N62269.AR.000719
NAWC WARMINSTER
5090.3a

Department of the Navy

Record of Decision for OU-10

Naval Air Warfare Center

Warminster, Pennsylvania

September 2000

THE DECLARATION

SITE NAME AND LOCATION

Naval Air Development Center
Site 5 Soils and Area B Surface Water and Sediment (Operable Unit 10)
Warminster Township
CERCLIS ID No. PAD6170024545

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for soils and waste at Site 5 and surface water and sediment potentially impacted by Area B (Operable Unit 10 or OU-10), at the Naval Air Development Center (NADC) (the "Site") in Warminster, Pennsylvania. This determination has been made in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the Administrative Record file for the Site.

In January 1993, the Site was renamed as the Naval Air Warfare Center (NAWC) Aircraft Division Warminster. NAWC was disestablished on September 30, 1996 and is targeted for transfer to the private sector.

The Commonwealth of Pennsylvania, as represented by the Pennsylvania Department of Environmental Protection (PADEP), has concurred with the selected remedy for OU-10 (Appendix C).

DESCRIPTION OF THE SELECTED REMEDY

A no action alternative is the selected remedy for OU-10 at the Site. OU-10 consists of soils and waste at Site 5 and surface water and sediment potentially impacted by Area B. Additional stream monitoring will be performed by the Navy to confirm that any potential impacts on stream sediment by Area B (which includes Sites 5, 6, and 7) have been mitigated by previous and ongoing response actions for Area B and attenuation processes.

Groundwater underlying and downgradient of Area B has been designated as Area B groundwater and is being addressed separately under Operable Unit 1B (OU-1B). An interim remedy ROD for OU-1B was issued in September 1993. A final remedy ROD for OU-1B was issued on September 6, 2000 and found no action was necessary for Area B groundwater.

STATUTORY DETERMINATIONS

The No Action remedy selection is based upon a remedial investigation of OU-10 that indicates that no action is necessary at OU-10 to be protective of human health and the environment. A five-year review will not be necessary for OU-10

Orlando J. Monaco
BRAC Environmental Coordinator
Naval Air Warfare Center
Naval Air Warfare Center, Warminster

4/26/00
Date

Abraham Ferdas, Director
Hazardous Site Cleanup Division
U.S. EPA Region III

9/28/00
Date

DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTION

The former Naval Air Development Center is located in Warminster Township and Ivyland Borough, Bucks County, Pennsylvania. The National Superfund electronic database identification number for the Naval Air Development Center is PA6170024545. The Naval Air Development Center was renamed the Naval Air Warfare Center (NAWC) Aircraft Division in January 1993 and was disestablished on September 30, 1996, in response to the requirements of the Base Realignment and Closure Act (BRAC). The Department of the Navy is the lead agency and EPA is the support agency for CERCLA activities at NAWC. The Department of Defense is the source of cleanup monies for NAWC. Soils and waste at Site 5 (hereafter referred to as Site 5 soils) and surface water and sediment potentially impacted by Area B have been identified as Operable Unit 10 at NAWC and are addressed by this ROD. Sites 5, 6, and 7 are located within Area B. Groundwater underlying and downgradient of Area B is being addressed under Operable Unit 1B.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

A. Site History

NAWC is an 824-acre facility located in Warminster Township, Northampton Township and Ivyland Borough, Bucks County, Pennsylvania (see Figure 1). All figures are included as part of Appendix A to this ROD. Per the Base Realignment and Closure Act (BRAC), NAWC ceased operations on 30 September 1996. The majority of NAWC, including Area A, is being transferred to the private sector.

The facility lies in a populated suburban area surrounded by private homes, various commercial and industrial activities, and a golf course. On-base areas include various buildings and other complexes connected by paved roads, the runway and ramp area, mowed fields, and a small wooded area.

The Navy purchased the base, including Site 5, in July 1944. Before the Navy purchase, the property contained an aircraft manufacturing facility operated by the Brewster Aeronautical Corporation. Aircraft manufacturing and modification remained the primary mission at the base until 1949. After 1949, the overall mission of the base underwent a change from a manufacturing operation to a research and development operation. Those activities varied over the years, but they included the development, research, and testing of aircraft components, coatings, electronics, and control devices. Concurrent with these activities, aircraft continued to be used and maintained.

NAWC also conducted studies in anti-submarine warfare systems and software development. Historically, wastes were generated during aircraft maintenance and repair, pest control, fire-fighting training, machine and plating shop operations, spray painting, and various materials research and testing activities in laboratories.

