nc			No	BSL
	7440-02-0	Nickel	2.64	-	20.8	mg/kg	TP-008	24	/	25	9.1	:	9.1	20.8	160	nc			No	BSL
	7440-09-7	Potassium	84.6	-	1560	mg/kg	TP-022	23	/	25	251	:	310	1560					No	E
	7782-49-2	Selenium	0.199	-	12.4	mg/kg	ES 7-10	19	/	25	0.34	:	0.41	12.4	39	nc			No	BSL
	7440-22-4	Silver	0.371	-	0.371	mg/kg	TP-022	1	/	25	0.69	:	3.3	0.371	39	nc			No	BSL
	7440-23-5	Sodium	40.5	-	823	mg/kg	ES 7-10	25	/	25				823					No	E
	7440-28-0	Thallium	0.906	-	1.57	mg/kg	TP-008	2	/	25	0.65	:	10	1.57	0.52	nc			Yes	ASL
	7440-62-2	Vanadium	6.44	-	53.8	mg/kg	EN 7-10	25	/	25				53.8	7.8	nc			Yes	ASL
	7440-66-6	Zinc	15.7	-	65.6	mg/kg	NW BOTA	25	/	25				65.6	2300	nc			No	BSL

(1) Minimum or maximum concentration detected in data set. Samples included in data set are identified in Appendix C.
(2) The concentration used for screening is the maximum detected concentration, per USEPA Region I (USEPA, 1999).
(3) Values are the Preliminary Remediation Goals (PRGs) obtained from USEPA Region IX dated October 2004.
Values used for screening are the residential soil PRGs for the lesser of cancer risks equal to 1E-06 or non-cancer risks equal to a hazard index of 0.1, per USEPA Region I (USEPA, 1999).
PRG for pyrene is used as a surrogate for PAHs without published PRG values (phenanthrene, acenaphthylene, benzo(g,h,i)perylene).
PRG for naphthalene used for 2-methylnaphthalene.
PRG for alpha-BHC used for delta-BHC.
nc - PRG is based on a non-cancer hazard quotient of 0.1.
ca - PRG is based on an excess lifetime cancer risk of 1 in 1 million.
ca* - where nc PRG < 100X ca PRG.
nc[a] - Value is based on a non-cancer endpoint because PRG at HI=0.1 is lower than PRG at cancer risk 1 in 1 million.
sat - PRG is based on soil saturation.
(4) There are no ARAR/TBC for soil.
(5) Analyte is selected as a COPC if the concentration used for screening exceeds the PRG or if no screening value is available.
BSL = Concentration used for screening is less than the screening toxicity value; the analyte was not selected as a COPC.
ASL = Concentration used for screening is greater than the screening toxicity value; the analyte was selected as a COPC.
E = The analyte is a human essential nutrient, and is not considered to be toxic at the concentration detected; the analyte was not selected as a COPC (USEPA, 1999).
FOD = Frequency of detection is below 5%.

mg/Kg = milligrams per kilogram
COPC = chemical of potential concern

Table 12-3
FPGS Selection of Chemicals of Potential Concern - Groundwater
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Exposure Point	CAS Number	Chemical	Range of Detected Concentrations (1)	Units	Location of Maximum	Frequency of Detection	Range of Non Detects	Concentration Used for Screening (2)	Screening Toxicity Value (3)	Potenetial ARAR/TBC Value (4)	Potential ARAR/TBC Source	Retain as COPC? (5)	Rationale for Contaminant Deletion of Selection (5)
FPGS		**Volatile Organics**											
	67-64-1	Acetone	0.0023 - 0.0078	mg/L	MW127A-2	7 / 27	0.005 - 0.005	0.0078	0.55 nc			No	BSL
	71-43-2	Benzene	0.000068 - 0.00036	mg/L	MW127A-2	7 / 76	0.000057 - 0.001	0.00036	0.00035 ca	0.005	MCL	No (6)	ASL
	67-66-3	Chloroform	0.000071 - 0.000071	mg/L	MW102B-2	1 / 76	0.0000625 - 0.005	0.00007	0.00017 ca			No	BSL
	156-59-2	Cis-1,2-Dichloroethene	0.00011 - 0.00038	mg/L	MW-5R	6 / 76	0.000101 - 0.005	0.00038	0.0061 nc	0.07	MCL	No	BSL
	74-82-8	Methane	9.86 - 10.9	mg/L	MW127A-2	2 / 3	0.0063 - 0.0063	10.9				No	NSL
	1634-04-4	Methyl Tertbutyl Ether	0.00009 - 0.00025	mg/L	MW-43B-2	4 / 76	0.000343 - 0.005	0.00025	0.0011 ca	0.02	SMCL	No	BSL
	127-18-4	Tetrachloroethene	0.000064 - 0.0032	mg/L	MW-5R	15 / 76	0.000221 - 0.001	0.00320	0.0001 ca	0.005	MCL	Yes	ASL
	79-01-6	Trichloroethene	0.00016 - 0.0021	mg/L	MW-5R	12 / 77	0.00002 - 0.001	0.00210	0.000028 ca	0.005	MCL	Yes	ASL
	75-01-4	Vinyl chloride	0.000014 - 0.000014	mg/L	MW127A-2	1 / 77	0.000163 - 0.005	0.00001	0.00002 ca	0.002	MCL	No	BSL
		Pesticides/PCBs											
	60-57-1	Dieldrin	0.000121 - 0.000121	mg/L	MW127A-2	1 / 2	0.0000202 - 0.0000202	0.000121	0.0000042 ca			Yes	ASL
	5103-74-2	Gamma-Chlordane	0.0000121 - 0.0000121	mg/L	MW127A-2	1 / 2	0.0000202 - 0.0000202	0.000012	0.00019 ca			No	BSL
		Metals, Total											
	7429-90-5	Aluminum	0.0336 - 0.0999	mg/L	MW127A-2	2 / 2		0.100	3.6 nc	0.05	SMCL	No	BSL
	7440-39-3	Barium	0.0494 - 0.054	mg/L	MW127A-2	2 / 2		0.054	0.26 nc	2	MCL	No	BSL
	7440-70-2	Calcium	63.9 - 66.6	mg/L	MW127A-2	2 / 2		66.6				No	E
	7439-89-6	Iron	19.6 - 72.4	mg/L	MW127A-2	2 / 2		72.4		0.3	SMCL	No	E
	7439-95-4	Magnesium	7.73 - 11.2	mg/L	MW127A-2	2 / 2		11.2				No	E
	7439-96-5	Manganese	2.06 - 3.99	mg/L	MW127A-2	3 / 3		4.0	0.088 nc	0.05	SMCL	Yes	ASL
	7440-09-7	Potassium	4.22 - 5.83	mg/L	MW127A-2	2 / 2		5.8				No	E
	7440-23-5	Sodium	58.1 - 72.8	mg/L	MW127A-2	2 / 2		72.8				No	E
	7440-66-6	Zinc	0.043 - 0.0512	mg/L	MW127A-2	2 / 2		0.051	1.1 nc	5	SMCL	No	BSL
		Metals, Dissolved											
	7439-96-5	Manganese	1.19 - 4.07	mg/L	MW127A-2	4 / 6	0.01 - 0.01	4.1	0.088 nc	0.05	SMCL	Yes	ASL
		Inorganics											
	HLA0091	Alkalinity, Total	310 - 459	mg/L	MW127A-2	3 / 3		459				No	NA
	16887-00-6	Chloride	20.8 - 154	mg/L	MW127A-2	5 / 5		154.0		250	SMCL	No	NA
	HLA0009	Nitrate+Nitrite as N	0.0731 - 34.8	mg/L	MW-5R	6 / 7	0.01 - 0.01	34.8	0.1 nc	10	MCL	Yes	ASL
	14808-79-8	Sulfate	0.18 - 82.8	mg/L	MW-5R	7 / 7		82.8		500	MCL	No	NA
	HLA0001	Total Alkalinity, as CaCO3	23.3 - 280	mg/L	MW-4	4 / 4		280				No	NA
	HLA0011	Total Organic Carbon	3.86 - 49.7	mg/L	MW-4	5 / 7	1 - 1	49.7				No	NA

(1) Minimum or maximum concentration detected in data set. Samples included in data set are identified in Appendix C.
(2) The concentration used for screening is the maximum detected concentration, per USEPA Region I (USEPA, 1999).
(3) Values are the Preliminary Remediation Goals (PRGs) obtained from USEPA Region IX dated October 2004.
Values used for screening are the tapwater PRGs for the lesser of cancer risks equal to 1E-06 or non-cancer risks equal to a hazard index of 0.1, per USEPA Region I (USEPA, 1999).
Values for Nitrate + Nitrite as N are based on Nitrite.
(4) Potentially applicable ARAR is the MCL, or SMCL. (USEPA, 2004)
(5) Analyte is selected as a COPC if the concentration used for screening exceeds the PRG or MCL or if a screening value is not available.
BSL = Concentration used for screening is less than the screening toxicity value and the ARAR/TBC; the analyte was not selected as a COPC.
ASL = Concentration used for screening is greater than the screening toxicity value or the ARAR/TBC; the analyte was selected as a COPC
E = The analyte is a human essential nutrient, and is not considered to be toxic at the concentration detected; the analyte was not selected as a COPC (USEPA, 1999).
NSL = No screening level available.
NA - Not applicable.
(6) The maximum concentratoin was detected in February 2004, there were no detects in the six subseqent rounds of data collected between June, 2004 and October, 2006.
Benzene was not deteced at a concentration greater than the screening value in any other well.

nc - Based on non-cancer endpoint
ca - Based on cancer endpoint
J = Value is estimated.
mg/L = milligrams per liter
COPC = chemical of potential concern
ARAR/TBC = Applicable or Relevant and Appropriate Requirements / To Be Considered
MCL - Maximum Contaminant Level
SMCL - Secondary Maximum Contaminant Levels

Table 12-4
FPGS Values Used For Daily Intake Calculations
Reasonable Maximum Exposure - Future Land Use Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Scenario Timeframe: Future Land Use
Medium: Soil
Exposure Medium: Soil (0 - 10 ft bgs)

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
Ingestion	Resident	Adult	FPGS	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	CHEMICAL INTAKE-INGESTION (mg/kg-day)=
				IR-S	Ingestion Rate of Soil	100	mg/day	USEPA, 1994	CS-c x IR-S x FI x EF x ED x CF1 x 1/BW x 1/AT
				FI	Fraction Ingested	1	unitless	Assumption	
				EF	Exposure Frequency	150	day/yr	USEPA, 1994	
				ED	Exposure Duration	24	yr	USEPA, 1994	
				BW	Body Weight	70	kg	USEPA, 1994	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	day	USEPA, 1989 / equal to ED	
				CF1	Conversion Factor	1E-06	kg/mg		
	Resident	Child (ages 1 - 6)	FPGS	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	CHEMICAL INTAKE-INGESTION (mg/kg-day)=
				IR-S	Ingestion Rate of Soil	200	mg/day	USEPA, 1994	CS-c x IR-S x FI x EF x ED x CF1 x 1/BW x 1/AT
				FI	Fraction Ingested	1	unitless	Assumption	
				EF	Exposure Frequency	150	day/yr	USEPA, 1994	
				ED	Exposure Duration	6	yr	USEPA, 1994	
				BW	Body Weight	15	kg	USEPA, 1994	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 1989 / equal to ED	
				CF1	Conversion Factor	1E-06	kg/mg		
Dermal	Resident	Adult	FPGS	CS	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	INTAKE-DERMAL (mg/kg-day) =
				DAevent	Dose Absorbed Per Event	chemical-specific	mg/cm2-event	USEPA, 2004	DAevent x SA x EF x ED x EV x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	5700	cm^2	USEPA, 2004	
				EF	Exposure Frequency	150	day/yr	USEPA, 1994	Where DAevent =
				ED	Exposure Duration	24	yr	USEPA, 1994	CS x AF x ABSd x CF
				EV	Events per Day	1	event/day	USEPA, 2004	
				AF	Adherence Factor	0.07	mg/cm^2-event	USEPA, 2004	
				ABSd	Dermal Absorption Factor	chemical-specific	unitless	USEPA, 2004	
				BW	Body Weight	70	kg	USEPA, 1994	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	day	USEPA, 1989 / equal to ED	
				CF	Conversion Factor	1E-06	kg/mg		

Table 12-4
FPGS Values Used For Daily Intake Calculations
Reasonable Maximum Exposure - Future Land Use Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Scenario Timeframe: Future Land Use
Medium: Soil
Exposure Medium: Soil (0 - 10 ft bgs)

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
	Resident	Child (ages 1 - 6)	FPGS	CS	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	INTAKE-DERMAL (mg/kg-day) =
				DAevent	Dose Absorbed Per Event	chemical-specific	mg/cm^2-event	USEPA, 2004	DAevent x SA x EF x ED x EV x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	2800	cm^2	USEPA, 2004	
				EF	Exposure Frequency	150	day/yr	USEPA, 1994	Where DAevent =
				ED	Exposure Duration	6	yr	USEPA, 1994	CS x AF x ABSd x CF
				EV	Events per Day	1	event/day	USEPA, 2004	
				AF	Adherence Factor	0.2	mg/cm^2-event	USEPA, 2004	
				ABSd	Dermal Absorption Factor	chemical-specific	unitless	USEPA, 2004	
				BW	Body Weight	15	kg	USEPA, 1994	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 1989 / equal to ED	
				CF	Conversion Factor	1E-06	kg/mg		
Dust Inhalation	Resident	Adult	FPGS	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	CHEMICAL INTAKE-INHALATION (ug/m^3) =
				CAair	Concentration in Air	95% UCL	ug/m^3	Modeled from soil	CAair x ED x EFo x ETo x 1/AT
				EFo	Exposure Frequency - outdoor	150	day/yr	USEPA, 1994	CAair =
				ED	Exposure Duration	24	yr	USEPA, 1994	CS-c x 1/PEF x 1000 ug/mg
				ETo	Exposure Time - outdoors	0.33	hr/hr	Assumption [1]	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	day	USEPA, 1989 / equal to ED	
				PEF	Particulate Emission Factor	1.16E+09	m^3/kg	per USEPA, 1996 [2]	
	Resident	Child (ages 1 - 6)	FPGS	CS-c	Chemical Concentration in Soil	95% UCL	mg/kg	USEPA, 1994	CHEMICAL INTAKE-INHALATION (ug/m^3) =
				CAair	Concentration in Air	95% UCL	ug/m^3	Modeled from soil	CAair x ED x EFo x ETo x 1/AT
				EFo	Exposure Frequency - outdoor	150	day/yr	USEPA, 1994	CAair =
				ED	Exposure Duration	6	yr	USEPA, 1994	CS-c x 1/PEF x 1000 ug/mg
				ETo	Exposure Time - outdoors	0.33	hr/hr	Assumption [1]	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 1989 / equal to ED	
				PEF	Particulate Emission Factor	1.16E+09	m^3/kg	per USEPA, 1996 [2]	

USEPA, 1989. "Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A)"; Office of Emergency and Remedial Response; EPA-540/1-89/002 (interim final); Washington, D.C., December.

USEPA, 1994. "Risk Updates No. 2"; USEPA Region I, Waste Management Division; August. Values from "Attachment 2" to Risk Updates No 2.

USEPA, 2002a. Supplemental Guidance for Developing Soil Screening Levels for Superfund Sites. OSWER 9355.4-24. December.

USEPA, 2004. "Risk Assessment Guidance for Superfund. Volume I. Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.

[1] - Assumes 8 hours per day.

[2] - Calculated for 0.5 acre source area, annual wind speed for Worcester, and O/C parameter for Hartford.

NA - Not Applicable

kg - kilograms; mg - milligrams; ug - micrograms; hr - hour; UCL - upper confidence limit

cm^2 - square centimeters; m^3 - cubic meters; yr - year; TBC - to be calculated

Prepared by: JHP
Checked by: KJC

Table 12-5
FPGS Values Used For Daily Intake Calculations
Reasonable Maximum Exposure - Future Land Use Groundwater
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Scenario Timeframe: Future Land Use
Medium: Groundwater
Exposure Medium: Groundwater used as potable water

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
Ingestion	Resident	Adult	FPGS	CW-c	Chemical Concentration in Water	Maximum	mg/l	USEPA, 1994	CHEMICAL INTAKE-INGESTION (mg/kg-day)=
				IR-W	Ingestion Rate of Water	2	l/day	USEPA, 1994	CW-c x IR-W x FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested	1	unitless	Assumption	
				EF	Exposure Frequency	350	day/yr	USEPA, 1994	
				ED	Exposure Duration	24	yr	USEPA, 1994	
				BW	Body Weight	70	kg	USEPA, 1994	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	8760	day	USEPA, 1989 / equal to ED	
		Child	FPGS	CW-c	Chemical Concentration in Water	Maximum	mg/l	USEPA, 1994	CHEMICAL INTAKE-INGESTION (mg/kg-day)=
				IR-W	Ingestion Rate of Water	1.5	l/day	USEPA, 1997	CW-c x IR-W x FI x EF x ED x 1/BW x 1/AT
				FI	Fraction Ingested	1	unitless	Assumption	
				EF	Exposure Frequency	350	day/yr	USEPA, 1994	
				ED	Exposure Duration	6	yr	USEPA, 1994	
				BW	Body Weight	15	kg	USEPA, 1994	
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 1989 / equal to ED	
Dermal	Resident	Adult	Overburden and bedrock wells	CW	Chemical Concentration in Water	Maximum	mg/l	USEPA, 1994	INTAKE-DERMAL (mg/kg-day)=
				DAevent	Permeability Constant Per Event	chemical-specific	mg/cm^2-event	USEPA, 2004	DAevent x SA x EF x ED x EV x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	18000	cm^2	USEPA, 2004 [1]	DAevent = CW x CF x PCevent
				tevent	Exposure Time	0.25	hr/event	USEPA, 1997 [2]	where
				EF	Exposure Frequency	350	day/yr	USEPA, 1994	PCevent is tevent multiplied by chemical-specific parameters
				ED	Exposure Duration	24	yr	USEPA, 1994	B, t*, Tevent, and Kp, using the algorithm that is appropriate
				EV	Event Frequency	1	event/day	USEPA, 2004	for the relationship between tevent and t*, per USEPA (2004)
				BW	Body Weight	70	kg	USEPA, 1994	and as described in the risk assessment text.
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	Calculations are documented in Appendix C.
				AT-N	Averaging Time (Non-Cancer)	8760	day	USEPA, 1989 / equal to ED	
				CF	Conversion Factor	0.001	l-cm^3		

Table 12-5
FPGS Values Used For Daily Intake Calculations
Reasonable Maximum Exposure - Future Land Use Groundwater
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Scenario Timeframe: Future Land Use
Medium: Groundwater
Exposure Medium: Groundwater used as potable water

Exposure Route	Receptor Population	Receptor Age	Exposure Points	Parameter Code	Parameter Definition	Value	Units	Rationale/ Reference	Intake Equation / Model Name
		Child	Overburden and	CW	Chemical Concentration in Water	Maximum	mg/l	USEPA, 1994	*INTAKE-DERMAL (mg/kg-day)=*
		(ages 1-6)	bedrock wells	DAevent	Permeability Constant Per Event	chemical-specific	mg/cm^2-event	USEPA, 2004	DAevent x SA x EF x ED x EV x 1/BW x 1/AT
				SA	Skin Surface Area Available for Contact	6600	cm^2	USEPA, 2004 [1]	DAevent = CW x CF x PCevent
				tevent	Exposure Time	0.33	hr/event	USEPA, 1997 [2]	where:
				EF	Exposure Frequency	350	day/yr	USEPA, 1994	PCevent is tevent multiplied by chemical-specific parameters
				ED	Exposure Duration	6	yr	USEPA, 1994	B, t*, Tevent, and Kp, using the algorithm that is appropriate
				EV	Event Frequency	1	event/day	USEPA, 2004	for the relationship between tevent and t*, per USEPA (2004)
				BW	Body Weight	15	kg	USEPA, 1994	and as described in the risk assessment text
				AT-C	Averaging Time (Cancer)	25550	day	USEPA, 1989	Calculations are documented in Appendix C.
				AT-N	Averaging Time (Non-Cancer)	2190	day	USEPA, 1989 / equal to ED	
				CF	Conversion Factor	0.001	l/cm^3		