The generated wastes included paints, solvents, sludges from industrial wastewater treatment, and waste oils that were disposed in several pits, trenches, and landfills throughout the facility property. NAWC was listed on the Superfund National Priorities List (NPL) in 1989. This list comprises sites where uncontrolled hazardous substance releases present the most significant potential threats to human health and the environment. Areas reported by the Navy to have been potentially used for disposal of hazardous substances include eight locations covering more than 15 acres. These locations include the following:

- Three waste disposal locations (Sites 1, 3, and 6)
- Two sludge disposal pit locations (Sites 2 and 7)
- Two landfills (Sites 4 and 5)
- One fire training location (Site 8)

These disposal locations have since been grouped within the following areas on NAWC property: Area A (Sites 1, 2, and 3); Area B (Sites 5, 6, and 7); and Area C (Sites 4 and 8). A fourth general area, Area D, primarily includes the main building complex at the base and lies west of Jacksonville Road. (Figure 2 provides the location of these areas.) A Navy housing area currently occupies the location of Site 5, while Sites 6 and 7 are within an area of open space consisting of grass and wood lot. An off-base residential neighborhood borders the Navy housing area to the south. With the exception of portions of Sites 6 and 7, the sites are located within a generally flat-lying area (Figure 3). Area B (i.e., Sites 5, 6, and 7) covers approximately 6.5 acres. A tributary of Southampton Creek is located south of Area B and collects surface runoff from Area B.

Site 5 is contained within a parcel of land that will be retained by a nearby Navy base [Naval Air Station Joint Reserve Base (NAS JRB) Willow Grove]. A housing unit designated as Building 401, paved roadways and walkways, and lawns currently occupies the area of Site 5. Buildings 402 and 403 are immediately adjacent to Site 5. Historical aerial photographs indicate these housing units were constructed within the apparent disposal area after disposal occurred. The remainder of Area B (i.e., Sites 6 and 7) is contained within a parcel of land that has been designated for transfer to the Federal Land Reuse Authority (FLRA) and local municipalities

under a public benefit conveyance (PBC). The re-use plan for Sites 6 and 7, prepared by the FLRA and approved by the local municipalities, identifies recreational use as the designated use for this land.

Site 5 reportedly consisted of up to eight trenches that were used for the disposal of demolition wastes, paints, solvents, scrap metal, aircraft paints, cans and asphalt. These disposal trenches were reportedly within 100 feet of the current location of the Shenandoah woods enlisted housing units located south of the runway, within 700 feet of the inertial navigation facility, and 400 feet from the NAWC property boundary (See Figure 3). The trenches were reportedly operated from 1955 to 1970 and were approximately 12 feet by 70 feet by 8 feet in dimension, and were covered with 2 feet of fill, graded and seeded. As indicated above, in addition to Site 5, Area B includes Sites 6 and 7. Surface runoff from Area B drains to an unnamed tributary to Southampton Creek.

B. Enforcement Activities

No enforcement actions have been taken at Site 5 or for the Area B stream. The Navy has owned the property since 1944 and is the lead agency for CERCLA work at NAWC Warminster.

III. REMEDIAL INVESTIGATIONS AND RESPONSE ACTIONS

A. Remedial Investigations

Remedial investigations addressing NAWC Site 5 and Area B surface water and sediment have been conducted in several phases; Phases I, II, and III of the RI were performed at Area B between October 1989 and December 1999. The RI work for Site 5 focused on characterizing potential sources of contamination. Background information (e.g., reporting of disposal) and analysis of historical aerial photographs by the EPA Environmental Photographic Interpretation Center (EPIC) and the Navy identified these potential sources. Field work included soil gas sampling, geophysical surveys, surface soil sampling and analysis, subsurface soil sampling and analysis, and a wetlands assessment. The subsurface studies included drilling soil borings to determine subsurface conditions. In addition, surface water and sediment sampling and analysis was conducted to evaluate the potential impacts of Area B on surface water and sediment within the unnamed tributary of Southampton Creek.

The Phase I RI was conducted from 1989 through 1991 (SMC Martin, 1991). The investigation activities for Site 5 soils included soil gas sampling, geophysical surveys, air sampling, and soil borings. Area B surface water and sediment were also sampled as part of the Phase I RI.

The Phase II RI included sampling of soils, surface water, and sediment (HNUS, 1992). Based on the findings of the Aerial Photographic Site Analysis Report (EPIC, 1994), a more comprehensive Phase III RI began in 1995. The EPIC study identified two potential waste disposal trenches in the reported area of Site 5 which were designated as TR3 and TR5 (see Figure 3). Phase III RI field activities included sampling and analysis of Site 5 surface soils, subsurface soils, and waste and Area B surface water and sediment. A wetlands assessment was also performed. The results of initial Phase III RI work for Site 5 and Area B surface water and sediment were reported in a draft Phase III RI report, which was issued in November 1996 (Brown & Root Environmental, 1996). Following the review of the draft Phase III RI report, the Navy conducted a supplemental soil investigation in December 1999 to complete RI work for Site 5 soils. The results of RI work for Site 5 soils and Area B surface water and sediment were included in the final RI report for OU-10 dated August 2000 (TtNUS, 2000).

B. Response Actions

No response actions have been taken at Site 5 or to directly address the stream associated with Area B surface water and sediment.

However, in response to the results of the RI work, a removal action was performed at Sites 6 and 7 in 1997. The action included the removal of over 3,500 tons of soil and debris to address subsurface contaminants. In addition, a ROD issued in June 2000 selected a final remedy consisting of a vegetated soil cover and institutional controls for Site 6 and 7 soils (OU-7). The soil cover has been placed and the vegetation of the soil is being completed at this time. As previously noted, runoff from Sites 6 and 7 drains to Area B surface water and sediment.

The results of all RI work addressing Site 5 soils and surface water and sediment potentially impacted by Area B are described or summarized in the RI report for OU-10 issued by the Navy in August 2000 (Tetra Tech NUS, 2000). This report characterizes OU-10 and contains an assessment of any risk posed by OU-10 to human health and the environment.

While the August 2000 RI report assesses the potential impact of Site 5 soils on groundwater quality, the report does not address groundwater underlying and downgradient of Area B, which has been identified as Area B groundwater. Area B groundwater is being addressed under Operable Unit 1B (OU-1B). A final ROD for OU-1B was issued on September 6, 2000 and found that no action was necessary to address Area B groundwater

IV. HIGHLIGHTS OF COMMUNITY PARTICIPATION

In accordance with Sections 113 and 117 of CERCLA, 42 U.S.C. Sections 9613 and 9617, the Navy, in conjunction with EPA, issued a Proposed Plan on August 7, 2000, presenting the preferred remedy for Operable Unit 10. The Proposed Plan and RI report for OU-10 became available for review at the time and are among the documents that comprise the Administrative Record for NAWC Warminster. The Administrative Record is available for review by the public at the following information repositories:

- Northern Division
  Naval Facilities Engineering Command
  Environmental Contracts Branch
  10 Industrial Highway
  Lester, Pennsylvania 19113

- Bucks County Library
  150 South Pine Street
  Doylestown, Pennsylvania 18901

An announcement of the public meeting, the comment period, and the availability of the Administrative Record for the proposed remedy for OU-10 was issued on August 7, 2000 in the Philadelphia Inquirer, Intelligencer, and Courier Times. Additionally, the Proposed Plan and the Notice of Availability were mailed to local municipal and government agencies and residents in the vicinity of the site. A public meeting was held on August 16, 2000. Additional community involvement, including Restoration Advisory Board (RAB) activities, are detailed in Section XI.

V. SCOPE AND ROLE OF OPERABLE UNIT

Section 300.430 (a) (1) (ii) (A) of the NCP, 40 C.F.R. Section 300.340 (a) (1) (ii) (A) provides that CERCLA NPL sites "should generally be remediated in operable units when early actions are necessary or appropriate to achieve significant risk reduction quickly, when phase analysis or response is necessary or appropriate given the size or complexity of the site, or to expedite the completion of a total cleanup." In the case of NAWC Warminster, the Navy has organized work to date into ten (10) operable units (OUs). These OUs are as follows:

- OU-1: Contaminated shallow groundwater attributable to Areas A and B.
- OU-2: Contamination of domestic well water for residences near the base.

- OU-3: Contaminated groundwater attributable to Area C.
- OU-4: Contaminated groundwater attributable to Area D.
- OU-5: Soils, sediment, and surface water associated with Site 8 at Area C.
- OU-6: Soils, sediment, and surface water associated with Site 4 at Area C.
- OU-7: Soils and wastes associated with Sites 6 and 7 at Area B.
- OU-8: Soils associated with Area D.
- OU-9: Soils, surface water, and sediment associated with Area A.
- OU-10: Site 5 soils and surface water and sediment potentially impacted by Area B.