USEPA, 1989. "Risk Assessment Guidance for Superfund, Volume 1, Human Health Evaluation Manual (Part A)"; Office of Emergency and Remedial Response; EPA-540/1-89/002 (interim final): Washington, D.C., December.
USEPA, 1994. "Risk Updates No. 2"; USEPA Region I, Waste Management Division; August. Values from "Attachment 2" to Risk Updates No. 2.
USEPA, 1997. "Exposure Factors Handbook, Volume I"; Office of Research and Development; EPA-600/P-95/002Fa; Washington, D.C.; August
USEPA, 2004. "Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Final. EPA/540/R/99/005.
[1] - Whole-body surface areas; values are recommended for evaluating residential exposures to water during showering/bathing.
[2] - Values used to calculate dermal absorption from water during showering/bathing. Exposure time values for adults correspond to the recommended 50th percentile for showering (10 minutes) and for children correspond to the recommended 50th percentile for bathing (20 minutes).

mg - milligrams
ug - micrograms
cm^2 - square centimeters
cm^3 - cubic centimeters
yr - year
hr - hour
l - liter
kg - kilograms

Prepared by: JPB
Checked by: KJC

Table 12-6
FPGS Exposure Point Concentrations - Surface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

							Exposure Point Concentration			
Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (distribution)		Maximum Detected Concentration (qualifier)	EPC	Units	Statistic	Rationale
FPGS (0-2 ft)	**Semivolatile Organics**									
	Acetophenone	mg/kg	0.073	0.40	G [a]	0.012 J	0.012	mg/kg	Maximum	(2)
	Benzo(a)anthracene	mg/kg	0.16	0.36	G [b]	0.96	0.36	mg/kg	95% UCL - G [b]	(3)
	Benzo(a)pyrene	mg/kg	0.14	0.38	G [a]	0.9	0.38	mg/kg	95% UCL - G [a]	(3)
	Benzo(b)fluoranthene	mg/kg	0.22	0.61	G [a]	1.7	0.61	mg/kg	95% UCL - G [a]	(3)
	Dibenz(a,h)anthracene	mg/kg	0.14	0.17	N [c]	0.12 J	0.12	mg/kg	Maximum	(2)
	Pesticides									
	Isodrin	mg/kg	0.0015	0.0062	G [b]	0.00509	0.00509	mg/kg	Maximum	(2)
	Inorganics									
	Aluminum	mg/kg	7557	8447	N [c]	9820	8447	mg/kg	95% UCL - N [c]	(3)
	Arsenic	mg/kg	4.4	5.4	G [b]	9.35	5.4	mg/kg	95% UCL - G [b]	(3)
	Manganese	mg/kg	166	186	N [c]	241	186	mg/kg	95% UCL - N [c]	(3)
	Mercury	mg/kg	0.26	2.2	NP [d]	2.62	2.2	mg/kg	95% UCL - NP [d]	(3)
	Thallium	mg/kg	0.47	0.55	N [c]	0.749 J	0.55	mg/kg	95% UCL - N [c]	(3)
	Vanadium	mg/kg	19.7	22.3	N [c]	29.8	22.3	mg/kg	95% UCL - N [c]	(3)
	Petroleum Hydrocarbons									
	Diesel Range Organics	mg/kg	44.3	NC		90.2	90.2	mg/kg	Maximum	(2)

(1) Arithmetic mean is calculated using one half the detection limit for nondetects.
(2) The maximum detected concentration is used as the EPC because the calculated 95% UCL exceeds the maximum detected concentration.
(3) UCL - The 95% UCL is used as the EPC because the calculated 95% UCL is less than the maximum detected concentration.
UCLs are calcualated using ProUCL (V. 3.02); documentation of calculations is provided in Appendix C.
G - Gamma Distribution
[a] - Adjusted Gamma UCL
[b] - Approximate Gamma UCL
N - Normal Distribution
[c] - Student's-t UCL
NP - Non-Parametric Distribution
[d] - 99% Chebyshev (Mean, Sd) UCL

mg/kg = milligrams per kilogram
EPC = Exposure Point Concentration
UCL = Upper Confidence Limit on the arithmetic mean
J -Value is estimated.
B - Analyte was detected in the method blank.
NC - Too few samples to permit 95% UCL calculation.

Table 12-7
FPGS Exposure Point Concentrations - Subsurface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachussetts

Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (distribution)		Maximum Detected Concentration (qualifier)		Exposure Point Concentration			
								EPC	Units	Statistic	Rationale
FPGS (2-10 ft)	**Semivolatile Organics**										
	Acetophenone	mg/kg	0.039	0.19	NP [a]	0.093	JB	0.093	mg/kg	Maximum	(3)
	Benzo(a)anthracene	mg/kg	0.15	0.29	G [c]	1.2		0.29	mg/kg	95% UCL - G [c]	(3)
	Benzo(a)pyrene	mg/kg	0.16	0.32	G [c]	0.84		0.32	mg/kg	95% UCL - G [c]	(3)
	Benzo(b)fluoranthene	mg/kg	0.15	0.69	NP [a]	1.2		0.69	mg/kg	95% UCL - NP [a]	(3)
	Pesticides										
	Isodrin	mg/kg	0.0022	NC		0.00455		0.00455	mg/kg	Maximum	(3)
	Inorganics										
	Aluminum	mg/kg	7672	8580	N [e]	13800		8580	mg/kg	95% UCL - N [e]	(3)
	Arsenic	mg/kg	4.4	5.5	G [d]	15.8		5.5	mg/kg	95% UCL - G [d]	(3)
	Manganese	mg/kg	188	212	N [e]	377		212	mg/kg	95% UCL - N [e]	(3)
	Thallium	mg/kg	0.91	1.8	NP [b]	1.57		1.57	mg/kg	Maximum	(3)
	Vanadium	mg/kg	21.0	24.9	LN [f]	53.8		24.9	mg/kg	95% UCL - LN [f]	(3)

(1) Arithmetic mean is calculated using one half the detection limit for nondetects.
(2) The maximum detected concentration is used as the EPC because the calculated 95% UCL exceeds the maximum detected concentration.
(3) UCL - The 95% UCL is used as the EPC because the calculated 95% UCL is less than the maximum detected concentration.
UCLs are calcualated using ProUCL (V. 3.02); documentation of calculations is provided in Appendix C.
NP - Non-Parametric Distribution
[a] - 99% Chebyshev (Mean, Sd) UCL
[b] - 95% Chebyshev (Mean, Sd) UCL
G - Gamma Distribution
[c] - Adjusted Gamma UCL
[d] - Approximate Gamma UCL
N - Normal Distribution
[d] - Student's-t UCL
LN - Log-Normal Distribution
[e] - 95% H-UCL

mg/kg = milligrams per kilogram
EPC = Exposure Point Concentration
UCL = Upper Confidence Limit on the arithmetic mean
J -Value is estimated.
B - Analyte was detected in the method blank.
NC - Too few samples to permit 95% UCL calculation.

Table 12-8
FPGS Exposure Point Concentrations - Groundwater
Record of Decision FPGS and BuildingsT- 62 and T-68
Soldier Systems Center
Natick, Massachussetts

						Exposure Point Concentration			
Exposure Point	Chemical of Potential Concern	Units	Arithmetic Mean (1)	95% UCL (distribution)	Maximum Detected Concentration (qualifier)	Value	Units	Statistic	Rationale
FPGS	**Volatile Organics**								
	Tetrachloroethene	mg/L	0.00076	NC	0.0032	0.0022	mg/L	Temporal Average	(3)
	Trichloroethene	mg/L	0.00052	NC	0.0021	0.00087	mg/L	Temporal Average	(3)
	Pesticides/PCBs								
	Dieldrin	mg/L	0.000066	NC	0.000121	0.000121	mg/L	Maximum	(2)
	Metals, Total								
	Manganese	mg/L	2.9	NC	3.99	3.99	mg/L	Maximum	(2)
	Metals, Dissolved								
	Manganese	mg/L	2.2	NC	4.07	4.07	mg/L	Maximum	(2)
	Inorganics								
	Nitrate+Nitrite as N	mg/L	8.8	NC	34.8	34.8	mg/L	Maximum	(2)

(1) Arithmetic mean is calculated using one half the detection limit for nondetects.
(2) Per USEPA Region I guidance (USEPA, 1994), the maximum detected concentration is selected as the EPC.
(3) EPC represents a temporal average of MW-5R, which is the location where the highest concentrations were detected.

NC = 95% UCL Not Calculated; not applicable for groundwater used as a potable water source (USEPA, 1995).
mg/L = milligrams/Liter
EPC = Exposure Point Concentration
UCL = Upper Confidence Limit on the arithmetic mean
J = Value is estimated.
N = Presumptively present.

Table 12-9
FPGS Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure - Future Resident - Child - Surface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
GROUND WATER	GROUND WATER	AQUIFER USED AS TAP WATER	INGESTION	Tetrachloroethene	0.0022	mg/l	1.8E-05	mg/kg-day	5.4E-01	(mg/kg/day)-1	9.8E-06	2.1E-04	mg/kg/day	1.0E-02	mg/kg/day	2.1E-02
				Trichloroethene	0.0008678571	mg/l	7.1E-06	mg/kg/day	4.0E-01	(mg/kg/day)-1	2.9E-06	8.3E-05	mg/kg/day	3.0E-04	mg/kg/day	2.8E-01
				Dieldrin	0.000121	mg/l	9.9E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.6E-05	1.2E-05	mg/kg/day	5.0E-05	mg/kg/day	2.3E-01
				Manganese (drinking water)	4.07	mg/l	NC		NC			3.9E-01	mg/kg/day	2.4E-02	mg/kg/day	1.6E+01
				Nitrite	34.8	mg/l	NC		NC			3.3E+00	mg/kg/day	1.0E-01	mg/kg/day	3.3E+01
			EXPOSURE ROUTE TOTAL								3E-05					5.0E+01
			DERMAL	Tetrachloroethene	0.0022	mg/l	4.0E-06	mg/kg-day	5.4E-01	(mg/kg/day)-1	2.2E-06	4.7E-05	mg/kg/day	1.0E-02	mg/kg/day	4.7E-03
				Trichloroethene	0.0008678571	mg/l	4.0E-07	mg/kg/day	4.0E-01	(mg/kg/day)-1	1.8E-07	5.2E-06	mg/kg/day	3.0E-04	mg/kg/day	1.7E-02
				Dieldrin	0.000121	mg/l	2.6E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	4.2E-06	3.0E-06	mg/kg/day	5.0E-05	mg/kg/day	6.1E-02
				Manganese (drinking water)	4.07	mg/l	NC		NC			5.7E-04	mg/kg/day	9.6E-04	mg/kg/day	5.9E-01
				Nitrite	34.8	mg/l	NC		NC			--		1.0E-01	mg/kg/day	
			EXPOSURE ROUTE TOTAL								7E-06					7E-01
		EXPOSURE POINT TOTAL									4E-05					5.1E+01
	EXPOSURE MEDIUM TOTAL										4E-05					5.1E+01
GROUNDWATER TOTAL											4E-05					5.1E+01
SOIL	SURFACE SOIL	SITE	INGESTION	Acetophenone	0.012	mg/kg	NC		NC			6.6E-08	mg/kg/day	1.0E-01	mg/kg/day	6.6E-07
				Benzo(a)anthracene	0.36	mg/kg	9.0E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	6.5E-07	2.0E-06	mg/kg/day	3.0E-02	mg/kg/day	6.6E-05
				Benzo(a)pyrene	0.38	mg/kg	9.5E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	6.9E-06	2.1E-06	mg/kg/day	3.0E-02	mg/kg/day	6.9E-05
				Benzo(b)fluoranthene	0.61	mg/kg	1.5E-06	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.1E-06	3.3E-06	mg/kg/day	3.0E-02	mg/kg/day	1.1E-04
				Dibenz(a,h)anthracene	0.12	mg/kg	3.0E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.2E-06	6.6E-07	mg/kg/day	3.0E-02	mg/kg/day	2.2E-05
				Endrin	0.00509	mg/kg	NC		NC			2.8E-08	mg/kg/day	ND		
				Aluminum	8447	mg/kg	NC		NC			4.6E-02	mg/kg/day	1.0E+00	mg/kg/day	4.6E-02
				Arsenic	5.4	mg/kg	2.5E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.8E-06	3.0E-05	mg/kg/day	3.0E-04	mg/kg/day	9.9E-02
				Manganese	186	mg/kg	NC		NC			1.0E-03	mg/kg/day	7.1E-02	mg/kg/day	1.4E-02
				Mercury	2.2	mg/kg	NC		NC			1.2E-05	mg/kg/day	3.0E-04	mg/kg/day	4.0E-02
				Thallium	0.55	mg/kg	NC		NC			3.0E-06	mg/kg/day	8.0E-05	mg/kg/day	3.8E-02
				Vanadium	22.3	mg/kg	NC		NC			1.2E-04	mg/kg/day	4.9E-03	mg/kg/day	2.5E-02
				Diesel Range Organics	90.2	mg/kg	NC		NC			4.9E-04	mg/kg/day	ND		
			EXPOSURE ROUTE TOTAL								1E-05					3E-01
			DERMAL	Acetophenone	0.012	mg/kg	NC		NC			--		1.0E-01	mg/kg/day	
				Benzo(a)anthracene	0.36	mg/kg	3.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	2.4E-07	7.2E-07	mg/kg/day	3.0E-02	mg/kg/day	2.4E-05
				Benzo(a)pyrene	0.38	mg/kg	3.4E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	2.5E-06	7.6E-07	mg/kg/day	3.0E-02	mg/kg/day	2.5E-05
				Benzo(b)fluoranthene	0.61	mg/kg	5.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.0E-07	1.2E-06	mg/kg/day	3.0E-02	mg/kg/day	4.1E-05
				Dibenz(a,h)anthracene	0.12	mg/kg	1.1E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	7.9E-07	2.4E-07	mg/kg/day	3.0E-02	mg/kg/day	8.0E-06
				Endrin	0.00509	mg/kg	NC		NC			--		ND		
				Aluminum	8447	mg/kg	NC		NC			--		1.0E+00	mg/kg/day	
				Arsenic	5.4	mg/kg	2.1E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	3.2E-07	2.5E-06	mg/kg/day	3.0E-04	mg/kg/day	8.3E-03
				Manganese	186	mg/kg	NC		NC			--		2.8E-03	mg/kg/day	
				Mercury	2.2	mg/kg	NC		NC			--		2.1E-05	mg/kg/day	
				Thallium	0.55	mg/kg	NC		NC			--		8.0E-05	mg/kg/day	
				Vanadium	22.3	mg/kg	NC		NC			--		1.3E-04	mg/kg/day	
				Diesel Range Organics	90.2	mg/kg	NC		NC			--		ND		
			EXPOSURE ROUTE TOTAL								4E-06					8E-03
		EXPOSURE POINT TOTAL									2E-05					3E-01

Table 12-9
FPGS Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure - Future Resident - Child - Surface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
	EXPOSURE MEDIUM TOTAL										2E-05					7E-01
	AIR	DUST AT SITE	DUST INHALATION	Acetophenone	0.012	mg/kg	NC		NC			2.7E-09	ug/m3	ND		
				Benzo(a)anthracene	0.36	mg/kg	1.7E-08	ug/m3	1.1E-04	(ug/m3)-1	4.0E-12	8.1E-08	ug/m3	ND		
				Benzo(a)pyrene	0.38	mg/kg	3.9E-08	ug/m3	1.1E-03	(ug/m3)-1	4.3E-11	8.5E-08	ug/m3	ND		
				Benzo(b)fluoranthene	0.61	mg/kg	6.2E-08	ug/m3	1.1E-04	(ug/m3)-1	6.8E-12	1.4E-07	ug/m3	ND		
				Dibenzo(a,h)anthracene	0.12	mg/kg	1.2E-08	ug/m3	1.1E-03	(ug/m3)-1	1.3E-11	2.7E-08	ug/m3	ND		
				Diethyl phthalate	0.00509	mg/kg	NC		NC			1.1E-09	ug/m3	ND		
				Aluminum	8487	mg/kg	NC		NC			1.9E-03	ug/m3	4.8E+00	ug/m3	3.9E-04
				Arsenic	3.4	mg/kg	1.0E-07	ug/m3	4.3E-03	(ug/m3)-1	4.5E-10	1.2E-06	ug/m3	3.0E-02	ug/m3	4.0E-05
				Manganese	186	mg/kg	NC		NC			4.2E-05	ug/m3	5.0E-02	ug/m3	8.4E-04
				Mercury	2.2	mg/kg	NC		NC			4.9E-07	ug/m3	3.0E-01	ug/m3	1.6E-06
				Thallium	0.55	mg/kg	NC		NC			1.2E-07	ug/m3	ND		
				Vanadium	22.3	mg/kg	NC		NC			5.0E-06	ug/m3	ND		
				Diesel Range Organics	90.2	mg/kg	NC		NC			2.0E-05	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								5E-10					1E-03
		EXPOSURE POINT TOTAL									5E-10					1E-03
	EXPOSURE MEDIUM TOTAL										5E-10					1E-03
SOIL TOTAL											2E-05					3E-01
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA
											5E-05					5.1E+01

NOTES
(1) - Blank cells indicate that an RfD or RfC is not available from the sources used to obtain dose-response data for this risk assessment
NC - Not carcinogenic via this exposure route
NA - Not applicable, exposure route not applicable for this chemical exposure medium.
NV - Not volatile, exposure route not complete for this chemical
-- - Not calculated, dose-response data and/or dermal absorption values are not available