The interim remedy for OU-1 was signed on September 30, 1993, and addressed contaminated groundwater in overburden and shallow bedrock attributable to Areas A and Area B. Subsequent to the issuance of the OU-1 ROD, the Navy and EPA conducted a removal action, providing water treatment system and public water connections to residences in the vicinity of the base. This removal action was designated as OU-2. Due to the time-critical nature of the removal action, a ROD was not issued for OU-2.

The ROD for OU-3 (Area C groundwater) was signed on March 10, 1995, while an interim ROD for OU-4 (Area D groundwater) was signed on September 29, 1997. Since the issuance of the RODs for OU-1, OU-3, and OU-4, a groundwater treatment plant was constructed within Area A and the cleanup of contaminated groundwater attributable to Area A, Area C, and Area D has begun.

The ROD for OU-5, which addressed soils, sediment, and surface water associated with Site 8, called for no further action at the site. It was signed on September 30, 1999. A no further action ROD for OU-6 (Site 4 soil, sediment, and surface water) was signed on June 19, 2000. The RODs for OU-7 (Sites 6 and 7 soils and wastes) and OU-8 (Area D soils) were signed on June 20, 2000 and June 22, 2000, respectively. The final remedy ROD for OU-4 (Area D groundwater) and the ROD for OU-9 (Area A soils, surface water, and sediment) were both signed on June 26, 2000. A final remedy ROD for Area B groundwater (OU-1B) was signed on September 6, 2000. A final remedy ROD for Area A groundwater (OU-1A) is being prepared at this time.

The tenth operable unit (OU-10), the subject of this ROD, consists of Site 5 soils and surface water and sediment in the vicinity of Area B. This ROD documents a No Action determination for OU-10 based on the results on the RI and baseline risk assessment. This is the last OU for the Site.

VI. SITE CHARACTERISTICS

Soils at Site 5 extend to a depth of 4 to 14 feet, where weathered bedrock is encountered. The soils at the site primarily consist of silt loam with slow to moderate permeability.

Surface topography across parts of Sites 6 and 7 slopes toward Site 5 (see Figure 4). The slope across Site 5 is about 3 percent. Stormwater collecting in the vicinity of Site 5 is designed to be collected by two stormwater drains. The collected stormwater is then piped underground to Outfall No. 11 (OF11) at the south-central NAWC Warminster property boundary. OF11 also collects surface runoff in the form of sheet flow from Area B as well as surface and subsurface flows from the vicinity of Building 108. The flow from Building 108 enters a 250-foot drainage swale before reaching OF11.

From OF11, stormwater flows to the south in a subsurface channel for 500 feet, where the stormwater is discharged to a surface concrete channel. The surface concrete channel flows through a residential subdivision for about 1,000 feet and through a road culvert before flowing into a streambed. This stream flows through a shaded 250-foot reach before entering a small and shallow off-base pond, which overflows into a second small pond, which in turn flows into Southampton Creek. The base flow rate was measured as 98 gallons per minute immediately below the road culvert during the RI. Minimal flow and virtually no biotic component were observed within the approximately 1,000-foot length of the surface concrete channel during the RI.

Several wetlands occur downstream along Southampton Creek south of the Area B. These wetlands are primarily palustrine, forested, broad-leaved deciduous, and temporary. There are no known critical habitats of endangered species located within 1 mile of Area B.

The climate of the area is humid continental and is modified by the Atlantic Ocean. Temperatures average 76°F (24.4°C) in July and 32°F (0°C) in January. The average daily temperature for the NAWC location is 53.3°F (11.8°C). Precipitation averages 42.5 inches per year (106.25 cm per year), and snowfall averages 22 inches per year (55 cm per year). The distribution of precipitation is fairly even throughout the year. The relative humidity for the Site averages 70 percent. The mean wind speed for this area is 9.6 mph, with a prevailing direction of west-southwest.

VII. NATURE AND EXTENT OF CONTAMINATION

The potential sources of contamination at Site 5 include disposal trenches TR3 and TR5 identified by EPIC as well as additional potential trenches immediately north of and parallel to TR5 identified by evaluating aerial photographs. For purposes of the RI, these additional trenches have also been identified as part of TR5. The locations of TR3 and TR5 are consistent with the reported locations of disposal in this area. As noted earlier, in addition to Site 5, Sites 6 and 7 also may have potentially impacted surface water and sediment in the unnamed tributary of Southampton Creek (i.e., Area B surface water and sediment). In this case, other disposal features associated with Sites 6 and 7 (pits and trenches used for waste disposal) were also briefly evaluated with regard to assessing potential impact on Area B surface water and sediment.

Surface and subsurface soil samples at Site 5 were collected at potential source areas based on a review of soil gas sample results, historical aerial photography, and other supporting information (e.g., record reviews, interviews with current or former employees). Samples of Area B surface water and sediment samples were taken. Background samples were also obtained to compare the resultant analytical data to site-related analytical results. Analytical results for soils were compared to federal and state residential risk-based soil screening criteria (RBCs) and soil screening levels (SSLs) for the soil-to-groundwater migration pathway. Surface water and sediment analytical results were compared to appropriate ecological screening criteria. Surface and subsurface soil concentrations were compared to residential RBCs to identify any contaminants of potential concern (COPCs).

A. Site 5 Soils

Based on observations during the RI, the area of TR3 and TR5 has been used for subsurface disposal of waste and placement of fill material. Based on soil borings, buried waste materials at Site 5 are in place at 2 to 10 feet below the ground surface. Fill material placed at Site 5 occurs at 3.5 to 8 feet below the ground surface. (See Figure 5 for locations of all soil borings.)

Wastes were found north, east, and south of Building 401 and west of Building 403. The wastes included ash, wood, glass, cardboard, paper, tree limbs, roots, brick fragments, wire, charcoal, and scrap metal pieces in a matrix of fill material. Waste observations suggest that subsurface disposal did occur as reported. However, the pattern of subsurface wastes observed during the RI was not an indication of discrete linear trenches filled with waste. Rather, the wastes appeared to be scattered within the subsurface area of disposal, suggesting that the wastes were either not disposed in linear trenches or that the contents of the trenches had been moved since placement.

The latter interpretation would be consistent with reports that some waste was encountered and removed during construction of the housing area. However, there are no records available regarding what was observed or removed during the construction. A portion of buried waste associated with trench TR3 appears to lie under Building 401; this portion could not be investigated during the RI.

A total of 36 surface soil and 55 subsurface soil samples were sampled in the area of Site 5 as part of the RI (see Figure 5 for subsurface soil locations and Figure 6 for surface soil locations). Table 1 in Appendix B provides the occurrence and distribution of organics and inorganics in Site 5 surface soils. The highest volatile organic compound detections in surface soils were found within the area of trench TR5. Low levels of TCE (ranging from 5 to 31.5 ug/kg) were found in about 15 percent of the surface soil samples. Benzene, toluene, and xylene were also detected at very low levels in at least one sample.

A variety of semivolatile organic compounds [including polycyclic aromatic hydrocarbon (PAHs) and phthalates], pesticides, and polychlorinated biphenyls (PCBs) were detected in some surface soil samples. Most contaminant levels were at low levels and did not exceed risk-based soil screening concentrations (RBCs) for residential land use. Only copper (in one sample), lead (two samples), vanadium (two samples), benzo(a)pyrene (two samples), and the PCB Aroclor-1254 (three samples) were contained in samples at levels greater than RBCs protective of residential land use (see Figure 7 for the nature and location of residential RBC exceedances in surface soils). The highest surface soil concentrations for lead, vanadium, and Aroclor-1254 (a polychlorinated biphenyl or PCB) were contained in samples collected beneath asphalt roadways. An elevated level (24,000 ug/kg) of Aroclor-1254 was reported for one sample collected west of Building 403 and beneath Skyhawk Drive. However, this compound was not detected at levels exceeding the RBC in other samples collected within 25 feet of this sample location.

Several metals were also found in surface soil samples at levels above background and residential RBCs. No consistent pattern of inorganic soil contamination was identified. While the presence of certain organic and inorganics above RBCs may be related to disposal operations, the sampling results do not suggest that any exceedance is representative of a substantial area of surface soil. The highest metal concentrations were from the middle and eastern ends of trench TR5. Figure 7 indicates the locations of samples where specific surface soil levels exceeded screening criteria protective of residential land use.

Table 2 displays the occurrence and distribution of organics and inorganics in Site 5 subsurface soils. The only organic compounds detected above residential RBCs were Aroclor-1254 (in two

samples) and several polynuclear aromatic hydrocarbons (PAHs) in one sample. Figure 8 indicates the locations of samples where subsurface soil contaminant levels exceeded RBCs.

Several metals were detected in subsurface soils at concentrations above background and residential soil levels in portions of trenches TR3 and TR5, as well as outside the approximate boundaries of these trenches. The presence of these compounds may be related to disposal operations at the site. Arsenic, copper, lead, and vanadium concentrations all exceeded their respective RBCs at one or more subsurface sample locations. Lead exceeded residential RBCs at 5 sample locations, all within the western third of the area investigated (see Figure 8).