Prepared by: KJC
Checked by: JHP

Table 12-10
FPGS Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure - Future Resident - Adult - Surface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (I) VALUE	RfD/RfC (I) UNITS	HAZARD QUOTIENT
GROUND WATER	GROUND WATER	AQUIFER USED AS TAP WATER	INGESTION	Tetrachloroethene	0 0022	mg/l	2 1E-05	mg/kg/day	5.4E-01	(mg/kg/day)-1	1 1E-05	6 0E-05	mg/kg/day	1 0E-02	mg/kg/day	6 0E-03
				Trichloroethene	0 000867857	mg/l	8 2E-06	mg/kg/day	4.0E-01	(mg/kg/day)-1	3 3E-06	2 4E-05	mg/kg/day	3 0E-04	mg/kg/day	7 9E-02
				Dieldrin	0 000121	mg/l	1 1E-06	mg/kg/day	1 6E+01	(mg/kg/day)-1	1 8E-05	3 3E-06	mg/kg/day	5 0E-05	mg/kg/day	6 6E-02
				Manganese (drinking water)	4 07	mg/l	NC		NC			1 1E-01	mg/kg/day	2 4E-02	mg/kg/day	4 6E+00
				Nitrite	34 8	mg/l	NC		NC			9 5E-01	mg/kg/day	1 0E-01	mg/kg/day	9 5E+00
			EXPOSURE ROUTE TOTAL								3E-05					1 4E-01
			DERMAL	Tetrachloroethene	0 0022	mg/l	8 2E-06	mg/kg/day	5 4E-01	(mg/kg/day)-1	4.4E-06	2 4E-05	mg/kg/day	1 0E-02	mg/kg/day	2 4E-03
				Trichloroethene	0 000867857	mg/l	9 0E-07	mg/kg/day	4 0E-01	(mg/kg/day)-1	3.6E-07	2 6E-06	mg/kg/day	3 0E-04	mg/kg/day	8.7E-03
				Dieldrin	0 000121	mg/l	5 3E-07	mg/kg/day	1 6E+01	(mg/kg/day)-1	8.5E-06	1 5E-06	mg/kg/day	5 0E-05	mg/kg/day	3 1E-02
				Manganese (drinking water)	4 07	mg/l	NC		NC			2 5E-04	mg/kg/day	9 6E-04	mg/kg/day	2 6E-01
				Nitrite	34 8	mg/l	NC		NC			–		1 0E-01	mg/kg/day	
			EXPOSURE ROUTE TOTAL								1E-05					3E-01
		EXPOSURE POINT TOTAL									5E-05					1 5E+01
	EXPOSURE MEDIUM TOTAL										5E-05					1.5E+01
GROUNDWATER TOTAL											5E-05					1.5E+01
SOIL	SURFACE SOIL	SITE	INGESTION	Acetophenone	0 012	mg/kg	NC		NC			7 0E-09	mg/kg/day	1 0E-01	mg/kg/day	7 0E-08
				Benzo(a)anthracene	0 36	mg/kg	1 3E-07	mg/kg/day	7 3E-01	(mg/kg/day)-1	9 5E-08	2 1E-07	mg/kg/day	3.0E-02	mg/kg/day	7 0E-06
				Benzo(a)pyrene	0 38	mg/kg	1 4E-07	mg/kg/day	7 3E+00	(mg/kg/day)-1	1.0E-06	2 2E-07	mg/kg/day	3 0E-02	mg/kg/day	7 4E-06
				Benzo(b)fluoranthene	0 61	mg/kg	2 2E-07	mg/kg/day	7 3E-01	(mg/kg/day)-1	1.6E-07	3 6E-07	mg/kg/day	3 0E-02	mg/kg/day	1 2E-05
				Dibenz(a,h)anthracene	0 12	mg/kg	4 3E-08	mg/kg/day	7 3E+00	(mg/kg/day)-1	3.2E-07	7 0E-08	mg/kg/day	3 0E-02	mg/kg/day	2 3E-06
				Isodrin	0 00509	mg/kg	NC		NC			3 0E-09	mg/kg/day	ND		
				Aluminum	8447	mg/kg	NC		NC			5 0E-03	mg/kg/day	1 0E+00	mg/kg/day	5 0E-03
				Arsenic	5 4	mg/kg	1 1E-06	mg/kg/day	1 5E+00	(mg/kg/day)-1	1 8E-06	3 2E-06	mg/kg/day	3 0E-04	mg/kg/day	1 1E-02
				Manganese	186	mg/kg	NC		NC			1 1E-04	mg/kg/day	7 1E-02	mg/kg/day	1 5E-03
				Mercury	2 2	mg/kg	NC		NC			1 3E-06	mg/kg/day	3 0E-04	mg/kg/day	4 3E-03
				Thallium	0 55	mg/kg	NC		NC			3.2E-07	mg/kg/day	8 0E-05	mg/kg/day	4 0E-03
				Vanadium	22 3	mg/kg	NC		NC			1 3E-05	mg/kg/day	4 9E-03	mg/kg/day	2.7E-03
				Diesel Range Organics	90 2	mg/kg	NC		NC			5 3E-05	mg/kg/day	ND		
			EXPOSURE ROUTE TOTAL								3E-06					3E-02
			DERMAL	Acetophenone	0.012	mg/kg	NC		NC			–		1.0E-01	mg/kg/day	
				Benzo(a)anthracene	0 36	mg/kg	6 8E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.9E-08	1 1E-07	mg/kg/day	3 0E-02	mg/kg/day	3 7E-06
				Benzo(a)pyrene	0 38	mg/kg	7 1E-08	mg/kg/day	7 3E+00	(mg/kg/day)-1	5.2E-07	1 2E-07	mg/kg/day	3 0E-02	mg/kg/day	3 9E-06
				Benzo(b)fluoranthene	0 61	mg/kg	1 1E-07	mg/kg/day	7 3E-01	(mg/kg/day)-1	8.4E-08	1 9E-07	mg/kg/day	3 0E-02	mg/kg/day	6 2E-06
				Dibenz(a,h)anthracene	0 12	mg/kg	2 3E-08	mg/kg/day	7 3E+00	(mg/kg/day)-1	1.6E-07	3 7E-08	mg/kg/day	3.0E-02	mg/kg/day	1.2E-06
				Isodrin	0 00509	mg/kg	NC		NC			–		ND		
				Aluminum	8447	mg/kg	NC		NC			–		1 0E+00	mg/kg/day	
				Arsenic	5 4	mg/kg	1 3E-07	mg/kg/day	1 5E+00	(mg/kg/day)-1	2.0E-07	3 8E-07	mg/kg/day	3 0E-04	mg/kg/day	1.3E-03
				Manganese	186	mg/kg	NC		NC			–		2 8E-03	mg/kg/day	
				Mercury	2 2	mg/kg	NC		NC			–		2 1E-05	mg/kg/day	
				Thallium	0 55	mg/kg	NC		NC			–		8 0E-05	mg/kg/day	
				Vanadium	22 3	mg/kg	NC		NC			–		1 3E-04	mg/kg/day	
				Diesel Range Organics	90 2	mg/kg	NC		NC			–		ND		
												–				
			EXPOSURE ROUTE TOTAL								1E-06					1E-03
		EXPOSURE POINT TOTAL									4E-06					3E-02

Table 12-10
FPGS Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure - *Future Resident - Adult - Surface Soil*
Record of Decision FPGS and Buildings T-42 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
	EXPOSURE MEDIUM TOTAL										4E-06					5E-02
	AIR	DUST AT SITE	DUST INHALATION	Acetophenone	0.012	mg/kg	NC		NC			1.4E-09	ug/m3	ND		
				Benzo(a)anthracene	0.36	mg/kg	2.6E-08	ug/m3	1.1E-04	(ug/m3)-1	2.9E-12	4.3E-08	ug/m3	ND		
				Benzo(a)pyrene	0.48	mg/kg	2.8E-08	ug/m3	1.1E-03	(ug/m3)-1	3.0E-11	4.5E-08	ug/m3	ND		
				Benzo(b)fluoranthene	0.61	mg/kg	4.4E-08	ug/m3	1.1E-04	(ug/m3)-1	4.9E-12	7.2E-08	ug/m3	ND		
				Dibenz(a,h)anthracene	0.12	mg/kg	8.7E-09	ug/m3	1.1E-03	(ug/m3)-1	9.6E-12	1.4E-08	ug/m3	ND		
				Isodrin	0.00509	mg/kg	NC		NC			5.9E-10	ug/m3	ND		
				Aluminum	9147	mg/kg	NC		NC			1.0E-03	ug/m3	4.9E+00	ug/m3	2.0E-04
				Arsenic	5.4	mg/kg	2.2E-07	ug/m3	4.3E-03	(ug/m3)-1	9.4E-10	6.3E-07	ug/m3	3.0E-02	ug/m3	2.1E-05
				Manganese	196	mg/kg	NC		NC			2.2E-05	ug/m3	5.0E-03	ug/m3	4.4E-03
				Mercury	2.2	mg/kg	NC		NC			2.6E-07	ug/m3	3.0E-01	ug/m3	8.7E-07
				Thallium	0.55	mg/kg	NC		NC			6.5E-08	ug/m3	ND		
				Vanadium	22.3	mg/kg	NC		NC			2.6E-06	ug/m3	ND		
				Diesel Range Organics	902	mg/kg	NC		NC			1.1E-05	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								1E-09					7E-04
		EXPOSURE POINT TOTAL									1E-09					7E-04
	EXPOSURE MEDIUM TOTAL										1E-09					7E-04
SOIL TOTAL											4E-06					3E-02
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA
											5E-05					1.5E+01

NOTES
(1) - Blank cells indicate that an RfD or RfC is not available from the sources used to obtain dose-response data for this risk assessment
NC - Not carcinogenic by this exposure route
NA - Not applicable, exposure route not applicable for this chemical-exposure medium
NV - Not volatile, exposure route not complete for this chemical
-- - Not calculated, dose-response data and or dermal absorption values are not available

Prepared by: KJC
Checked by: JHP

Table 12-11
FPGS Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure - Future Resident - Child -Subsurface Soil
Record of Decision FPGS and Buildings T-62 and T-48
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC		CANCER RISK CALCULATIONS					NON-CANCER HAZARD CALCULATIONS				
					VALUE	UNITS	INTAKE/EXPOSURE CONCENTRATION		CSF/UNIT RISK		CANCER RISK	INTAKE/EXPOSURE CONCENTRATION		RfD/RfC (1)		HAZARD QUOTIENT
							VALUE	UNITS	VALUE	UNITS		VALUE	UNITS	VALUE	UNITS	
GROUND WATER	GROUND WATER	AQUIFER USED AS TAP WATER	INGESTION	Tetrachloroethene	0.0022	mg/l	1 8E-05	mg/kg/day	5 4E-01	(mg/kg/day)-1	9 8E-06	2 1E-04	mg/kg/day	1 0E-02	mg/kg/day	2 1E-02
				Trichloroethene	0 000867857	mg/l	7 1E-06	mg/kg/day	4 0E-01	(mg/kg/day)-1	2 9E-06	8 3E-05	mg/kg/day	3 0E-04	mg/kg/day	2 8E-01
				Dieldrin	0 000121	mg/l	9 9E-07	mg/kg/day	1 6E+01	(mg/kg/day)-1	1 6E-05	1 2E-05	mg/kg/day	5 0E-05	mg/kg/day	2 3E-01
				Manganese (drinking water)	4 07	mg/l	NC		NC			3 9E-01	mg/kg/day	2 4E-02	mg/kg/day	1 6E-01
				Nitrite	34 8	mg/l	NC		NC			3 3E+00	mg/kg/day	1 0E-01	mg/kg/day	3 3E+01
			EXPOSURE ROUTE TOTAL								3E-05					5 0E+01
			DERMAL	Tetrachloroethene	0.0022	mg/l	4 0E-06	mg/kg/day	5 4E-01	(mg/kg/day)-1	2 2E-06	4 7E-05	mg/kg/day	1 0E-02	mg/kg/day	4 7E-03
				Trichloroethene	0 000867857	mg/l	4 4E-07	mg/kg/day	4 0E-01	(mg/kg/day)-1	1 8E-07	5 2E-06	mg/kg/day	3 0E-04	mg/kg/day	1 7E-02
				Dieldrin	0 000121	mg/l	2 6E-07	mg/kg/day	1 6E+01	(mg/kg/day)-1	4 2E-06	3 0E-06	mg/kg/day	5 0E-05	mg/kg/day	6 1E-02
				Manganese (drinking water)	4 07	mg/l	NC		NC			5 7E-04	mg/kg/day	9 6E-04	mg/kg/day	5 9E-01
				Nitrite	34 8	mg/l	NC		NC			--		1 0E-01	mg/kg/day	
			EXPOSURE ROUTE TOTAL								7E-06					7E-01
		EXPOSURE POINT TOTAL									4E-05					5 1E+01
	EXPOSURE MEDIUM TOTAL										4E-05					5 1E+01
GROUNDWATER TOTAL											4E-05					5 1E+01
SOIL	SUBSURFACE SOIL	SITE	INGESTION	Acetophenone	0 093	mg/kg	NC		NC			5 1E-07	mg/kg/day	1 0E-01	mg/kg/day	5 1E-06
				Benzo(a)anthracene	0 29	mg/kg	7 2E-07	mg/kg/day	7 3E-01	(mg/kg/day)-1	5 3E-07	1 6E-06	mg/kg/day	3 0E-02	mg/kg/day	5 3E-05
				Benzo(a)pyrene	0 32	mg/kg	8 0E-07	mg/kg/day	7 3E+00	(mg/kg/day)-1	5 8E-06	1 8E-06	mg/kg/day	3 0E-02	mg/kg/day	5 8E-05
				Benzo(b)fluoranthene	0 69	mg/kg	1 7E-06	mg/kg/day	7 3E-01	(mg/kg/day)-1	1 3E-06	3 8E-06	mg/kg/day	3 0E-02	mg/kg/day	1 3E-04
				Iodine	0 00455	mg/kg	NC		NC			2 5E-08	mg/kg/day	ND		
				Aluminum	8580	mg/kg	NC		NC			4 7E-02	mg/kg/day	1 0E+00	mg/kg/day	4 7E-02
				Arsenic	5 5	mg/kg	2 6E-06	mg/kg/day	1 5E+00	(mg/kg/day)-1	3 9E-06	9 0E-05	mg/kg/day	3 0E-04	mg/kg/day	1 0E-01
				Manganese	212	mg/kg	NC		NC			1 2E-03	mg/kg/day	7 1E-02	mg/kg/day	1 6E-02
				Thallium	1 57	mg/kg	NC		NC			8 6E-06	mg/kg/day	8 0E-05	mg/kg/day	1 1E-01
				Vanadium	24 9	mg/kg	NC		NC			1 4E-04	mg/kg/day	4 9E-03	mg/kg/day	2 8E-02
			EXPOSURE ROUTE TOTAL								1E-05					3E-01
			DERMAL	Acetophenone	0 093	mg/kg	NC		NC			--		1 0E-01	mg/kg/day	
				Benzo(a)anthracene	0 29	mg/kg	2 6E-07	mg/kg/day	7 3E-01	(mg/kg/day)-1	1 9E-07	5 8E-07	mg/kg/day	3 0E-02	mg/kg/day	1 9E-05
				Benzo(a)pyrene	0 32	mg/kg	2 9E-07	mg/kg/day	7 3E+00	(mg/kg/day)-1	2 1E-06	6 4E-07	mg/kg/day	3 0E-02	mg/kg/day	2 1E-05
				Benzo(b)fluoranthene	0 69	mg/kg	6 3E-07	mg/kg/day	7 3E-01	(mg/kg/day)-1	4 6E-07	1 4E-06	mg/kg/day	3 0E-02	mg/kg/day	4 6E-05
				Iodine	0 00455	mg/kg	NC		NC			--		ND		
				Aluminum	8580	mg/kg	NC		NC			--		1 0E+00	mg/kg/day	
				Arsenic	5 5	mg/kg	2 2E-07	mg/kg/day	1 5E+00	(mg/kg/day)-1	1 3E-07	2 5E-06	mg/kg/day	3 0E-04	mg/kg/day	8 4E-03
				Manganese	212	mg/kg	NC		NC			--		2 8E-03	mg/kg/day	
				Thallium	1 57	mg/kg	NC		NC			--		8 0E-05	mg/kg/day	
				Vanadium	24 9	mg/kg	NC		NC			--		1 3E-04	mg/kg/day	
												--				
												--				
												--				
			EXPOSURE ROUTE TOTAL								3E-06					9E-03
		EXPOSURE POINT TOTAL									1E-05					3E-01

Table 12-11
EPC8 Cacluation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure - Future Resident - Child -Subsurface Soil
Record of Decision FPC8 and Buildings T-42 and T-48
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
	EXPOSURE MEDIUM TOTAL										1E-05					3E-01
	AIR	DUST AT SITE	DUST INHALATION	Acetophenone	0.093	mg/kg	NC		NC			2.1E-08	ug/m3	ND		
				Benzo(a)anthracene	0.29	mg/kg	5.0E-08	ug/m3	1.1E-04	(ug/m3)-1	5.3E-12	6.5E-08	ug/m3	ND		
				Benzo(a)pyrene	0.42	mg/kg	7.3E-08	ug/m3	1.1E-03	(ug/m3)-1	7.8E-11	9.5E-08	ug/m3	ND		
				Benzo(b)fluoranthene	0.69	mg/kg	1.2E-07	ug/m3	1.1E-04	(ug/m3)-1	1.3E-11	1.5E-07	ug/m3	ND		
				Endrin	0.00455	mg/kg	NC		NC			1.0E-09	ug/m3	ND		
				Aluminum	8580	mg/kg	NC		NC			1.9E-03	ug/m3	4.9E+00	ug/m3	3.9E-04
				Arsenic	5.5	mg/kg	9.5E-07	ug/m3	4.3E-03	(ug/m3)-1	4.1E-09	1.2E-06	ug/m3	3.0E-02	ug/m3	4.1E-05
				Manganese	212	mg/kg	NC		NC			4.6E-05	ug/m3	5.0E-02	ug/m3	9.5E-04
				Thallium	1.57	mg/kg	NC		NC			3.4E-07	ug/m3	ND		
				Vanadium	24.9	mg/kg	NC		NC			5.6E-06	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								5E-10					1E-03
		EXPOSURE POINT TOTAL									5E-10					1E-03
	EXPOSURE MEDIUM TOTAL										5E-10					1E-03
SOIL TOTAL											1E-05					3E-01
											TOTAL RECEPTOR RISK ACROSS ALL MEDIA					TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA
											5E-05					5.1E+01

NOTES:
(1) - Blank cells indicate that an RfD or RfC is not available from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route.
NA - Not applicable: exposure route not applicable for this chemical/exposure medium
NV - Not volatile, exposure route not complete for this chemical
-- - Not calculated, dose-response data and/or dermal absorption values are not available

Prepared by: KJC
Checked by: JHP

Table 12-12
FPGS Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure - Future Resident - Adult - Subsurface Soil
Record of Decision FPGS and Buildings T-61 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (I) VALUE	RfD/RfC (I) UNITS	HAZARD QUOTIENT
GROUND WATER	GROUND WATER	AQUIFER USED AS TAP WATER	INGESTION	Tetrachloroethene	0.0022	mg/l	2.1E-05	mg/kg/day	5.4E-01	(mg/kg/day)-1	1.1E-05	6.0E-05	mg/kg/day	1.0E-02	mg/kg/day	6.0E-03
				Trichloroethene	0.000867857	mg/l	8.2E-06	mg/kg/day	4.0E-01	(mg/kg/day)-1	3.3E-06	2.4E-05	mg/kg/day	3.0E-04	mg/kg/day	7.9E-02
				Dieldrin	0.000121	mg/l	1.1E-06	mg/kg/day	1.6E+01	(mg/kg/day)-1	1.8E-05	3.3E-06	mg/kg/day	5.0E-05	mg/kg/day	6.6E-02
				Manganese (drinking water)	4.07	mg/l	NC		NC			1.1E-01	mg/kg/day	2.4E-02	mg/kg/day	4.6E+00
				Nitrite	34.8	mg/l	NC		NC			9.5E-01	mg/kg/day	1.0E-01	mg/kg/day	9.5E+00
			EXPOSURE ROUTE TOTAL								3E-05					1.4E+01
			DERMAL	Tetrachloroethene	0.0022	mg/l	8.2E-06	mg/kg/day	5.4E-01	(mg/kg/day)-1	4.4E-06	2.4E-05	mg/kg/day	1.0E-02	mg/kg/day	2.4E-03
				Trichloroethene	0.000867857	mg/l	9.0E-07	mg/kg/day	4.0E-01	(mg/kg/day)-1	3.6E-07	2.6E-06	mg/kg/day	3.0E-04	mg/kg/day	8.7E-03
				Dieldrin	0.000121	mg/l	5.3E-07	mg/kg/day	1.6E+01	(mg/kg/day)-1	8.5E-06	1.5E-06	mg/kg/day	5.0E-05	mg/kg/day	3.1E-02
				Manganese (drinking water)	4.07	mg/l	NC		NC			2.5E-04	mg/kg/day	9.6E-04	mg/kg/day	2.6E-01
				Nitrite	34.8	mg/l	NC		NC			–		1.0E-01	mg/kg/day	
			EXPOSURE ROUTE TOTAL								1E-05					3E-01
		EXPOSURE POINT TOTAL									5E-05					1.5E+01
	EXPOSURE MEDIUM TOTAL										5E-05					1.5E+01
GROUNDWATER TOTAL											5E-05					1.5E+01
SOIL	SUBSURFACE SOIL	SITE	INGESTION	Acetophenone	0.093	mg/kg	NC		NC			5.5E-08	mg/kg/day	1.0E-01	mg/kg/day	5.5E-07
				Benzo(a)anthracene	0.29	mg/kg	1.1E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	7.7E-08	7.7E-07	mg/kg/day	3.0E-02	mg/kg/day	2.7E-06
				Benzo(a)pyrene	0.32	mg/kg	1.2E-07	mg/kg/day	7.3E+00	(mg/kg/day)-1	8.5E-07	1.9E-07	mg/kg/day	3.0E-02	mg/kg/day	6.3E-06
				Benzo(b)fluoranthene	0.69	mg/kg	2.5E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	1.8E-07	4.1E-07	mg/kg/day	3.0E-02	mg/kg/day	1.4E-05
				Isodrin	0.00455	mg/kg	NC		NC			2.7E-09	mg/kg/day	ND		
				Aluminum	8580	mg/kg	NC		NC			5.0E-03	mg/kg/day	1.0E+00	mg/kg/day	5.0E-03
				Arsenic	5.5	mg/kg	1.1E-06	mg/kg/day	1.5E+00	(mg/kg/day)-1	1.7E-06	3.2E-06	mg/kg/day	3.0E-04	mg/kg/day	1.1E-02
				Manganese	212	mg/kg	NC		NC			1.2E-04	mg/kg/day	7.1E-02	mg/kg/day	1.8E-03
				Thallium	1.57	mg/kg	NC		NC			9.2E-07	mg/kg/day	8.0E-05	mg/kg/day	1.2E-02
				Vanadium	24.9	mg/kg	NC		NC			1.5E-05	mg/kg/day	4.9E-03	mg/kg/day	3.0E-03
			EXPOSURE ROUTE TOTAL								3E-06					3E-02
			DERMAL	Acetophenone	0.093	mg/kg	NC		NC			–		1.0E-01	mg/kg/day	
				Benzo(a)anthracene	0.29	mg/kg	5.5E-08	mg/kg/day	7.3E-01	(mg/kg/day)-1	4.0E-08	8.8E-08	mg/kg/day	3.0E-02	mg/kg/day	2.9E-06
				Benzo(a)pyrene	0.32	mg/kg	6.0E-08	mg/kg/day	7.3E+00	(mg/kg/day)-1	4.4E-07	9.7E-08	mg/kg/day	3.0E-02	mg/kg/day	3.2E-06
				Benzo(b)fluoranthene	0.69	mg/kg	1.3E-07	mg/kg/day	7.3E-01	(mg/kg/day)-1	9.5E-08	2.1E-07	mg/kg/day	3.0E-02	mg/kg/day	7.0E-06
				Isodrin	0.00455	mg/kg	NC		NC			–		ND		
				Aluminum	8580	mg/kg	NC		NC			–		1.0E+00	mg/kg/day	
				Arsenic	5.5	mg/kg	1.3E-07	mg/kg/day	1.5E+00	(mg/kg/day)-1	2.0E-07	3.9E-07	mg/kg/day	3.0E-04	mg/kg/day	1.3E-03
				Manganese	212	mg/kg	NC		NC			–		2.8E-03	mg/kg/day	
				Thallium	1.57	mg/kg	NC		NC			–		8.0E-05	mg/kg/day	
				Vanadium	24.9	mg/kg	NC		NC			–		1.3E-04	mg/kg/day	
			EXPOSURE ROUTE TOTAL								8E-07					1E-03
		EXPOSURE POINT TOTAL									4E-06					3E-02

Table 12-12
FPGS Calculation of Chemical Cancer Risks and Non-Cancer Hazards - Reasonable Maximum Exposure - Future Resident - Adult - Subsurface Soil
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	EXPOSURE ROUTE	CHEMICAL	EPC VALUE	EPC UNITS	CANCER RISK CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	CSF/UNIT RISK VALUE	CSF/UNIT RISK UNITS	CANCER RISK	NON-CANCER HAZARD CALCULATIONS: INTAKE/EXPOSURE CONCENTRATION VALUE	INTAKE/EXPOSURE CONCENTRATION UNITS	RfD/RfC (1) VALUE	RfD/RfC (1) UNITS	HAZARD QUOTIENT
	EXPOSURE MEDIUM TOTAL										4E-06					3E-02
	AIR	DUST AT SITE	DUST INHALATION	Acetophenone	0.093	mg/kg	NC		NC			1.1E-08	ug/m3	ND		
				Benzo(a)anthracene	0.29	mg/kg	2.1E-08	ug/m3	1.1E-04	(ug/m3)-1	2.3E-12	3.4E-08	ug/m3	ND		
				Benzo(a)pyrene	0.32	mg/kg	2.3E-08	ug/m3	1.1E-03	(ug/m3)-1	2.6E-11	3.8E-08	ug/m3	ND		
				Benzo(b)fluoranthene	0.69	mg/kg	5.0E-08	ug/m3	1.1E-04	(ug/m3)-1	5.5E-12	8.1E-08	ug/m3	ND		
				Endrin	0.00455	mg/kg	NC		NC			5.3E-10	ug/m3	ND		
				Aluminum	8580	mg/kg	NC		NC			1.0E-03	ug/m3	1.9E+00	ug/m3	2.1E-04
				Arsenic	5.4	mg/kg	2.2E-07	ug/m3	4.3E-03	(ug/m3)-1	9.6E-10	6.5E-07	ug/m3	1.0E-02	ug/m3	2.2E-05
				Manganese	212	mg/kg	NC		NC			2.5E-05	ug/m3	5.0E-02	ug/m3	5.0E-04
				Thallium	1.57	mg/kg	NC		NC			1.9E-07	ug/m3	ND		
				Vanadium	24.9	mg/kg	NC		NC			2.9E-06	ug/m3	ND		
			EXPOSURE ROUTE TOTAL								1E-09					7E-04
		EXPOSURE POINT TOTAL									1E-09					7E-04
	EXPOSURE MEDIUM TOTAL										1E-09					7E-04
SOIL TOTAL											4E-06					3E-02
									TOTAL RECEPTOR RISK ACROSS ALL MEDIA		5E-05	TOTAL RECEPTOR HAZARD ACROSS ALL MEDIA				1.5E+01

NOTES
(1) - Blank cells indicate that an RfD or RfC is not available from the sources used to obtain dose-response data for this risk assessment.
NC - Not carcinogenic by this exposure route
NA - Not applicable: exposure route not applicable for this chemical/exposure medium
NV - Not volatile: exposure route not complete for this chemical
-- - Not calculated: dose-response data and or dermal absorption values are not available.

Prepared by: KJC
Checked by: JHP

Table 12-13

FPGS Cancer Toxicity Data - Oral/Dermal

Record of Decision FPGS and Buildings T-62 and T-68

Soldier Systems Center

Natick, Massachusetts

Chemical of Potential Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal (1)	Absorbed Cancer Slope Factor for Dermal (2)		Weight of Evidence/ Cancer Guideline Description	Oral Cancer Slope Factor	
	Value	Units		Value	Units		Source(s)	Date(s)
VOLATILES								
Tetrachloroethene	5.4E-01	$(mg/kg/day)^{-1}$	100%	5.4E-01	$(mg/kg/day)^{-1}$	NA	CALEPA	August, 2005
Trichloroethene	4.0E-01	$(mg/kg/day)^{-1}$	100%	4.0E-01	$(mg/kg/day)^{-1}$	NA	NCEA	
SEMIVOLATILES								
Acetophenone	ND			ND			IRIS	December, 2006
Benzo(a)anthracene	7.3E-01	$(mg/kg/day)^{-1}$	89%	7.3E-01	$(mg/kg/day)^{-1}$	B2	NCEA	April, 2006
Benzo(a)pyrene	7.3E+00	$(mg/kg/day)^{-1}$	89%	7.3E+00	$(mg/kg/day)^{-1}$	B2	IRIS	December, 2006
Benzo(b)fluoranthene	7.3E-01	$(mg/kg/day)^{-1}$	89%	7.3E-01	$(mg/kg/day)^{-1}$	B2	NCEA	April, 2006
Dibenzo(a,h)anthracene	7.3E+00	$(mg/kg/day)^{-1}$	89%	7.3E+00	$(mg/kg/day)^{-1}$	B2	NCEA	April, 2006
PESTICIDES/PCBs								
Dieldrin	1.6E+01	$(mg/kg/day)^{-1}$	100%	1.6E+01	$(mg/kg/day)^{-1}$	B2	IRIS	December, 2006
Isodrin	ND			ND				
INORGANICS/METALS								
Aluminum	ND			ND		ND		
Arsenic	1.5E+00	$(mg/kg/day)^{-1}$	95%	1.5E+00	$(mg/kg/day)^{-1}$	A	IRIS	December, 2006
Manganese	NA			NA		D	IRIS	December, 2006
Mercury (as mercuric chloride)	NA		7%	NA		C	IRIS	December, 2006
Nitrite	ND			ND		ND	IRIS	December, 2006
Thallium	NA			NA		D	IRIS	December, 2006
Vanadium	ND			ND		ND		

Notes:

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following heirarchy of sources:

Tier 1:

IRIS = Integrated Risk Information System. December, 2006

Tier 2:

PPRTV = Preliminary Peer-Reviewed Reference Toxicity Value April, 2006 Obtained from Region III RBC Table

Tier 3:

HEAST= Health Effects Assessment Summary Tables: FY 1997 / April, 2006 Verified using Region IX PRG and/or Region III RBC Table

CALEPA - California Environmental Protection Agency August, 2005

In addition, provisional RfDs developed by NCEA are presented for informational purposes and to be used on a case-by-case basis.

NCEA = National Center for Environmental Assessment: April, 2006 Obtained from Region III RBC Table

Weight of Evidence:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

Table 12-13

FPGS Cancer Toxicity Data - Oral/Dermal

Record of Decision FPGS and Buildings T-62 and T-68

Soldier Systems Center

Natick, Massachusetts

ND = no data available

(1) Values obtained from RAGS Volume 1 (Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Guidance) (EPA, 2004)
Per this guidance, a value of 100% is used for analytes without published values.

(2) Adjusted Dermal SF = Oral SF / Oral to Dermal Adjustment Factor. Per RAGS Part E (USEPA, 2004), adjustments are only performed for chemicals that have an oral absorption efficiency of less than 50%.

Values for 2,4- and 2,6-dinitrotoluene based on IRIS for 2,4/2,6-Dinitrotoluene mixture

The value for chlordane is used as surrogate for the isomers

Slope Factor for Benzo(a)Pyrene used for other carcinogenic PAHs, adjusted by Relative Potency Factors of 1.0 [benzo(a)pyrene, dibenz(a,h)anthracene], 0.1 [benzo(a)anthracene, benzo(b)flouoranthene, indeno(1,2,3-c,d)pyrene], 0.01 [benzo(k)fluoranthene], 0.001 [chrysene]

PCB slope factors are applicable to Aroclors 1016, 1248, 1254, and 1260.

[a] - The RfD for chloroform is protective for cancer risk

mg = milligram

kg = kilogram

BW = body weight

Checked by: JHP 7/2006

Table 12-14

FPGS Cancer Toxicity Data - Inhalation

Record of Decision FPGS and Buildings T-62 and T-68

Soldier Systems Center

Natick, Massachusetts

Chemical of Potential Concern	Unit Risk		Inhalation Cancer Slope Factor (1)		Weight of Evidence/ Cancer Guideline Description	Unit Risk: Inhalation Cancer Slope Factor	
	Value	Units	Value	Units		Source(s)	Date(s)
VOLATILES							
Tetrachloroethene	5.90E-06	$(ug/m^3)^{-1}$	2.00E-02	$(mg/kg/day)^{-1}$	NA	CALEPA	August, 2005
Trichloroethene	1.10E-04	$(ug/m^3)^{-1}$	4.00E-01	$(mg/kg/day)^{-1}$	NA	NCEA	April, 2006
SEMIVOLATILES							
Acetophenone	ND		ND		D	IRIS	December, 2006
Benzo(a)anthracene	1.10E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	B2	CALEPA	August, 2005
Benzo(a)pyrene	1.10E-03	$(ug/m^3)^{-1}$	3.9E+00	$(mg/kg/day)^{-1}$	B2	CALEPA	August, 2005
Benzo(b)fluoranthene	1.10E-04	$(ug/m^3)^{-1}$	3.9E-01	$(mg/kg/day)^{-1}$	B2	CALEPA	August, 2005
Dibenzo(a,h)anthracene	1.10E-03	$(ug/m^3)^{-1}$	3.9E+00	$(mg/kg/day)^{-1}$	B2	CALEPA	August, 2005
PESTICIDES/PCBs							
Dieldrin	4.60E-03	$(ug/m^3)^{-1}$	1.60E+01	$(mg/kg/day)^{-1}$	B2	IRIS	December, 2006
Isodrin	ND		ND				
INORGANICS/METALS							
Aluminum	ND		ND		ND		
Arsenic	4.30E-03	$(ug/m^3)^{-1}$	1.50E+01	$(mg/kg/day)^{-1}$	A	IRIS	December, 2006
Manganese	NA		NA		D	IRIS	December, 2006
Mercury (as mercuric chloride)	NA		NA		C	IRIS	December, 2006
Nitrite	ND		ND		ND	IRIS	December, 2006
Thallium	NA		NA		D	IRIS	December, 2006
Vanadium	ND		ND		ND		

Notes:

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following heirarchy of sources:

Tier 1:

IRIS = Integrated Risk Information System: December, 2006

Tier 2:

PPRTV = Preliminary Peer-Reviewed Reference Toxicity Value April, 2006 Obtained from Region III RBC Table

Tier 3:

Table 12-14

FPGS Cancer Toxicity Data - Inhalation

Record of Decision FPGS and Buildings T-62 and T-68

Soldier Systems Center

Natick, Massachusetts

HEAST- Health Effects Assessment Summary Tables:	FY 1997	Verified using Region IX PRG and/or Region III RBC Table
CALEPA - California Environmental Protection Agency	August, 2005	

In addition, provisional RfDs developed by NCEA are presented for informational purposes and to be used on a case-by-case basis:

NCEA – National Center for Environmental Assessment:	April, 2006	Obtained from Region III RBC Table

ND = no data available

(1) - Inhalation cancer dose-response values are typically published as unit risk values. Unit risk values may be converted to slope factors using the following equation (HEAST, 1997):

Adjustment = 70 kg [adult body weight] * 1000 ug/mg [conversion factor] / 20 m3/day [inhalation rate]

and: Inhalation Slope Factor = Unit Risk * Adjustment

For slope factors obtained from NCEA (published in USEPA Region III RBC Table), it is assumed that the value has been converted from a Unit Risk value. Therefore, the slope factor is converted back to a unit risk value as follows: 20 m3/day / 70 kg * 1000 ug/mg

PAHs, adjusted by Relative Potency Factors of 1.0 [benzo(a)pyrene, dibenz(a,h)anthracene]; 0.1 [benzo(a)anthracene, benzo(b)flouoranthene, indeno(1,2,3-c,d)pyrene]; 0.01 [benzo(k)fluoranthene]; 0.001 [chrysene].

PCB slope factors are applicable to Aroclors 1016, 1248, 1254, and 1260.

Value for nickel based on nickel as nickel refinery dust

Weight of Evidence:

A - Human carcinogen

B1 - Probable human carcinogen - indicates that limited human data are available

B2 - Probable human carcinogen - indicates sufficient evidence in animals and inadequate or no evidence in humans

C - Possible human carcinogen

D - Not classifiable as a human carcinogen

mg = milligram

ug = microgram

kg = kilogram

m^3 = cubic meter

BW = body weight

Checked by: JHP 7/2006

Table 12-15

FPGS Non-Cancer Toxicity Data - Oral/Dermal

Record of Decision FPGS and Buildings T-62 and T-68

Soldier Systems Center

Natick, Massachusetts

Chemical of Potential Concern	Chronic/ Subchronic	Oral RfD		Oral Absorption Efficiency for Dermal (1)	Adjusted Dermal RfD (2)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfD Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s)
VOLATILES										
Tetrachloroethene	chronic	1.0E-02	mg/kg/day	100%	1.0E-02	mg/kg/day	Liver/Hepatotoxicity	1,000/1	IRIS	December, 2006
	subchronic	1.0E-01	mg/kg/day	100%	1.0E-01	mg/kg/day	Liver/Hepatotoxicity	100/1	HEAST	FY 1997
Trichloroethene	chronic	3.0E-04	mg/kg/day	100%	3.0E-04	mg/kg/day	Liver and kidney		NCEA	April, 2006
	subchronic	3.0E-04	mg/kg/day	100%	3.0E-04	mg/kg/day	Liver and kidney		Chronic	
SEMIVOLATILES										
Acetophenone	chronic	1.0E-01	mg/kg/day	100%	1.0E-01	mg/kg/day	NOAEL	1,000/1	IRIS	December, 2006
	subchronic	1.0E-01	mg/kg/day	100%	1.0E-01	mg/kg/day	NOAEL	3,000/1	Chronic	
Benzo(a)anthracene	chronic	3.0E-02	mg/kg/day	89%	3.0E-02	mg/kg/day	Kidney/Renal tubular pathology	3,000/1	Surrogate (2)	
	subchronic	3.0E-01	mg/kg/day	89%	3.0E-01	mg/kg/day	Kidney/Renal tubular pathology	300/1	Surrogate (2)	
Benzo(a)pyrene	chronic	3.0E-02	mg/kg/day	89%	3.0E-02	mg/kg/day	Kidney/Renal tubular pathology	3,000/1	Surrogate (2)	
	subchronic	3.0E-01	mg/kg/day	89%	3.0E-01	mg/kg/day	Kidney/Renal tubular pathology	300/1	Surrogate (2)	
Benzo(b)fluoranthene	chronic	3.0E-02	mg/kg/day	89%	3.0E-02	mg/kg/day	Kidney/Renal tubular pathology	3,000/1	Surrogate (2)	
	subchronic	3.0E-01	mg/kg/day	89%	3.0E-01	mg/kg/day	Kidney/Renal tubular pathology	300/1	Surrogate (2)	
Dibenzo(a,h)anthracene	chronic	3.0E-02	mg/kg/day	89%	3.0E-02	mg/kg/day	Kidney/Renal tubular pathology	3,000/1	Surrogate (2)	
	subchronic	3.0E-01	mg/kg/day	89%	3.0E-01	mg/kg/day	Kidney/Renal tubular pathology	300/1	Surrogate (2)	
PESTICIDES/PCBs										
Dieldrin	chronic	5.0E-05	mg/kg/day	100%	5.0E-05	mg/kg/day	Liver/Liver lesions	100/1	IRIS	December, 2006
	subchronic	1.0E-04	mg/kg/day	100%	1.0E-04	mg/kg/day	CNS	100	MRL	December, 2005
Isodrin	chronic	ND								
	subchronic	ND								
INORGANICS/METALS										
Aluminum	chronic	1.0E+00	mg/kg/day	100%	1.0E+00	mg/kg/day			PPRTV	September, 2004
	subchronic	2.0E+00	mg/kg/day	100%	2.0E+00	mg/kg/day	CNS	30	MRL	December, 2005
Arsenic	chronic	3.0E-04	mg/kg/day	95%	3.0E-04	mg/kg/day	Skin/Keratosis and hyperpigmentation	3/1	IRIS	December, 2006
	subchronic	3.0E-04	mg/kg/day	95%	3.0E-04	mg/kg/day	Skin/Keratosis and hyperpigmentation	3/1	HEAST	FY 1997
Manganese (drinking water)	chronic	2.4E-02	mg/kg/day	4%	9.6E-04	mg/kg/day	CNS/Impairment of neurobehavioral function	1/3	IRIS	December, 2006
	subchronic	2.4E-02	mg/kg/day	4%	9.6E-04	mg/kg/day	CNS/Impairment of neurobehavioral function	1/3	Chronic	
Manganese (soil)	chronic	7.1E-02	mg/kg/day	4%	2.8E-03	mg/kg/day	CNS/Impairment of neurobehavioral function	1/1	IRIS	December, 2006
	subchronic	7.1E-02	mg/kg/day	4%	2.8E-03	mg/kg/day	CNS/Impairment of neurobehavioral function	1/1	Chronic	
Mercury (as mercuric chloride)	chronic	3.0E-04	mg/kg/day	7%	2.1E-05	mg/kg/day	Immune system/Autoimmune effects	1,000/1	IRIS	December, 2006
	subchronic	2.0E-03	mg/kg/day	7%	1.4E-04	mg/kg/day	Kidney	100/1	MRL	December, 2005
Nitrite	chronic	1.0E-01	mg/kg/day	100%	1.0E-01	mg/kg/day	Hematological/Methemoglobinemia	1/10	IRIS	December, 2006
	subchronic	1.0E-01	mg/kg/day	100%	1.0E-01	mg/kg/day	Hematological/Methemoglobinemia	1/10	HEAST	FY 1997
Thallium	chronic	8.0E-05	mg/kg/day	100%	8.0E-05	mg/kg/day	Liver/Increased SGOT and LDH	3,000/1	IRIS	December, 2006
	subchronic	8.0E-04	mg/kg/day	100%	8.0E-04	mg/kg/day	No effects observed	300/1	HEAST	FY 1997
Vanadium	chronic	4.9E-03	mg/kg/day	2.6%	1.3E-04	mg/kg/day	Decreased hair cysteine	100/1	IRIS	December, 2006
	subchronic	4.9E-03	mg/kg/day	2.6%	1.3E-04	mg/kg/day	Decreased hair cysteine	100/1	Chronic	