B. Area B Surface Water

Surface water sample locations are indicated in Figure 9. Tables 3 and 4 summarize the occurrence and distribution of total inorganics and organics in the samples collected during the RI. Figure 10 indicates sample results that exceeded Ambient Water Quality Criteria (AWQCs) protective of aquatic life developed pursuant to the Federal Clean Water Act. Only manganese exceeded AWQCs. Only one exceedance for manganese was detected.

C. Area B Sediment

Sediment sample locations are indicated in Figure 9. Tables 5 and 6 summarize the occurrence and distribution of inorganics and organics in the sediment samples collected during the RI. Many of the detected concentrations exceeded available screening criteria indicative of a potential risk of concern to ecological receptors. These exceedances are indicated in Figure 11.

Exceedances at multiple sample locations were found for a group of PAHs. Other organics detected at notably high concentrations were DDT and n-nitrosodiphenylamine. While Aroclor-1260, a PCB, was detected at 1,900 ug/kg in a sample from the drainage swale collecting flow from the area of Building 108, further sampling in this swale detected Aroclor-1260 levels of 270 to 580 ug/kg in three samples.

VIII. CURRENT AND POTENTIAL FUTURE SITE AND RESOURCE USES

Site 5 is located in the southeastern portion of NAWC and is within an enlisted person's housing area to be retained indefinitely by the Navy. Area B surface water and sediment are located off-base within a residential area that also includes wooded areas and wetlands.

IX. SUMMARY OF SITE RISKS

As part of the OU-10 RI, a risk assessment was conducted with available data to estimate the potential risks posed to human health and the environment by Site 5 soils and Area B surface water and sediment.

Potential human health risks are categorized as carcinogenic or noncarcinogenic. A hypothetical carcinogenic risk increase from exposure should not exceed a risk range from 1×10^{-6} (an increase of one case of cancer for one million people exposed) to 1×10^{-4} (one additional case per 10,000 people exposed). Noncarcinogenic risks are estimated utilizing Hazard Indices (HI), where an HI exceeding one is considered an unacceptable health risk. In addition, health risks posed by lead are assessed by estimating the percentage of child residents who may have a blood lead level of 10 micrograms per deciliter (ug/dl) or greater. This percentage is estimated by applying an Integrated Exposure and Uptake Biokinetic (IEUBK) Model. An estimate of 5 percent or less is considered acceptable.

As part of the RI, a risk assessment was conducted with RI sampling data to estimate the potential risks to human heath posed by Site 5 soils and surface water and sediment associated with Area B stream. To assess these risks, the potential exposure scenarios identified below were assumed.

- Ingestion of soils (both surface and subsurface).
- Dermal contact with soils.
- Inhalation of fugitive dusts associated with soils.
- Ingestion and dermal contact with surface water and sediment.

A. Summary of Human Health Risk Assessment

The human health risk assessment estimates the risks posed to human health by Site 5 soils and Area B surface water and sediment if no action is taken and identifies any contaminants and exposure pathways of concern. This section of the ROD summarizes the results of this human health risk assessment.

B. Identification of Contaminants of Potential Concern

The tables in Section VII (Nature and Extent of Contamination) of this ROD summarize the range of detected concentrations (minimum and maximum) and the frequency of detection of hazardous substances in surface soils and subsurface soils for Site 5, as well as Area B surface water and sediment. In the case of each hazardous substance detected in each medium, these tables also

identify a representative concentration, which is the lower of the upper 95% confidence limit (UCL) of the mean concentration and the maximum concentration detected. These representative concentrations are the exposure point concentrations that were used to estimate risk to human health. The exposure point concentrations (EPCs) for Site 5 soils were compared to soil screening levels protective of residential land use. Tables 7 and 8 identify the contaminants of potential concern (COPCs) for surface and subsurface soils. COPCs in surface water were chosen based on their occurrence and distribution, mobility, persistence, and toxicity.

C. Exposure Assessment

For Site 5 soils, the human health risk assessment was conducted assuming residential use of the property. In addition, while industrial use of the property is not reasonably anticipated, potential risks under industrial use were also assessed. Current and future users were evaluated for exposure to surface soil (0 to 2 feet in depth) and subsurface soils [2 feet to maximum depth of contaminant (up to 15 feet below ground surface)]. In assessing risks posed by subsurface soils, it was assumed that these soils may be displaced to the surface (e.g., through excavation) and that resulting surface contaminant concentrations would be half the representative concentrations detected in the subsurface soils.

Current and future recreational children were also assessed for exposure to surface water via wading and to sediment via ingestion and dermal contract

D. Toxicity Assessment

The toxicity assessment characterizes the nature and magnitude of potential health effects associated with human exposure to COPCs. Quantitative risk estimates for each COPC and exposure pathway are developed by integrating chemical-specific toxicity factors with estimated chemical intakes discussed in the previous section.

Quantitative risk estimates are calculated using cancer slope factors (CSFs) for COPCs exhibiting carcinogenic effects and reference doses (RfDs) for COPCs exhibiting systemic (noncarcinogenic) effects. The RfDs and CSFs used in the human health risk assessment are presented in the RI report for OU-10.

CSFs and RfDs are based on ingestion (oral) or inhalation routes of exposure rather than dermal contact. Therefore, these values reflect administered doses rather than absorbed doses.

E. Risk Characterization

Excess lifetime carcinogenic risks are quantified by multiplying the intake level and the CSF. These risks are probabilities that are generally expressed in scientific notation (e.g., 1×10^{-6}). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a plausible upper bound, an individual has a one in one million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime, under the specific exposure conditions. Noncarcinogenic risks were estimated utilizing Hazard Indices (HI), where an HI exceeding one is considered unacceptable.

1. Site 5 Surface and Subsurface Soils

The area of Site 5 is expected to continue to be used for residential purposes. Risks posed to human health by surface and subsurface soils at Site 5 were evaluated assuming residential as well as potential industrial use. Tables 9 through 24 provide the estimated incremental carcinogenic and noncarcinogenic risks for the child resident and adult resident contact with Site 5 surface and subsurface soils through ingestion, dermal contact, and particulate dust inhalation. Tables 25 through 28 estimate the incremental carcinogenic risks for the lifetime resident. Table 29 summarizes these results. The highest carcinogenic risk estimated by the risk assessment identified a risk of 1.2×10^{-5} for a lifetime resident exposed to subsurface soils (Table 29). This carcinogenic risk is well within the acceptable risk range. Therefore, carcinogenic risks associated with both surface and subsurface soils are acceptable.

The highest non-carcinogenic risks for surface soil were to a residential child and estimated to correspond to a Hazard Index (HI) of 1.4. The principal substance contributing to this HI was manganese. In this case, the contribution to the HI was 0.38 and the target organ was the central nervous system. No other substances contributed more than 0.2 to the HI. To further evaluate whether the noncarcinogenic risks posed by surface soils to a residential child was unacceptable, non-carcinogenic risks were identified by target organ. This evaluation found that in no case did the HI for any target organ exceed one. As a result, non-carcinogenic risks posed by surface soils to residential children are considered acceptable. Non-carcinogenic risks posed by surface soils to residential adults correspond to an HI of less than one and are also acceptable

The highest non-carcinogenic risks for subsurface soil were to a residential child and estimated to correspond to a Hazard Index (HI) of 2.9. The principal substances contributing to this HI were iron (1.3, where the target organs are the liver and pancreas), manganese (0.45, where the target organ is the central nervous system), and copper (0.23, where the target organ is the

gastrointestinal tract). No other substances were found to contribute more than 0.2 to the HI. To further evaluate whether the noncarcinogenic risk to a residential child was unacceptable, non-carcinogenic risks were identified by target organ. This evaluation found that, as noted above, the HI of 1.3 for both the liver and the pancreas was attributable to iron. However, iron is an essential nutrient, there is uncertainty regarding available toxicity criteria for iron, and the estimated HI in this case is only marginally above the acceptable level. Under these circumstances, iron in Site 5 subsurface soils is not considered to present a non-carcinogenic risk to children. In no other case, was an HI for a target organ estimated at greater than one for residential child exposure to subsurface soils. In addition, in no case, was an HI of greater than one calculated for residential adult exposure to subsurface soils. As a result, non-carcinogenic risks posed by subsurface soils at Site 5 are acceptable.

An assessment of risk posed by lead in Site 5 soils found that the estimated percentage of children with a blood level of 10 ug/l was 0.10 percent for those exposed to surface soils and 0.09 percent for those exposed to subsurface soils. In each case, the estimated percentage was below the protective level of 5 percent and therefore acceptable.

An evaluation was also performed to determine if groundwater quality is threatened by Site 5 soils. As part of the RI, contaminant concentrations in Site 5 soils were compared to EPA soil screening levels protective of groundwater quality. Only thallium, silver and methylene chloride exceeded these criteria (Table 30). However, a final ROD for Area B groundwater has determined that no substances in Area B groundwater present an unacceptable risk. In this case, Site 5 soils should not present a threat to groundwater quality.