Notes:

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following hierarchy of sources

Tier 1

IRIS = Integrated Risk Information System: December, 2006

Tier 2

PPRTV = Preliminary Peer-Reviewed Toxicity Value: September, 2004 — Obtained from Region IX PRG Table

April, 2006 — Obtained from Region III RBC Table

Tier 3

HEAST = Health Effects Assessment Summary Tables: FY 1997 — Verified using Region IX PRG and/or Region III RBC Table

MRL = Minimum Risk Level (ATSDR, chronic MRLs): December, 2005

mg = milligram

kg = kilogram

surrogate = a value for a closely related chemical is used as the RfD

BW = body weight

chronic = the chronic value is used as the subchronic RfD

ND = no data available

Table 12-15

FPCS Non-Cancer Toxicity Data - Oral/Dermal

Record of Decision FPCS and Buildings 7-62 and 7-68

Soldier Systems Center

Natick, Massachusetts

In addition, provisional RfDs developed by NCEA are presented for informational purposes and to be used on a case-by-case basis:

NCEA = National Center for Environmental Assessment	September, 2004	Obtained from Region IX PRG Table
	April, 2006	Obtained from Region III RBC Table

Subchronic RfDs are obtained from:

- ATSDR, Intermiteni MRLs
- HEAST: subchronic RfDs (from HEAST FY 1997)
- Equal to chronic RfDs when values are not published in HEAST or by ATSDR

(1) Values obtained from RAGS Volume I (Part E, Supplemental Guidance for Dermal Risk Assessment, Interim Guidance) (EPA, 2004)
Per this guidance, a value of 100% is used for analytes without published values

(2) Adjusted Dermal RfD = Oral RfD x Oral to Dermal Adjustment Factor. Per RAGS Part E (USEPA, 2004), adjustments are only performed for chemicals that have an oral absorption efficiency of less than 50%.

Values for petroleum fractions are provided for informational purposes, and are developed by MADEP.

The RfD for uranium of 6E-04 mg/kg/day was developed by EPA Office of Water in support of the MCL for uranium, and was published in the Federal Register (Thursday, December 7, 2000)

Per USEPA Region I "Risk Updates, No. 5". (August, 1999), Non-carcinogenic PAHs without published RfDs should be evaluated using the published RfD for a structurally similar PAH.
Surrogate (1) - Value for acenaphthene used as a surrogate
Surrogate (2) - Value for pyrene used as a surrogate

For Manganese in drinking water: As recommended by USEPA Region I Risk Update, a non-dietary RfD is obtained by subtracting typical dietary intake of manganese (5 mg/kday) from critical dose (10 mg/day). Non-dietary RfD is then adjusted with a modifying factor of 3, as recommended by IRIS for drinking water exposures.

For manganese in non-drinking water media: As recommended by USEPA Region I Risk Update, a non-dietary RfD is obtained by subtracting typical dietary intake of manganese (5 mg/kday) from critical dose (10 mg/day). A modifying factor of 1 is then applied, per USEPA Region I

Vanadium - Region I - RfD for vanadium is the RfD for Vanadium pentoxide of 9E-3, adjusted for the amount of vanadium in vanadium pentoxide (56%), per USEPA Region I.

Checked by: JHP 7/2006

Table 12-16

FPGS Non-Cancer Toxicity Data - Inhalation

Record of Decision FPGS and Buildings T-62 and T-68

Soldier Systems Center

Natick, Massachusetts

Chemical of Potential Concern	Chronic/ Subchronic	Inhalation RfC (1)		Extrapolated RfD (1)		Primary Target Organ or System / Critical Effect	Combined Uncertainty/Modifying Factors	RfC: Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s)
VOLATILES									
Tetrachloroethene	chronic	2.8E-01	mg/m3	8.0E-02	mg/kg/day	Nervous system	100	MRL	December, 2005
	subchronic	2.8E-01	mg/m3	8.0E-02	mg/kg/day	Nervous system		Chronic	
Trichloroethene	chronic	6.0E-01	mg/m3	1.7E-01	mg/kg/day	Nervous system		REL	February, 2005
	subchronic	6.0E-01	mg/m3	1.7E-01	mg/kg/day	Nervous system		Chronic	
SEMIVOLATILES									
Acetophenone	chronic	ND		ND				IRIS	December, 2006
	subchronic	ND		ND					
Benzo(a)anthracene	chronic	ND		ND				IRIS	December, 2006
	subchronic	ND		ND					
Benzo(a)pyrene	chronic	ND		ND				IRIS	December, 2006
	subchronic	ND		ND					
Benzo(b)fluoranthene	chronic	ND		ND				IRIS	December, 2006
	subchronic	ND		ND					
Dibenzo(a,h)anthracene	chronic	ND		ND				IRIS	December, 2006
	subchronic	ND		ND					
PESTICIDES/PCBs									
Dieldrin	chronic	ND		ND				IRIS	December, 2006
	subchronic	ND		ND					
Isodrin	chronic	ND		ND					
	subchronic	ND		ND					
INORGANICS/METALS									
Aluminum	chronic	4.9E-03	mg/m3	1.4E-03	mg/kg/day			PPRTV	September, 2004
	subchronic	4.9E-03	mg/m3	1.4E-03	mg/kg/day			Chronic	
Arsenic	chronic	3.0E-05	mg/m3	8.6E-06	mg/kg/day	Developmental/Cardiovascular/CNS		REL	February, 2005
	subchronic	ND		ND					
Manganese	chronic	5.0E-05	mg/m3	1.4E-05	mg/kg/day	CNS/Impairment of neurobehavioral function	1,000/1	IRIS	December, 2006
	subchronic	5.0E-05	mg/m3	1.4E-05	mg/kg/day	CNS/Impairment of neurobehavioral function	1,000/1	Chronic	
Mercury (as mercuric chloride)	chronic	ND		ND				IRIS	December, 2006
	subchronic	ND		ND					
Nitrite	chronic	ND		ND				IRIS	December, 2006
	subchronic	ND		ND					
Thallium	chronic	ND		ND				IRIS	December, 2006
	subchronic	ND		ND					
Vanadium	chronic	ND		ND				IRIS	December, 2006
	subchronic	ND		ND					

Table 12-16

FPGS Non-Cancer Toxicity Data - Inhalation

Record of Decision FPGS and Buildings T-62 and T-68

Soldier Systems Center

Natick, Massachusetts

Notes:

In accordance with OSWER 9285.7-53, chronic RfDs are identified from the following heirarchy of sources:

Tier 1:

IRIS = Integrated Risk Information System:	December, 2006	

Tier 2:

PPRTV = Preliminary Peer-Reviewed Toxicity Value:	September, 2004	Obtained from Region IX PRG Table
	April, 2006	Obtained from Region III RBC Table

Tier 3

HEAST - Health Effects Assessment Summary Tables:	FY 1997	Verified using Region IX PRG and/or Region III RBC Table
MRL = Minimum Risk Level (ATSDR, chronic MRLs)	December, 2005	
REL - CALEPA	February, 2005	

In addition, provisional RfDs developed by NCEA are presented for informational purposes and to be used on a case-by-case basis.

NCEA = National Center for Environmental Assessment:	September, 2004	Obtained from Region IX PRG Table
	April, 2006	Obtained from Region III RBC Table

Subchronic RfDs are obtained from:

- ATSDR Intermitent MRLs
- HEAST, subchronic RfDs (from HEAST FY 1997)
- Equal to chronic RfDs when values are not published in HEAST or by ATSDR

chronic - the chronic value is used as the subchronic RfD

Values for petroleum fractions are provided for informational purposes, and are developed by MADEP

(1) - Inhalation non-cancer dose-response values are typically published as RfC values. RfC values may be converted to RfDs using the following equation (HEAST, 1997):

RfD (mg/kg-d) = RfC (mg/m^3) x 20 m^3/d / 70 kg, unless otherwise indicated

For RfDs obtained from NCEA (published in USEPA Region III RBC Table), it is assumed that the value has been converted from a RfC value. Therefore, the RfD is converted back to a RfC value as follows: RfC (mg/m^3) = RfD (mg/kg/day) x 70 kg / 20 m^3/day

mg = milligram
kg = kilogram
ug = microgram
m^3 = cubic meter
BW = body weight

Checked by: JHP 7/2006

Table 12-17
FPCS Summary of Receptor Risks and Hazards for COPCs - Reasonable Maximum Exposure - Future Resident - Child
Record of Decision FPCS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
GROUND WATER	GROUND WATER	AQUIFER USED AS TAP WATER	Tetrachloroethene	9 8E-06	NA	2 2E-06	NA	1 2E-05	Liver	2 1E-02	NA	4.7E-03	2 6E-02
			Trichloroethene	2 9E-06	NA	1.8E-07	NA	3 0E-06	Liver	2 8E-01	NA	1 7E-02	2.9E-01
			Dieldrin	1 6E-05	NA	4.2E-06	NA	2 0E-05	Liver	2.3E-01	NA	6 1E-02	2 9E-01
			Manganese (drinking water)	NC	NA	NC	NA		Nervous System	1 6E+01	NA	5.9E-01	1 7E+01
			Nitrite	NC	NA	NC	NA		Hematological system	3.3E+01	NA	--	3.3E+01
			CHEMICAL TOTAL	2.9E-05	--	6.5E-06	--	4E-05		5 0E+01	--	6 7E-01	5.1E+01
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						4E-05					5.1E+01
	EXPOSURE MEDIUM TOTAL							4E-05					5.1E+01
GROUNDWATER TOTAL								4E-05					5.1E+01
SOIL	SURFACE SOIL	SITE	Acetophenone	NC	NA	NC	NA		General Toxicity	6.6E-07	NA	--	6 6E-07
			Benzo(a)anthracene	6 5E-07	NA	2 4E-07	NA	8 9E-07	Kidney	6 6E-05	NA	2.4E-05	9 0E-05
			Benzo(a)pyrene	6 9E-06	NA	2 5E-06	NA	9 4E-06	Kidney	6.9E-05	NA	2 5E-05	9 5E-05
			Benzo(b)fluoranthene	1 1E-06	NA	4.0E-07	NA	1 5E-06	Kidney	1 1E-04	NA	4 1E-05	1 5E-04
			Dibenz(a,h)anthracene	2 2E-06	NA	7.9E-07	NA	3.0E-06	Kidney	2.2E-05	NA	8.0E-06	3 0E-05
			Isodrin	NC	NA	NC	NA			--	NA	--	
			Aluminum	NC	NA	NC	NA		Undetermined	4.6E-02	NA	--	4.6E-02
			Arsenic	3 8E-06	NA	3 2E-07	NA	4.1E-06	Skin	9 9E-02	NA	8.3E-03	1 1E-01
			Manganese	NC	NA	NC	NA		Nervous System	1 4E-02	NA	--	1 4E-02
			Mercury	NC	NA	NC	NA		Immune system	4.0E-02	NA	--	4.0E-02
			Thallium	NC	NA	NC	NA		Liver	3.8E-02	NA	--	3.8E-02
			Vanadium	NC	NA	NC	NA		Kidney	2.5E-02	NA	--	2 5E-02
			Diesel Range Organics	NC	NA	NC	NA			--	NA	--	
												--	
												--	
			CHEMICAL TOTAL	1 5E-05	--	4 3E-06	--	2E-05		2.6E-01	0 0E+00	8.4E-03	3E-01
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						2E-05					3E-01
	EXPOSURE MEDIUM TOTAL							2E-05					3E-01
SOIL	AIR	DUST AT SITE	Acetophenone	NA	NC	NA	NA			NA	--	NA	
			Benzo(a)anthracene	NA	4 0E-12	NA	NA	4 0E-12		NA	--	NA	
			Benzo(a)pyrene	NA	4 3E-11	NA	NA	4 3E-11		NA	--	NA	
			Benzo(b)fluoranthene	NA	6 8E-12	NA	NA	6 8E-12		NA	--	NA	
			Dibenz(a,h)anthracene	NA	1 3E-11	NA	NA	1 3E-11		NA	--	NA	
			Isodrin	NA	NC	NA	NA			NA	--	NA	
			Aluminum	NA	NC	NA	NA			NA	3 9E-04	NA	3.9E-04
			Arsenic	NA	4.5E-10	NA	NA	4 5E-10	Developmental / Cardiovascular / Nervous system	NA	4 0E-05	NA	4 0E-05
			Manganese	NA	NC	NA	NA		Nervous System	NA	8 3E-04	NA	8.3E-04
			Mercury	NA	NC	NA	NA		Nervous System	NA	1 6E-06	NA	1 6E-06
			Thallium	NA	NC	NA	NA			NA	--	NA	
			Vanadium	NA	NC	NA	NA			NA	--	NA	

Table 12-17
FPGS Summary of Receptor Risks and Hazards for COPCs - Reasonable Maximum Exposure - Future Resident - Child
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
			Diesel Range Organics	NA	NC	NA	NA			NA	–	NA	
			CHEMICAL TOTAL	–	5E-10	–	–	5E-10		–	1.3E-03	–	1E-03
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						5E-10					1E-03
	EXPOSURE MEDIUM TOTAL							5E-10					1E-03
SOIL TOTAL								2E-05					3E-01
RECEPTOR TOTAL								5E-05					5.1E+01
							TOTAL RISK ACROSS ALL MEDIA	5E-05	TOTAL HAZARD ACROSS ALL MEDIA				5.1E+01

NOTES:
NC - Not carcinogenic by this exposure route
NA - Not applicable; exposure route not applicable for this chemical/exposure medium
– - Not calculated, dose-response data and/or dermal absorption values are not available

Prepared by KJC
Checked by JHP

TOTAL GENERAL TOXICITY HI =	6.6E-07
TOTAL CARDIOVASCULAR HI =	4.0E-05
TOTAL DEVELOPMENTAL HI =	4.0E-05
	–
	–
	–
	–
TOTAL IMMUNE SYSTEM HI =	4.0E-02
TOTAL KIDNEY HI =	2.5E-02
TOTAL LIVER HI =	6.5E-01
	–
TOTAL NERVOUS SYSTEM HI =	1.7E+01
TOTAL NOAEL HI =	4.7E-02
	–
TOTAL SKIN HI =	1.1E-01
	–

Table 12-18
FPCS Summary of Receptor Risks and Hazards for COPCs - Reasonable Maximum Exposure - Future Resident - Adult
Record of Decision FPCS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
GROUND WATER	GROUND WATER	AQUIFER USED AS TAP WATER	Tetrachloroethene	1.1E-05	NA	4.4E-06	NA	1.6E-05	Liver	6.0E-03	NA	2.4E-03	8.4E-03
			Trichloroethene	3.3E-06	NA	3.6E-07	NA	3.6E-06	Liver	7.9E-02	NA	8.7E-03	8.8E-02
			Dieldrin	1.8E-05	NA	8.5E-06	NA	2.7E-05	Liver	6.6E-02	NA	3.1E-02	9.7E-02
			Manganese (drinking water)	NC	NA	NC	NA		Nervous System	4.6E+00	NA	2.6E-01	4.9E+00
			Nitrite	NC	NA	NC	NA		Hematological system	9.5E+00	NA	--	9.5E+00
			CHEMICAL TOTAL	3.1E-05	--	1.3E-05	--	5E-05		1.4E+01	--	3.0E-01	1.5E+01
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						5E-05					1.5E+01
	EXPOSURE MEDIUM TOTAL							5E-05					1.5E+01
GROUNDWATER TOTAL								5E-05					1.5E+01
SOIL	SURFACE SOIL	SITE	Acetophenone	NC	NA	NC	NA		General Toxicity	7.0E-08	NA	--	7.0E-08
			Benzo(a)anthracene	9.5E-08	NA	4.9E-08	NA	1.4E-07	Kidney	7.0E-06	NA	3.7E-06	1.1E-05
			Benzo(a)pyrene	1.0E-06	NA	5.2E-07	NA	1.5E-06	Kidney	7.4E-06	NA	3.9E-06	1.1E-05
			Benzo(b)fluoranthene	1.6E-07	NA	8.4E-08	NA	2.5E-07	Kidney	1.2E-05	NA	6.2E-06	1.8E-05
			Dibenz(a,h)anthracene	3.2E-07	NA	1.6E-07	NA	4.8E-07	Kidney	2.3E-06	NA	1.2E-06	3.6E-06
			Isodrin	NC	NA	NC	NA			--	NA	--	
			Aluminum	NC	NA	NC	NA		Undetermined	5.0E-03	NA	--	5.0E-03
			Arsenic	1.6E-06	NA	2.0E-07	NA	1.8E-06	Skin	1.1E-02	NA	1.3E-03	1.2E-02
			Manganese	NC	NA	NC	NA		Nervous System	1.5E-03	NA	--	1.5E-03
			Mercury	NC	NA	NC	NA		Immune system	4.3E-03	NA	--	4.3E-03
			Thallium	NC	NA	NC	NA		Liver	4.0E-03	NA	--	4.0E-03
			Vanadium	NC	NA	NC	NA		Kidney	2.7E-03	NA	--	2.7E-03
			Diesel Range Organics	NC	NA	NC	NA			--	NA	--	
												--	
												--	
			CHEMICAL TOTAL	3.2E-06	--	1.0E-06	--	4E-06		2.8E-02	0.0E+00	1.3E-03	3E-02
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						4E-06					3E-02
	EXPOSURE MEDIUM TOTAL							4E-06					3E-02
SOIL	AIR	DUST AT SITE	Acetophenone	NA	NC	NA	NA			NA	--	NA	
			Benzo(a)anthracene	NA	2.9E-12	NA	NA	2.9E-12		NA	--	NA	
			Benzo(a)pyrene	NA	3.0E-11	NA	NA	3.0E-11		NA	--	NA	
			Benzo(b)fluoranthene	NA	4.9E-12	NA	NA	4.9E-12		NA	--	NA	
			Dibenz(a,h)anthracene	NA	9.6E-12	NA	NA	9.6E-12		NA	--	NA	
			Endrin	NA	NC	NA	NA			NA	--	NA	
			Aluminum	NA	NC	NA	NA			NA	2.0E-04	NA	2.0E-04
			Arsenic	NA	9.4E-10	NA	NA	9.4E-10	Developmental / Cardiovascular / Nervous system	NA	2.1E-05	NA	2.1E-05
			Manganese	NA	NC	NA	NA		Nervous System	NA	4.4E-04	NA	4.4E-04
			Mercury	NA	NC	NA	NA		Nervous System	NA	8.7E-07	NA	8.7E-07
			Thallium	NA	NC	NA	NA			NA	--	NA	
			Vanadium	NA	NC	NA	NA			NA	--	NA	

Table 12-18
FPGS Summary of Receptor Risks and Hazards for COPCs - Reasonable Maximum Exposure - Future Resident - Adult
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (L)					NON-CARCINOGENIC HAZARD QUOTIENT (L)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
			Diesel Range Organics	NA	NC	NA	NA			NA	--	NA	
			CHEMICAL TOTAL	--	9.9E-10	--	--	1E-09		--	6.6E-04	--	7E-04
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						1E-09					7E-04
	EXPOSURE MEDIUM TOTAL							1E-09					7E-04
SOIL TOTAL								4E-06					5E-02
RECEPTOR TOTAL								5E-05					1.5E+01
							TOTAL RISK ACROSS ALL MEDIA	5E-05	TOTAL HAZARD ACROSS ALL MEDIA				1.5E+01

NOTES:
NC - Not carcinogenic by this exposure route
NA - Not applicable; exposure route not applicable for this chemical/exposure medium
-- - Not calculated, dose-response data and/or dermal absorption values are not available.

Prepared by: KJC
Checked by: JHP

TOTAL GENERAL TOXICITY HI =	7.0E-05
TOTAL CARDIOVASCULAR HI =	2.1E-05
TOTAL DEVELOPMENTAL HI =	2.1E-05
	--
	--
	--
	--
TOTAL IMMUNE SYSTEM HI =	4.3E-03
TOTAL KIDNEY HI =	2.7E-03
TOTAL LIVER HI =	2.0E-01
	--
TOTAL NERVOUS SYSTEM HI =	4.9E+00
TOTAL NOAEL HI =	5.2E-03
	--
TOTAL SKIN HI =	1.2E-02
	--

Table 12-19
FPGS Summary of Receptor Risks and Hazards for COPCs - Reasonable Maximum Exposure - Future Resident - Child
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
GROUND WATER	GROUND WATER	AQUIFER USED AS TAP WATER	Tetrachloroethene	9 8E-06	NA	2.2E-06	NA	1.2E-05	Liver	2 1E-02	NA	4.7E-03	2 6E-02
			Trichloroethene	2 9E-06	NA	1 8E-07	NA	3.0E-06	Liver	2 8E-01	NA	1 7E-02	2 9E-01
			Dieldrin	1 6E-05	NA	4 2E-06	NA	2 0E-05	Liver	2.3E-01	NA	6 1E-02	2 9E-01
			Manganese (drinking water)	NC	NA	NC	NA		Nervous System	1.6E+01	NA	5 9E-01	1.7E+01
			Nitrite	NC	NA	NC	NA		Hematological system	3 3E+01	NA	–	3 3E+01
			CHEMICAL TOTAL	2.9E-05	–	6 5E-06	–	4E-05		5.0E+01	–	6 7E-01	5 1E+01
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						4E-05					5.1E+01
	EXPOSURE MEDIUM TOTAL							4E-05					5.1E+01
GROUNDWATER TOTAL								4E-05					5.1E+01
SOIL	SUBSURFACE SOIL	SITE	Acetophenone	NC	NA	NC	NA		General Toxicity	5.1E-06	NA	–	5 1E-06
			Benzo(a)anthracene	5 3E-07	NA	1.9E-07	NA	7 2E-07	Kidney	5 3E-05	NA	1.9E-05	7 2E-05
			Benzo(a)pyrene	5 8E-06	NA	2 1E-06	NA	7 9E-06	Kidney	5 8E-05	NA	2 1E-05	8 0E-05
			Benzo(b)fluoranthene	1 3E-06	NA	4 6E-07	NA	1.7E-06	Kidney	1.3E-04	NA	4 6E-05	1.7E-04
			Isodrin	NC	NA	NC	NA			–	NA	–	
			Aluminum	NC	NA	NC	NA		Undetermined	4 7E-02	NA	–	4 7E-02
			Arsenic	3.9E-06	NA	3.3E-07	NA	4.2E-06	Skin	1 0E-01	NA	8 4E-03	1 1E-01
			Manganese	NC	NA	NC	NA		Nervous System	1 6E-02	NA	–	1 6E-02
			Thallium	NC	NA	NC	NA		Liver	1 1E-01	NA	–	1 1E-01
			Vanadium	NC	NA	NC	NA		Kidney	2 8E-02	NA	–	2 8E-02
												–	
												–	
			CHEMICAL TOTAL	1 1E-05	–	3 1E-06	–	1E-05		3.0E-01	0 0E+00	8 5E-03	3E-01
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						1E-05					3E-01
	EXPOSURE MEDIUM TOTAL							1E-05					3E-01
SOIL	AIR	DUST AT SITE	Acetophenone	NA	NC	NA	NA			NA	–	NA	
			Benzo(a)anthracene	NA	3 3E-12	NA	NA	3 3E-12		NA	–	NA	
			Benzo(a)pyrene	NA	3 6E-11	NA	NA	3 6E-11		NA	–	NA	
			Benzo(b)fluoranthene	NA	7 7E-12	NA	NA	7.7E-12		NA	–	NA	
			Isodrin	NA	NC	NA	NA			NA	–	NA	
			Aluminum	NA	NC	NA	NA			NA	3 9E-04	NA	3 9E-04
			Arsenic	NA	4 5E-10	NA	NA	4 5E-10	Developmental / Cardiovascular / Nervous system	NA	4 1E-05	NA	4 1E-05
			Manganese	NA	NC	NA	NA		Nervous System	NA	9 5E-04	NA	9 5E-04
			Thallium	NA	NC	NA	NA			NA	–	NA	

Table 12-19
FPGS Summary of Receptor Risks and Hazards for COPCs - Reasonable Maximum Exposure - Future Resident - Child
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: CHILD

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
			Vanadium	NA	NC	NA	NA			NA	--	NA	
			CHEMICAL TOTAL	--	5.0E-10	--	--	5E-10		--	1.4E-03	--	1E-03
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						5E-10					1E-03
	EXPOSURE MEDIUM TOTAL							5E-10					1E-03
SOIL TOTAL								1E-05					1E-01
RECEPTOR TOTAL								5E-05					5.1E+01
							TOTAL RISK ACROSS ALL MEDIA	5E-05	TOTAL HAZARD ACROSS ALL MEDIA				5.1E+01

NOTES:
NC - Not carcinogenic by this exposure route
NA - Not applicable; exposure route not applicable for this chemical/exposure medium
-- - Not calculated; dose-response data and/or dermal absorption values are not available.

Prepared by: KJC
Checked by: BJP

TOTAL GENERAL TOXICITY HI =	5.1E-06
TOTAL CARDIOVASCULAR HI =	4.1E-05
TOTAL DEVELOPMENTAL HI =	4.1E-05
	--
	--
	--
	--
	--
TOTAL KIDNEY HI =	2.8E-02
TOTAL LIVER HI =	7.2E-01
	--
TOTAL NERVOUS SYSTEM HI =	1.7E+01
TOTAL NOAEL HI =	4.7E-02
	--
TOTAL SKIN HI =	1.1E-01
	--

Table 12-20
FPGS Summary of Receptor Risks and Hazards for COPCs - Reasonable Maximum Exposure - Future Resident - Adult
Record of Decision FPGS and Buildings T-62 and T-65
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
GROUND WATER	GROUND WATER	AQUIFER USED AS TAP WATER	Tetrachloroethene	1 1E-05	NA	4 4E-06	NA	1 6E-05	Liver	6.0E-03	NA	2 4E-03	8 4E-03
			Trichloroethene	3 3E-06	NA	3 6E-07	NA	3 6E-06	Liver	7 9E-02	NA	8.7E-03	8 8E-02
			Dieldrin	1 8E-05	NA	8 5E-06	NA	2 7E-05	Liver	6.6E-02	NA	3 1E-02	9.7E-02
			Manganese (drinking water)	NC	NA	NC	NA		Nervous System	4.6E+00	NA	2.6E-01	4 9E+00
			Nitrite	NC	NA	NC	NA		Hematological system	9.5E+00	NA	--	9.5E+00
			CHEMICAL TOTAL	3 3E-05	--	1 3E-05	--	5E-05		1 4E+01	--	3 0E-01	1.5E+01
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						5E-05					1.5E+01
	EXPOSURE MEDIUM TOTAL							5E-05					1.5E+01
GROUNDWATER TOTAL								**5E-05**					**1.5E+01**
SOIL	SUBSURFACE SOIL	SITE	Acetophenone	NC	NA	NC	NA		General Toxicity	5.5E-07	NA	--	5.5E-07
			Benzo(a)anthracene	7 7E-08	NA	4.0E-08	NA	1.2E-07	Kidney	5.7E-06	NA	2.9E-06	8 6E-06
			Benzo(a)pyrene	8 5E-07	NA	4 4E-07	NA	1 3E-06	Kidney	6 3E-06	NA	3.2E-06	9.5E-06
			Benzo(b)fluoranthene	1 8E-07	NA	9.5E-08	NA	2.8E-07	Kidney	1 4E-05	NA	7.0E-06	2.1E-05
			Isodrin	NC	NA	NC	NA			--	NA	--	
			Aluminum	NC	NA	NC	NA		Undetermined	5 0E-03	NA	--	5.0E-03
			Arsenic	1 7E-06	NA	2.0E-07	NA	1.9E-06	Skin	1 1E-02	NA	1 3E-03	1 2E-02
			Manganese	NC	NA	NC	NA		Nervous System	1 8E-03	NA	--	1 8E-03
			Thallium	NC	NA	NC	NA		Liver	1 2E-02	NA	--	1.2E-02
			Vanadium	NC	NA	NC	NA		Kidney	3.0E-03	NA	--	3.0E-03
												--	
												--	
			CHEMICAL TOTAL	2 8E-06	--	7.7E-07	--	4E-06		3.2E-02	0.0E+00	1.3E-03	3E-02
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						4E-06					3E-02
	EXPOSURE MEDIUM TOTAL							4E-06					3E-02
SOIL	AIR	DUST AT SITE	Acetophenone	NA	NC	NA	NA			NA	--	NA	
			Benzo(a)anthracene	NA	2 3E-12	NA	NA	2 3E-12		NA	--	NA	
			Benzo(a)pyrene	NA	2.6E-11	NA	NA	2 6E-11		NA	--	NA	
			Benzo(b)fluoranthene	NA	5 5E-12	NA	NA	5.5E-12		NA	--	NA	
			Isodrin	NA	NC	NA	NA			NA	--	NA	
			Aluminum	NA	NC	NA	NA			NA	2 1E-04	NA	2.1E-04
			Arsenic	NA	9 6E-10	NA	NA	9 6E-10	Developmental / Cardiovascular / Nervous system	NA	2 2E-05	NA	2.2E-05
			Manganese	NA	NC	NA	NA		Nervous System	NA	5 0E-04	NA	5 0E-04
			Thallium	NA	NC	NA	NA			NA	--	NA	

Table 12-20
FPGS Summary of Receptor Risks and Hazards for COPCs - Reasonable Maximum Exposure - Future Resident - Adult
Record of Decision FPGS and Buildings T-62 and T-68
Soldier Systems Center
Natick, Massachusetts

SCENARIO TIMEFRAME: FUTURE
RECEPTOR POPULATION: RESIDENT
RECEPTOR AGE: ADULT

MEDIUM	EXPOSURE MEDIUM	EXPOSURE POINT	CHEMICAL	CARCINOGENIC RISK (1)					NON-CARCINOGENIC HAZARD QUOTIENT (1)				
				INGESTION	INHALATION	DERMAL	EXTERNAL (RADIATION)	EXPOSURE ROUTES TOTAL	PRIMARY TARGET ORGAN	INGESTION	INHALATION	DERMAL	EXPOSURE ROUTES TOTAL
			Vanadium	NA	NC	NA	NA			NA	--	NA	
			CHEMICAL TOTAL	--	9.9E-10	--	--	1E-09		--	7.3E-04	--	7E-04
			RADIONUCLIDE TOTAL										
		EXPOSURE POINT TOTAL						1E-09					7E-04
	EXPOSURE MEDIUM TOTAL							1E-09					7E-04
SOIL TOTAL								4E-06					3E-02
RECEPTOR TOTAL								5E-05					1.5E+01
							TOTAL RISK ACROSS ALL MEDIA	5E-05	TOTAL HAZARD ACROSS ALL MEDIA				1.5E+01

NOTES
NC - Not carcinogenic by this exposure route
NA - Not applicable; exposure route not applicable for this chemical/exposure medium
-- - Not calculated dose-response data and/or dermal absorption values are not available

Prepared by: KJC
Checked by: JHP

TOTAL GENERAL TOXICITY HI =	5.5E-07
TOTAL CARDIOVASCULAR HI =	2.2E-05
TOTAL DEVELOPMENTAL HI =	2.2E-05
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TOTAL KIDNEY HI =	3.0E-03
TOTAL LIVER HI =	2.1E-01
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TOTAL NERVOUS SYSTEM HI =	4.9E+00
TOTAL NOAEL HI =	5.2E-03
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TOTAL SKIN HI =	1.2E-02
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APPENDIX A

APPENDIX A

DECLARATION OF STATE CONCURRENCE

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
DEPARTMENT OF ENVIRONMENTAL PROTECTION
ONE WINTER STREET, BOSTON, MA 02108 617-292-5500

DEVAL L. PATRICK
Governor

TIMOTHY P. MURRAY
Lieutenant Governor

IAN A. BOWLES
Secretary

LAURIE BURT
Commissioner

September 28, 2007

James T. Owens, Director
Office of Site Remediation and Restoration
Region 1
U.S Environmental Protection Agency
One Congress St., Suite 1100 (HIO)
Boston, MA 02114-2023

Re: ROD Concurrence Letter
Army Soldier Systems Biological and Chemical Command (Natick Labs)
Former Proposed Gymnasium Site/
Buildings T-62 and T-68 Site, Natick, MA

Dear Mr. Owens:

The Department of Environmental Protection (MassDEP) has reviewed the Selected Remedy recommended by the U.S. Environmental Protection Agency (EPA) for the cleanup of the Army Soldier Systems Biological and Chemical Command (Natick Labs) Former Proposed Gymnasium Site (FPGS) and the Buildings T-62 and T-68 Site. The Department concurs with the selection of the No Further Action Alternative as presented in the Record of Decision.

Prior remedial actions have addressed contamination of groundwater and soil in the FPGS and soil in the Buildings T-62 and T-68 Site. Therefore, owing to the remedial actions previously conducted, no additional actions are required at this Site at this time. The selected alternative also meets applicable or relevant and appropriate State requirements.

If you have any questions or comments, please contact Robert Campbell, Project Manager, at (617) 292-5732.

Sincerely,

Laurie Burt
Commissioner

APPENDIX B

APPENDIX B

ADMINISTRATIVE RECORD INDEX

Documents currently in the public repositories (U.S. Army Soldier Systems Center's Environmental, Safety and Health Office, Morse Institute Reference Section, Natick Board of Health, Massachusetts Department of Environmental Protection (Boston), U.S. Environmental Protection Agency (EPA) (Boston))

Document	Title	Date
1	Analysis of Existing Facilities/Environmental Assessment Report, U.S. Army Natick Research and Development Command, Natick, Massachusetts	November 1978
2	Installation Assessment of U.S. Army Natick Research and Development Command, Report # 170	May 1980
3	Phase II Petrix Gas Survey conducted at U.S. Army Natick Research, Development and Engineering Center (NRDEC)	April 1990
4	Final Report Master Environmental Plan for the U.S. Army Natick Research, Development and Engineering Center (NRDEC)	January 1993
5	Interim Remedial Action Study, Remedial Investigation/Feasibility Study (RI/FS) for T-25 Area at the U.S. Army Natick Research, Development, and Engineering Center (NRDEC), Natick, Massachusetts	March 1993
6	EPA Final Hazard Ranking System (HRS), U.S. Army Natick Research, Development and Engineering Center (NRDEC)	May 1993
7	Draft Report, Assessment of Location-Specific Applicable or Relevant and Appropriate Requirements (ARARS) for the U.S. Army Natick Research, Development and Engineering Center (NRDEC), Natick, Massachusetts	June 1993
8	Draft Feasibility Study Report, T-25 Area at the U.S. Army Natick Research, Development and Engineering Center (NRDEC), Natick, Massachusetts	July 1994
9	Agency for Toxic Substances and Disease Registry, Department of Health and Human Services, Public Health Service Site Visit Summary for the U.S. Army Natick Research, Development and Engineering Center (NRDEC), Natick, Massachusetts	September 1994
10	Draft Remedial Investigation (RI) Addendum T-25 Area and Water Supply Wells at the U.S. Army Natick Research, Development and Engineering Center (NRDEC)	September 1994

Document	Title	Date
11	Draft Geophysical Investigation, Natick Research and Development Engineering Center (NRDEC), Natick, Massachusetts	January 1995
12	Prepare Ground Water Model for Natick Research and Development and Engineering Center (NRDEC), Draft Technical Plan	March 1995
13	Draft Work Plan Remedial Investigation/Feasibility Study (RI/FS) and Interim Remedial Alternatives (IRA) Study and Design for the T-25 Area at the U.S. Army Natick Research, Development and Engineering Center (NRDEC)	March 1995
14	Draft Stepped Rate Aquifer Test Design, T-25 Area at the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	March 1996
15	Final Health and Safety Plan, Remedial Investigation/Feasibility Study (RI/FS) for T-25 Area at U.S. Army Natick Research, Development and Engineering Center (NRDEC), Natick, Massachusetts	June 1996
16	Final Work Plan - Phase II Remedial Investigation (RI) for T-25 Area at the U.S. Army Soldier Systems Command (SSCOM) Natick, Massachusetts	June 1996
17	Final Quality Assurance Project Plan - Phase II Remedial Investigation (RI) for T-25 Area at the U.S. Army Soldier Systems Command (SSCOM) Natick, Massachusetts - Volume I of II	June 1996
18	Final Quality Assurance Project Plan - Phase II Remedial Investigation (RI) for T-25 Area at the U.S. Army Soldier Systems Command (SSCOM) Natick, Massachusetts - Volume II of II	June 1996
19	Final Quality Assurance Project Plan Remedial Investigation/Feasibility Study (RI/FS) and Interim Remedial Alternatives (IRA) Study and Design for T-25 Area at the U.S. Army Natick Research, Development and Engineering Center (NRDEC), Natick, Massachusett	July 1996
20	Draft Final Community Relations Plan - U.S. Army Soldier Systems Command (SSCOM) Natick, Massachusetts	July 1996
21	Draft Final Letter Report Survey of Local Properties - Remedial Investigation/Feasibility Study (RI/FS) for T-25 Area at the U.S. Army Natick Research, Development and Engineering Center (NRDEC), Natick, Massachusetts	July 1996

Document	Title	Date
22	Phase I Final Work Plan - Remedial Investigation/Feasibility Study (RI/FS) and Interim Remedial Alternatives (IRA) Study and Design for T-25 Area at the U.S. Army Natick Research, Development and Engineering Center (NRDEC), Natick Massachusetts	August 1996
23	Final Phase I Remedial Investigation (RI) Report Volume I of III Sections 1.0 through 8.0 - T-25 Area at the U.S. Army Natick Research, Development and Engineering Center (NRDEC), Natick, Massachusetts	August 1996
24	Final Phase I Remedial Investigation (RI) Report Volume II of III Appendices - T-25 Area at the U.S. Army Natick Research, Development and Engineering Center (NRDEC), Natick, Massachusetts	August 1996
25	Final Phase I Remedial Investigation (RI) Report Volume III of III Appendices - T-25 Area at the U.S. Army Natick Research, Development and Engineering Center (NRDEC), Natick, Massachusetts	August 1996
26	Draft Final Quarterly Ground Water Monitoring Report (Summer and Fall 1995) - T-25 Area, Water Supply Well Area, and Former Proposed Gymnasium Area at the U.S. Army Soldier Systems Command (SSCOM) Natick, Massachusetts	August 1996
27	DRAFT Action Memorandum Storage Area, U.S. Army Soldier Systems Command (SSCOM) Natick, Massachusetts, Revision 1	November 1996
28	Draft Quarterly Ground Water Monitoring Report (Winter 1996 and Spring 1996) - T-25 Area, Water Supply Well Area, and Former Proposed Gymnasium Area, and Boiler Plant Area at the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	December 1996
29	Phase II Field Investigation Data, Remedial Investigation (RI) of the T-25 Area at the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	January 1997
30	Draft Quality Assurance Project Plan-Addendum, Sections 1.0 - 15.0, U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	May 1997
31	Draft Health and Safety Plan-Addendum Former Proposed Gymnasium Site, SSCOM Water Supply Wells Remedial Investigation (RI) Data Item A003	May 1997
32	Draft Final Work Plan, Former Proposed Gymnasium Site, SSCOM Water Supply Wells Remedial Investigation (RI) Data Item A003	June 1997

Document	Title	Date
33	Final Report Ground Water Model for Soldier Systems Command (SSCOM), Natick, Massachusetts	June 1997
34	Draft Quarterly Ground Water Monitoring Report (Summer 1996, Fall 1996 and Winter 1996\1997) - T-25 Area, Water Supply Well Area, and Former Proposed Gymnasium Area, and Boiler Plant Area at the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachus	June 1997
35	Agency for Toxic Substance and Disease Registry Public Health Assessment for Natick Laboratory Army Research a/k/a U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	July 1997
36	Final Site Safety and Health Plan for Storage Area Removal Action T-25 Area, U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	August 1997
37	Final Removal Action Work Plan for Storage Area Removal Action T-25 Area, U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	August 1997
38	Final Treatability Study Work Plan - T-25 Area at the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	October 1997
39	Final Work Plan Former Proposed Gymnasium Site, Soldier Systems Command (SSCOM) Water Supply Wells Remedial Investigation (RI) Data Item A003	December 1997
40	Draft Final Quarterly Groundwater Sampling Report Event 14 (July 1997) at the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	March 1998
41	Public Health Assessment for the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	March 1998
42	Health Consultation for the U.S. Army Soldier Systems Command (SSCOM), Natick. Massachusetts	March 1998
43	Draft Technical Work Plan, Groundwater Modeling at the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	April 1998
44	Draft Final Quarterly Groundwater Sampling Report Event 15 (January 1997) at the U.S. Army Soldier Systems Command (SSCOM), Natick. Massachusetts	June 1998

Document	Title	Date
45	Draft Work Plan for Site Investigation for Boiler Plant, Former Hazardous Materials Storage Building, Former Piggery, and Building T-23, U.S. Army Environmental Center, Aberdeen Proving Grounds, Maryland	June 1998
46	Storm Water Sampling Report, Contract No. DAAK60-97-P-4847, prepared for Soldier Systems Command (SSCOM)	August 1998
47	Draft Final Work Plan for Site Investigation for Boiler Plant, Former Hazardous Materials Storage Building, Former Piggery, and Building T-23, U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	September 1998
48	Draft Final Quarterly Groundwater Sampling Report Event 16 (April 1998) at the U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	October 1998
49	Tier II Ecological Risk Assessment Work Plan, T-25 Area at the U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	November 1998
50	Draft Addendum to Quality Assurance Project Plan, Tier II Ecological Risk Assessment and Treatability Study Operation and Maintenance for T-25 Area at the U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	November 1998
51	Final Phase II Remedial Investigation (RI) Report Volume I sections 1.0 through 4.0 - T-25 Area at the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	December 1998
52	Final Phase II Remedial Investigation (RI) Report Volume II sections 5.0 through 9.0 - T-25 Area at the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	December 1998
53	Draft Remedial Investigation Report (RI), Former Proposed Gymnasium Site, Data Item A013, Volume I of II-Text, Figures And Tables	January 1999
54	Draft Remedial Investigation Report (RI), Former Proposed Gymnasium Site, Data Item A013, Volume II of II-Appendices A through V	January 1999
55	Final Removal Action Report, Storage Area Removal Action T-25 Area at the U.S. Army Soldier Systems Command (SSCOM), Natick, Massachusetts	February 1999

Document	Title	Date
56	Draft Final Quarterly Groundwater Sampling Report Event 17 (August 1998) U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	February 1999
57	Draft Remedial Investigation (RI) Report Soldier Systems Center (SSC) Water Supply Wells Site, Volume I of II: Text, Tables & Figures	March 1999
58	Draft Remedial Investigation (RI) Report Soldier Systems Center (SSC) Water Supply Wells Site, Volume II of II: Appendices A through R	March 1999
59	Draft Final Quarterly Groundwater Sampling Report Event 18 (December 1998) U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	May 1999
60	Draft Final Quarterly Groundwater Sampling Report Event 19 (March 1999) U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	June 1999
61	Final Focused Feasibility Study/Treatability Study, T-25 Area at the U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	September 1999
62	Transcript of Public Hearing, Re: U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts Proposed Plan to Clean Up Groundwater at the T-25 Area	September 1999
63	Tier II Ecological Risk Assessment Work Plan, Main Storm water Outfall (MSO) Area, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	October 1999
64	Draft Final Quarterly Groundwater Sampling Report Event 20 (July 1999) U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	February 2000
65	1999 Storm Water Sampling Report; U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	January 2002
66	Working Draft, Interim Technical Memorandum, T-25 Area Storm water Outfall, Tier II Ecological Risk Assessment, U.S. Army Soldier Systems Center (SSC)	April 2000
67	Draft Preliminary Phase II Site Investigation Report, Boiler Plant Site, Soldier Systems Center (SSC), Natick, Massachusetts, Data Item A003	May 2000
68	Draft, Quarterly Groundwater Monitoring Report Event 21 (October 1999), Soldier Systems Center (SSC), Natick, Massachusetts	June 2000

Document	Title	Date
69	Draft, T-25 Area Tier II Ecological Risk Assessment Report for the U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	June 2000
70	Draft Technical Memorandum, Building 22, Soldier Systems Center (SSC), Natick, Massachusetts	September 2000
71	Draft Work Plan, Building 22 Remedial Investigation (RI), Soldier Systems Center (SSC), Natick, Massachusetts	September 2000
72	Water Resources Investigation Report, Pond-Aquifer Interaction at South Pond of Lake Cochituate, Natick, Massachusetts, prepared in cooperation with the U.S. Environmental Protection Agency (USEPA) and the U.S. Army	January 2001
73	Draft Final, Revised Quality Assurance Project Plan, Soldier Systems Center (SSC), Natick, Massachusetts, Volume I Sections 1.0-14.0 and Appendices A through G	January 2001
74	Draft, Final Revised Quality Assurance Project Plan, Soldier Systems Center (SSC), Natick, Massachusetts, Volume II Appendix H Laboratory Quality Assurance Plan and Operating Procedures (Severn Trent Laboratory, Sparks, Maryland)	January 2001
75	Draft, Final Revised Quality Assurance Project Plan, Soldier Systems Center (SSC), Natick, Massachusetts, Volume III Appendix I Laboratory Quality Assurance Plan and Standard Operating Procedures (Datachem Laboratory, Salt Lake City, Utah)	January 2001
76	Draft Final, Quarterly Groundwater Monitoring Report Event 26 (June 2001), Soldier Systems Center (SSC), Natick, Massachusetts	February 2001
77	Draft Final Quarterly Groundwater Monitoring Report, Event 22 (January 2000) U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	March 2001
78	Draft Final Quarterly Groundwater Monitoring Report, Event 23 (May 2000), Soldier Systems Center (SSC), Natick, Massachusetts	March 2001
79	Record of Decision, T-25 Area Ground Water (Operable Unit 1), U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	April 2001
80	Draft Report Groundwater Flow and Transport Modeling Results for the T-25 Area at Soldier Systems Center (SSC), Natick, Massachusetts	June 2001
81	Draft Tier III Ecological Risk Assessment Work Plan, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	August 2001

Document	Title	Date
82	Draft Quality Assurance Project Plan Addendum, Tier III Ecological Risk Assessment, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	August 2001
83	Draft Letter Report Historic Outfalls, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	August 2001
84	Draft Main Storm Water Outfall (MSO) Tier II Ecological Risk Assessment Report for the U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	August 2001
85	Draft Feasibility Study (FS) Report, Former Proposed Gymnasium Site	August 2001
86	Draft Final Remedial Investigation (RI) Report, Soldier Systems Center (SSC) Water Supply Wells Site, Volume I of II - Text, Figures and Tables	August 2001
87	Draft Final Remedial Investigation (RI) Report, Soldier Systems Center (SSC) Water Supply Wells Site, Volume II of II - Appendices A through R	August 2001
88	Final Work Plan, Buildings 22 and 36 Remedial Investigation (RI), Soldier Systems Center (SSC), Natick, Massachusetts	August 2001
89	Final Revised Quality Assurance Project Plan, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts, Volume I, Sections 1.0-14.0 and Appendices A through G	August 2001
90	Draft Quarterly Groundwater Monitoring Report, Event 24 (October 2000), Soldier Systems Center (SSC)	August 2001
91	Draft Final Quarterly Groundwater Monitoring Report, Event 24 (October 2000), Soldier Systems Center (SSC)	September 2001
92	NPDES Permit Exclusion - Chemical Data, July 1, 2001 to September 30, 2001, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	October 2001
93	Draft Storm Water Sampling Report, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	October 2001
94	Final, T-25 Area Tier II Ecological Risk Assessment Report, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	December 2001
95	Final Report, Development and Application of a Calibrated Ground Water Flow and Transport Model for the T-25 Area at Soldier Systems Center (SSC), Natick, Massachusetts	February 2002

Document	Title	Date
96	Draft Final, Quarterly Groundwater Monitoring Report, Event 25 (March 2001), Soldier Systems Center (SSC), Natick, Massachusetts	February 2002
97	Draft Revised Risk Assessment Approach Technical Memorandum, Soldier Systems Center (SSC), Natick, Massachusetts	June 2002
98	Draft Final Quarterly Groundwater Monitoring Report, Event 27 (August 2001), Soldier Systems Center (SSC), Natick, Massachusetts	June 2002
99	Letter Report titled Natick Tier III Fish Data - Human Health Screening Comparisons prepared by ICF Consulting, Inc., 18 July 2002	July 2002
100	Interim Technical Memorandum, Tier III Ecological Risk Assessment, U.S. Army Soldier Systems Center (SSC)	July 2002
101	Final Draft, Storm water Sampling Report 2001 Sampling Event, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts August 2002	August 2002
102	Final Tier III Ecological Risk Assessment Work Plan, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts August 2002	August 2002
103	Final Quality Assurance Project Plan Addendum, Tier III Ecological Risk Assessment, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts August 2002	August 2002
104	Final Letter Report, Historic Outfalls, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts August 2002	August 2002
105	Final Main Stormwater Outfall (MSO), Tier II Ecological Risk Assessment Report for the U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts August 2002	August 2002
106	Draft, Quality Assurance Project Plan Addendum - Building 14 and Former Building 13 Site Investigation/Remedial Investigation and Feasibility Study, U.S. Army Soldier Systems Command (SSC), Natick, Massachusetts September 2002	September 2002
107	Draft Work Plan, Building 14 and Former Building 13 Site Investigation/Remedial Investigation and Feasibility Study	September 2002
108	Draft Remedial Investigation Report, Buildings 22 and 36, Soldier Systems Center (SSC), Natick, Massachusetts, Volume I of II, Text, Figures, and Tables November 2002	November 2002

Document	Title	Date
109	Draft Remedial Investigation Report, Buildings 22 and 36, Soldier Systems Center (SSC), Natick, Massachusetts, Volume II of II, Appendices A through R November 2002	November 2002
110	Final, Stormwater Sampling Report - 2001 Sampling Event, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	November 2002
111	Draft Final, Quarterly Groundwater Monitoring Report, Event 29 (March 2002), Soldier Systems Center (SSC), Natick, Massachusetts December 2002	December 2002
112	Augmentation of the Ground-Water Monitoring Well Network in the Vicinity of the T-25 Area, U.S. Army Soldier Systems Center (SSC), Natick, Massachusetts	January 2003
113	Draft Final Quarterly Groundwater Sampling Report Event 28 (December 2001) U.S. Army Soldier Systems Center Natick, Massachusetts	August 2002
114	Quality Assurance Project Plan Addendum Building 14 and Former Building 13 Site Investigation/Remedial Investigation and Feasibility Study, U.S. Army Soldier Systems Command (SSC) Natick, Massachusetts	March 2003
115	Work Plan Building 14 and Former Building 13 Site Investigation/Remedial Investigation and Feasibility Study	March 2003
116	Draft Work Plan Buildings 2 and 45 Site Investigation Soldier Systems Center, Natick, Massachusetts	April 2003
117	NPDES Permit Exclusion - Chemical Data January 1, 2003 to March 31, 2003	April 2003
118	Draft Final Quarterly Groundwater Sampling Report Event 30 (June 2002) U.S. Army Soldier Systems Center Natick, Massachusetts	May 2003
119	Draft Final Remedial Investigation Report Buildings 22 and 36, U.S. Army Soldier Systems Center Natick, Massachusetts Volume 1 of 2	June 2003
120	Draft Final Remedial Investigation Report Buildings 22 and 36, U.S. Army Soldier Systems Center Natick, Massachusetts Volume 2 of 2	June 2003
121	NPDES Permit Exclusion - Chemical Data April 1, 2003 to June 30, 2003	July 2003
122	Tier III Deterministic Ecological Risk Assessment Report	March 2004

Document	Title	Date
123	Draft Final Quarterly Groundwater Sampling Report Event 31 (September 2002) U.S. Army Soldier Systems Center Natick, Massachusetts	August 2003
124	Draft Final Quarterly Groundwater Sampling Report Event 32 (December 2002) U.S. Army Soldier Systems Center Natick, Massachusetts	August 2003
125	Method 2 Risk Characterization and Class A-2 Response Action Outcome Statement	September 2003
126	Final Phase II Site Investigation Report, Volume I - Boiler Plant Site	September 2003
127	Final Phase II Site Investigation Report, Volume II Appendices - Boiler Plant Site	September 2003
128	Final Work Plan Building 2 & 45 Site Investigation U.S. Army Soldier Systems Center Natick, Massachusetts	January 2004
129	Draft Final Quarterly Groundwater Sampling Report Event 33 (April 2003)	January 2004
130	Draft Final Site Investigation Work Plan, Buildings 62 & 68	January 2004
131	Draft Final Quarterly Groundwater Sampling Report Event 34 (June 2003)	February 2004
132	NPDES Permit Exclusion Chemical Data October 1 2003-December 31 2003	February 2004
133	New Long-Term Monitoring Well Letter Report T-25 Area U.S. Army Soldier Systems Center Natick, Massachusetts	February 2004
134	Long-Term Monitoring Plan T-25 Area (OU-1) Ground Water Treatment System U.S. Army Soldier Systems Center Natick, Massachusetts	March 2004
135	Draft Site Investigation Report, Building 14 and Former Building 13, U.S. Army Soldier Systems Center (SSC) Natick, Massachusetts	March 2004
136	New Extraction Well Letter Report T-25 Area U.S. Army Soldier Systems Center Natick, Massachusetts	April 2004
137	T-25 Area (OU-1) Ground Water Treatment System Operation and Maintenance Manual Volume 1 of 2	May 2004
138	T-25 Area (OU-1) Ground Water Treatment System Operation and Maintenance Manual Volume 2 of 2	May 2004

Document	Title	Date
139	Draft Buildings 22 & 36 Feasibility Study Work Plan	April 2004
140	Draft Final Quarterly Groundwater Sampling Report Event 35 (September 2003)	July 2004
141	Draft Final Quarterly Groundwater Sampling Report Event 36 (December 2003)	August 2004
142	Final Letter Work Plan, Additional HHRA and ERA Activities to Support Sediment Risk Management at the U. S. Army Soldier Systems Center (SSC) Natick, MA	August 2004
143	Final Work Plan Addendum - Building 14 and Former Building 13 Site Investigation	September 2004
144	Building 14 and Former Building 13 Site Investigation Report	September 2004
145	Draft T-25 Area Groundwater Treatment System January - June 2004 Semi Annual Report	October 2004
146	Draft Buildings 22 & 36 Feasibility Study Report	October 2004
147	Draft Quarterly Assurance Project Plan Addendum	November 2004
148	Draft Final Quarterly Groundwater Sampling Report Event 37 (March 2004)	November 2004
149	Safety and Health Plan	November 2004
150	Draft Final Sediment Risk Management Technical Memorandum: Additional Assessment Activities to Support Sediment Risk Management at the U. S. Army Soldier Systems Center (SSC) Natick, MA	December 2004
151	Draft Study Area 2 Record Review Memorandum	February 2005
152	Final Quality Assurance Project Plan Addendum, Quarterly Groundwater Monitoring Program - U.S. Army Soldier Systems Center (SSC) Natick, MA	February 2005
153	Draft Buildings 62 and 68 Removal Action Work Plan	February 2005
154	Application of an Updated Regional Groundwater Flow Model and an Updated T-25 Area Transport Model	February 2005
155	Numerical Simulations of Remedial Alternatives for the PCE Plume Near Buildings 36 and 22	February 2005

Document	Title	Date
156	Draft Final Quarterly Groundwater Sampling Report Event 38 (June 2004)	February 2005
157	Final Record Review Memorandum SA2 Waste Oil Underground Storage Tank, SSC Natick, MA	February 2005
158	U.S. Army Natick Laboratories The Science Behind the Soldier	April 2005
159	Final Removal Action Closure Report Soil Excavation and Off-Site Treatment/Disposal at the Former Proposed Gymnasium Site Soldier Systems Center Natick, MA	May 2003
160	T-25 Area Ground Water Treatment System Semi-Annual Report January through June 2004 U.S. Army Soldier Systems Center (SSC) Natick, MA	April 2005
161	T-25 Area Ground Water Treatment System 2003 Annual Report U.S. Army Soldier Systems Center (SSC) Natick, MA	April 2005
162	Draft Final Quarterly Groundwater Monitoring Report Event 39 (September 2004) Soldier Systems Center Natick, MA	May 2005
163	Draft Final Quarterly Groundwater Monitoring Report Event 40 (December 2004) U.S. Army Soldier Systems Centerr (SSC) Natick, MA	May 2005
164	Final Action Memorandum Building 62 and 68 Soldier Systems Center Natick, MA	May 2005
165	Draft Site Investigation Report Building 63, 2, and 45 U.S. Army Soldier Systems Center Natick, MA (2 Volumes)	June 2005
166	Final Site Investigation Report Addendum Building 14 and Former Building 13 U.S. Army Soldier Systems Center (SSC) Natick, MA	July 2005
167	Final Remedial Investigation Report Buildings 22 and 36 Soldier Systems Center Natick, MA (3 Volumes)	September 2005
168	Draft Final Quarterly Groundwater Monitoring Report Event 41 (April 2005) U.S. Army Soldier Systems Center (SSC) Natick, MA	September 2005
169	Final Action Memorandum Building 14 and Former Building 13 U.S. Army Soldier Systems Center (SSC) Natick, MA	September 2005
170	Draft Final Quarterly Groundwater Monitoring Report Event 42 (August 2005) U.S. Army Soldier Systems Center (SSC) Natick. MA	December 2005

Document	Title	Date
171	Final Removal Action Completion Report Buildings 62 and 68 Soldier Systems Center Natick, MA	February 2006
172	T-25 Area Ground Water Treatment System 2004 Annual Report U.S. Army Soldier Systems Center (SSC) Natick, MA	March 2006
173	Final T-25 Area Ground Water Treatment System Semi-Annual Report January thought June 2005 U.S. Army Soldier Systems Center (SSC) Natick, MA	March 2006
174	Final Work Plan for First Five-Year Review U.S. Army Soldier Systems Center (SSC) Natick, MA	March 2006
175	Final Work Plan Ground Water Remedial Optimization Study at the T-25 Area U.S. Army Soldier Systems Center (SSC) Natick, MA	April 2006
176	Final Remedial Investigation Report Former Proposed Gymnasium Site Data Item A013 Volume I of II Text, Figures, and Tables	December 2006
177	Final Remedial Investigation Report Former Proposed Gymnasium Site Data Item A013 Volume II of II Appendices A through U	December 2006
178	Draft Final Remedial Investigation Report Former Proposed Gymnasium Site Data Item A013 Volume I of II Text, Figures, and Tables	August 2006
179	Draft Final Remedial Investigation Report Former Proposed Gymnasium Site Data Item A013 Volume II of II Appendices A through U	August 2006
180	Draft Final Buildings 22 and 36 Feasibility Study Report	October 2006
181	Draft Site Investigation Report Building 63, 2, and 45 US Army Soldier Systems Center Natick, MA Volume I of II Text, Figures, and Tables	August 2006
182	Draft Site Investigation Report Building 63, 2, and 45 US Army Soldier Systems Center Natick, MA Volume II of II Appendices A-M	August 2006
183	Final Supplemental Remedial Investigation Report Former Proposed Gymnasium Site	December 2006
184	Final Pilot Study Work Plan Groundwater Containment at Building 22 and 36 and Buildings 63, 2, and 45	January 2007
185	Draft Final Supplemental Remedial Investigation Report Former Proposed Gymnasium Site	September 2006

Document	Title	Date
186	Draft Pilot Study Work Plan Groundwater Containment at Buildings 22 and 36 and Buildings 63,2, and 45	April 2006
187	Draft Final Explanation of Significant Differences for the T-25 Area Groundwater (Operable Unit 1)	August 2006
188	Draft Sediment Feasibility Study Work Plan	October 2006
189	Draft Final Pilot Work Plan Groundwater Containment at Buildings 22 and 36 and Buildings 63,2, and 45	August 2006
190	Draft Final Sediment Feasibility Study Work Plan	November 2006
191	Final Removal Action Work Plan Building 14 and Former Building 13	July 2006
192	Final Sediment Feasibility Study Work Plan	January 2007
193	Draft Sediment Feasibility Study	January 2007
194	Draft Focused Feasibility Study Former Proposed Gymnasium Site	January 2007
195	Technical Specifications for Groundwater Containment Pilot Study Soldier Systems Center Natick, MA	October 2006
196	First Five-Year Review Report for U.S. Army Soldier Systems Center Natick, MA	January 2007
197	Draft Final Quarterly Groundwater Monitoring Report Event 43 (October 2005)	April 2006
198	Draft Final Quarterly Groundwater Monitoring Report Event 44	August 2006
199	Draft Final Quarterly Groundwater Monitoring Report Event 46 (September 2006)	April 2007
200	Draft Final Quarterly Groundwater Sampling Report Event 45 (June 2006)	March 2007
201	Draft Record of Decision for Former Proposed Gymnasium Site and Buildings T-62 and T-68	June 2007
202	Groundwater Remedial Optimization Study at the T-25 Area Summary of Event 02 Post HRC-A Injection Groundwater Monitoring	June 2007
203	Final Quarterly Groundwater Monitoring Report Event 44 (March 2006)	May 2007
204	Draft Final Sediment Feasibility Study	March 2007

Document	Title	Date
205	Final Soil Excavation and Off-Site Treatment/Disposal, and Installation of Oil Water Separator at Boiler Plant Site	March 2003
206	Draft T-25 Area Supplemental Remedial Investigation Report	March 2007
207	Final Work Plan, T-25 Area Supplemental Remedial Investigation	March 2007

APPENDIX C

APPENDIX C

PUBLIC HEARING TRANSCRIPT

PROPOSED PLAN
FOR
BUILDINGS 62 AND 68
AND
FORMER PROPOSED GYMNASIUM SITE

SOLDIER SYSTEMS CENTER
NATICK, MASSACHUSETTS

PRESENT:

JOEL MC CASSIE, U.S. Army Natick Soldier Research, Development and Engineering Center

STANLEY W. REED, P.E., MACTEC

MARCO KALTOFEN, RAB

A. RICHARD MILLER

MICHELLE BONANCA, SSC (PKI)

ROBERT CAMPBELL

CAROLE BERKOWITZ

CHRISTINE WILLIAMS, EPA

JAMES CONNOLLY, SSC (PKI)

DEBI HEIMS, H&S Environmental

JEFFREY S. PICKETT, C.G., MACTEC

KEVIN PALAIA

ORIGINAL

CONTINUED PRESENT:

JOHN MC HUGH, SSC (PKI)

NEIL OSGOOD

STACY GREENDLINGER

VEMBU KANNAN

JERRY WHITAKER, RDECOM

ANNE MALEWICZ, DEP

Public Safety Training Center
20 East Central Street
Natick, Massachusetts

March 15, 2007
7:15 p.m.

MICHAEL GRUBER
Shorthand Reporter

P R O C E E D I N G S

MR. KALTOFEN: Okay, ladies and gentlemen, let's get the show on the road.

Before we start the hearing we have an informational session presentation by Stan Reed, of MACTEC, a Massachusetts P.E., and he's going to talk about Building 62 and 68 proposed plan.

MR. REED: Thank you.

The purpose of our meeting tonight is to present the proposed plan, as Marco said, Buildings 62 and 68, two buildings located close together at the Soldier System Center, and also the former proposed gymnasium site.

The first part -- we have a two-hour schedule. The first hour is the presentation, opportunity for questions and answers. Then at eight o'clock, transition to a more formal public hearing, at which time people can offer formal comments on the Army's proposed plan. However, when that begins, then there will be no further answers given by the Army, or on behalf of the Army. There will just be a time when comments are accepted.

This isn't the only time that people can offer comments, though. The opportunity to provide written comments, faxed comments or emailed comments, there's information on how to do that on the front page of the proposed plan, and it will be mentioned again later.

First of all, I just want to make sure everyone knows what the proposed plan does. In a CERCLA process the proposed plan presents the preferred alternative, requests comments, and then perhaps afterwards -- perhaps after that a remedy is selected.

The proposed plan summarizes the site description and history, identifies the preferred clean-up approach, explains the rationale for selecting the preferred alternative, provides opportunity for public comment, and sometimes, as happens today, opens the public comment period.

The remedy -- actual selection of the remedy is done in the record of decision, which comes at a later date. Also in the record of decision will be a responsiveness summary, which will include all the comments that are offered here tonight at the start of the public hearing,

and then there will be written responses from the Army to that responsive summary. All the public comments that are received during the comment period will be considered during the decision-making process.

MS. WILLIAMS: Stan,, can I say something?

MR. REED: Sure.

MS. WILLIAMS: I just want to let you folks know that EPA has been working with the Army, and we are in concurrence with this proposed no further action plan for both the sites.

MR. REED: This is Christine Williams from the EPA.

MS. WILLIAMS: Yes, sorry, Christine Williams.

MR. REED: Steps in the CERCLA process -- CERCLA being the Comprehensive Environmental Response Compensation Liability Act, the process in which the investigations are done -- the sites move from discovery, which is thinking there might be a contaminated site, through a couple of levels of investigation, then

on to study of the feasibility of various clean-up actions, and then, following that, move into a proposed plan phase, which is where we are tonight for the sites we're talking about. The record of decision, remedy implementation, ultimately the site closeout.

A little bit about the sites that we're talking about tonight. Buildings 62 and 68 are two small buildings located up here in the northwest corner of the Soldier System Center. For those who are familiar, this is Kansas Street going into the installation. This is the main guard security checkpoint right there.

Buildings 62 and 68 are located up there. They're 25, 35 years old now, small concrete block buildings, concrete slabs. The area immediately -- it doesn't show clearly -- the area immediately adjacent to the buildings is grassed, but then -- well, this area is all paved. There's a large parking lot and material and sand in the area.

Couple of -- these are different shots looking across that parking area. I think that's Building 62, that's Building 68. They're small

buildings.

A little bit about the history of the buildings. Initially, until about 1991, they were used for hazardous material storage, but after that they were not. Presently they're used to store non-hazardous materials. No documented spills or releases associated with the buildings. In 2004 there was a site investigation performed revealing that the soil close to the buildings, primarily within a few feet, maybe ten feet of the buildings, was contaminated with some petroleum type compounds. There's no site-related groundwater contamination found at the buildings. I need to point out, too, that groundwater in this area, even though there isn't a groundwater concern associated with the buildings, groundwater in this area is captured by the treatment system that serves the T-25 area and is treated at that point. The T-25 area is not associated with this.

Because of soil contamination identified there, there was petroleum or soil removal action conducted in 2005 to clean up the soil to levels specified in the Massachusetts

Contingency Plan, the Method 1, S-1/GW-1 standards -- Soil Class 1 and Groundwater Class 1 -- the most stringent of the Massachusetts standards.

Soil was excavated to a depth of two to three feet around the buildings. Pretty much all the way around the buildings. A little bit in-between. To about a two or three-foot depth. All told, there were about 170 tons of soil removed, and it was taken to a soil disposal recycling facility off-site.

Samples were taken after the excavation to see what levels of contamination remained. Those confirmation samples were from the excavation, and none of the samples that were collected exceeded the standards that were used in the excavation, indicating that the excavation accomplished what it was intended to do as far as the soil was concerned.

I'll move on to the former proposed gym site. A little bit about that. This is a photograph taken from Kansas Street as you drive onto the installation. This is up on the road. Looking down to the left, this whole area is the

former proposed gym site. It extends partly out into the parking lot there. Right now there's a security tent right in this area. When you drive on you have to stop there and go to the security tent.

The total area here is about 1.6 acres. It's grassy, sloped a little bit, but not too much. It includes part of the parking lot that's back there.

The history of this site, it has been, is used as a parking lot. There was a helicopter landing pad here at one point, and there was a petroleum, oil and lubricant bladder, or container, test site there. It was proposed as a gym site in the 1980s, but the gym was never developed, but the name stuck. That's why it's called the former proposed gym site.

No documented spills or releases associated with the site, and it was investigated with a remedial investigation in 1997, 1998.

Contamination at this site, there's some volatiles found in the soil. Benzene, chlorobenzene, benzo(a)pyrene. Generally petroleum-related contaminants. Beryllium is a

metal. Those contaminants are all found within about 20 feet of that Monitoring Well 5 which showed on the previous slide. Monitoring Well 5. All the contamination is right in this area right here.

MR. KALTOFEN: Stan, Marco Kaltofen.

Did we ever have a hit of beryllium anywhere else in the soil on the facility?

MR. REED: I don't know.

MR. KALTOFEN: Do you have a number for that?

MR. REED: I don't have it with me. I'm sorry.

MR. PICKETT: We can look. I don't really remember any. But we can look.

MR. KALTOFEN: If you don't mind.

MR. PICKETT: We can search database and take a look. I'll make a note.

MR. KALTOFEN: Thank you.

MR. REED: Groundwater -- again this is the Monitoring Well 5 -- some petroleum type compounds, also some chlorobenzene, dichloroethene. Benzene exceeded the drinking water maximum contaminant level of five

micrograms per liter. There were also some metals there. A little iron and manganese were found above what's called secondary MCLs.

Lake surface water in the area of the gym site didn't exceed the criteria that are used to screen for potential risks there. And lake sediments in the area, again close to the gym site, contained several things. Some volatile compounds, semivolatiles, some pesticides, some petroleum compounds, and metals. No PCBs in the sediments from that area.

These lake sediments are grouped in a different operable unit now, the sediment operable unit, and they're being managed separately. If anybody has questions about that, I believe it's going to be discussed next week at the RAB meeting.

Because of the contamination identified at the gym site about 1,200 pounds of soil were excavated in 2002 from an area about 40 feet by 40 feet, ten feet deep, centered around the MW-5 area.

As at the Building 62 and 68, MCP standards were used as clean-up goals. At the end

of the excavation all the soil samples met the criteria, indicating that the soil action was successful in meeting its goals, the soil goals.

I just have a picture here during the excavation. Looks like, again, this is probably taken from -- from Kansas Street looking at a different angle. They excavated it out to a depth of 10 feet, about 40 by 40 square.

Following the removal action, that monitoring well that was in the middle was replaced with MW-5R. Sampling of that well indicated benzene had decreased substantially from 64 micrograms per liter to less than the drinking water standard of five. Several things that were formerly detected in the groundwater were reduced to concentrations less than the MCLs.

A couple of things remained. Some elevated concentrations of nitrate -- nitrate and nitrite -- were identified and attributed to -- are attributed to non-site related sources, such as septic tanks and leach fields located upgradient in the residential community. Also a major source of nitrate, nitrite in groundwater

are fertilizers that people use on lawns or gardens, that sort of thing.

There's also some manganese detected in the groundwater from that well. This is associated with releases from soil. Natural-occurring manganese associated with releases from soil as a result of bacterial activity that goes on there during the degradation of organic compounds. It results in the release of manganese in the soil.

This is a graphic of benzene concentrations in groundwater at wells MW-5 and MW-5R. The point right here, this is before the removal action, and then following the removal action you see a dramatic drop in the groundwater concentrations of benzene. These concentrations here are below the five micrograms standard, signifying that the removal action not only got the soil we talked about a minute ago, but it was also successful in erasing the benzene concentrations.

We'll move on here to quickly talk about potential risks at the site. We'll do the gym site first.

As part of the remedial investigation there's a risk assessment done to evaluate potential risk to humans or ecological risk to wildlife. In the human health risk assessment there were no identified risks that exceeded EPA's risk guidelines, either the cancer guidelines or the non-cancer guidelines.

The groundwater notes that there's no current exposure to groundwater at that area. There's no drinking water wells or anything located at the site. Nobody is using the groundwater and drinking it. There's no cancer risks exceeding the EPA's recommended risk range.

The nitrate, nitrite, manganese do offer potential risk, as was mentioned before. Those are not judged -- judged to be not site-related chemicals.

Ecological risks, surface soil and surface water were thought unlikely to pose risk. Remedial investigation initially identified potential risk to fish and wildlife. There was additional sampling and evaluation done after that. Then looking at all the data as a whole, there are no identified significant risks to

surface water sediment, but these sediments here are, as mentioned before, in the sediment operable unit.

At Buildings 62 and 68 the soil was removed to meet the MCP standards. Did not exceed the MCP standards. Those standards are consistent with EPA's risk management numbers, so when the site meets those MCP numbers it also meets the risk management guidelines.

The preferred alternative for Buildings 62 and 68 is no further action. Soil does not exceed the MCP S-1/GW-1 standards -- those are judged protective standards -- both from the Massachusetts EPA's point of view, and there's no site-related groundwater contamination. Soil removals were already performed. Therefore, there's no need to do further action.

The preferred alternative for the gym site, similarly the preferred alternative is no further action. Soil does not exceed protective standards promulgated by Massachusetts. It's within the EPA's risk management guidelines, and site-related groundwater constituents do not

exceed MCLs.

Next steps, today began the -- I think it's the 31-day public comment period, so beginning at eight o'clock tonight really, the oral comments, then 'til April 16 people can submit comments, written comments, in a letter. There's a form on the back page of the proposed plan. It can be filled out and forwarded -- the addresses are there, both on the back page and on the front page -- to Jim -- I think to Jim Connolly, SSC. There's a fax number where comments can be faxed to Jim Connolly, and it even has his email address in there. You can send an email with those comments.

At the end of the public comment period the comments will be compiled and a responsiveness summary will be prepared in which all the comments -- the comments, at least tonight's comments, will be transcribed. Comments that are received will probably be bound -- receive a letter, that letter will probably be bound into the responsiveness summary, and then there will be written responses prepared by the Army. That responsiveness summary will be part of

the record of decision which will document the selection of a remedy for the two sites.

After the record of decision is prepared it has to be signed by the Army, by U.S. EPA. I believe Massachusetts does not sign it, but they have to concur with its remedy, so in the end it's a joint remedy of the Army, EPA and the DEP.

That was the last slide. That is the last slide. So if people have comments I would like to try to answer any questions or comments right now.

A VOICE: It's not too germane, but it crossed my mind. Does the Army use, in the support of their landscaping and so on, nitrates and nitrites and so on?

MR. REED: I believe that they -- in certain areas they do -- they do some fertilization of lawns, and usually in certain areas -- I don't know the full extent.

MS. WILLIAMS: No, we don't use any fertilizer in that area. We had some up near some of the main buildings, but there's a small amount, and they're all things that will

biologically break down quickly because we're near the water.

A VOICE: Fine. Thank you.

A VOICE: One question on this. On the same topic, is there any plan to deal with the manganese in the groundwater? Because what if, hypothetical, future residential use becomes a reality?

MR. REED: There's no current plans to address groundwater at either of these two sites. There is -- manganese in groundwater is -- manganese is found in groundwater throughout the area at high concentrations, relatively high concentrations naturally around here, and can be exacerbated by other things, but it's common in groundwater in this area.

A VOICE: So why was the presumption of hypothetical future residential use considered?

MR. REED: To be conservative in the risk assessment, that's the scenario that's used.

MS. WILLIAMS: It's standard EPA practice to find out what would happen without any restrictions. That's part of the no-action evaluation.

MR. KALTOFEN: Stan, I know we have a 31-day or 30-day comment period.

MR. REED: April 16.

MR. KALTOFEN: April 16 on this particular issue. But for people who might be here for the first time it's worth pointing out that at all RAB meetings people are always given the opportunity to comment and ask questions about any of the environmental issues at the laboratory. So the fact that there's a 31-day restriction on this particular issue doesn't mean that people can't come and bring up anything they want to related to environmental issues at the labs at the next meeting or any other meeting.

I do have a couple of quick questions, and that way I don't have to actually send in the written thing. Save you some paper.

MR. REED: If you want them to be official --

MR. KALTOFEN: I understand, but an unofficial answer is probably going to be good enough.

I recall that you tested for but did not detect perchlorates at this site. Is that

right?

MR. PICKETT: Perchlorates? No, I don't think so, Marco. I don't believe we did perchlorates.

A VOICE: Didn't they test that in the town of Natick at the other end?

MR. PICKETT: Are you talking about groundwater or soil?

MR. KALTOFEN: I'm talking about groundwater.

MR. PICKETT: Not at this site.

MR. KALTOFEN: Okay. And you were going to get back me on that earlier number. We didn't see it again after the removal of the cores.

MR. PICKETT: No.

MR. REED: If there's no other questions --

MR. KALTOFEN: Stan, I think we're looking at a 22-minute break. Thank you for your presentation.

(Twenty-minute recess.)

MR. MC CASSIE: Good evening. I'm Joel McCassie. I'm the installation co-chair. I would like to call this part of the formal hearing

open.

One of the things that we would like to do, anyone that is speaking will please state their name and their address, because all of the comments will be responded back to you at that address. And all comments that are given during this public hearing will be addressed in writing to the regulatory agencies.

That's pretty much what I have. Do we have anyone that needs to -- is ready to speak, make comments about the former proposed gym site or Buildings 62 and 68?

MR. KALTOFEN: Joel, if I could.

MR. MC CASSIE: Yes.

MR. KALTOFEN: My name is Marco Kaltofen, and I'm the community co-chair of the Restoration Advisory Board. I just wanted to say that it's nice to see one come to closure.

MR. MC CASSIE: Thank you.

MR. KALTOFEN: And that represents my comments.

MR. MC CASSIE: Are there any other comments?

MS. WILLIAMS: You might want to leave

it open.

MR. MC CASSIE: I can formally close the hearing?

MR. MC CASSIE: Well, I would suggest leaving it open. It's just three minutes after eight o'clock. I would suggest leaving it up for ten or 15 minutes.

MR. MC CASSIE: That's fine.

(Twenty-five minute recess.)

MR. MC CASSIE: We're going to quickly reconvene.

The RAB member that we were waiting for does not want to make a comment. I want to remind everyone that written comments need to be in by April 16, and they'll be answered directly to the person and then put in the public record.

If there's no further public comment I call the meeting adjourned. Or, the hearing adjourned.

A VOICE: I just want to say thank you. I was coming to be here, not to comment.

(Proceedings adjourned.)

CERTIFICATION

I, Michael Gruber, hereby certify the foregoing to be a true and complete transcript of the oral evidence presented at the subject hearing.

Shorthand Reporter

DATED: 9/27/07

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