2. Area B Surface Water and Sediment

An evaluation of potential risks posed to children by surface water and sediment impacted by Area B also found that carcinogenic and non-carcinogenic risks were well within the acceptable range. Tables 31 through 34 provide the estimated incremental carcinogenic and noncarcinogenic risks for the future child recreational receptor regarding exposure to Area B surface water and sediment.

F. Summary of Ecological Risk Assessment

As part of the RI, a screening ecological risk assessment was performed to identify whether Area B surface water and sediment presented a potential for adverse impact to the environment. Risks presented to aquatic and semi-aquatic receptors were evaluated.

The focus of the ecological risk assessment was a portion of Southampton Creek and its headwaters that receive runoff, channelized stormwater, and discharges from Area B. The discharges from the stormwater collection systems within Area B comprise a substantial portion of the headwaters of the creek. (See Section VI of this ROD for a detailed description of the surface drainage pathway.) The initial surface drainage channel of 1,000-foot length is composed of concrete. Aquatic habitat increases in quantity and quality south of the point where the concrete channel enters the natural streambed.

Ecologically based benchmark toxicity values (BTVs or "benchmarks"), which are concentrations of contaminants in various media protective of ecological receptors, were selected to screen EPCs for COPCs in surface water and sediment to determine if they should be retained as COPCs. Tables 35 through 38 present the ecological COPCs in Area B surface water and sediment. Benchmark values used to identify surface water COPCs were chronic screening values, primarily federal ambient water quality criteria (AWQCs). BTVs for sediment-dwelling organisms were gathered from the most widely accepted EPA Region III guidance, primarily effects range-low (ER-L) values from the National Oceanic and Atmospheric Administration (NOAA). The ratio of the surface water or sediment exposure point concentration to the benchmark value is called the ecological effects quotient (EEQ).

When the ratio of the EPC to its respective benchmark value exceeds 1.0, adverse impacts are considered possible. In these cases, additional evaluation is necessary to assess risk because most BTVs are conservatively derived.

Surface water downstream of Area B was estimated to present a very low potential risk. All EEQs for surface water were less than 1 (Tables 35 and 36)

Numerous substances is sediment downstream of Area B were found to be COPCs (Tables 37 and 38). The EEQ values based on maximum concentrations for several sediment inorganics were indicative of low potential risk, but most of the inorganic EEQs only slightly exceeded 1.0. Based on maximum concentrations, EEQ values for several PAHs, two phthalate compounds, n-nitrosodiphenylamine, and DDE in sediments were indicative of low to moderate potential risk, while EEQ values for DDT and Aroclor-1260 were indicative of high potential risk. Aroclor-1260 was found only in sediment samples from the drainage swale collecting flow from the area of Building 108 and leading to Outfall No. 11. Aroclor-1260 concentrations decreased in distance away from the head of the swale appeared to be confined to the swale.

A screening food-web model was used to further evaluate ecological risks to semi-aquatic receptors. The representative upper-level receptors included the raccoon, marsh wren, mallard, and green heron. For the raccoon, both thallium and vanadium had estimated ecological hazard quotients (HQs), which indicated a moderate potential risk (Table 39). For all other COPCs, the HQs based on detected concentrations were at or below 3 with most values at or below 1.

For the three birds evaluated (i.e., marsh wren, mallard, and green heron), HQ values exceeded unity for at least one species with regard to Aroclor-1260, bis(2-ethylhexyl)phthalate, chromium, DDE, DDT, lead, and zinc. Only the HQs associated with DDT suggested a moderate potential risk.

With the exception of the drainage swale leading from Building 108, surface water and sediment sampled as part of the RI also receive drainage from residential areas south of NAWC. Based on available data, the relative contribution of Area B and the Site to concentrations detected in the surface water and sediment cannot be fully distinguished from levels attributable to non-Site related sources within these residential areas. For example, runoff from road surfaces may contain PAHs and may be a source of PAHs detected in the sediment samples collected. It is also notable that all estimated high potential risks were based on sample results for sediments collected from a concrete channel. Estimated risks for COPCs in the sediment of the natural streambed were estimated as low to moderate and were primarily attributable to PAHs that may or may not be associated with Area B.

While the RI found that Area B sediment presented potential risks of concern to ecological receptors, the estimated potential risks may be attributable to non-Site related sources and not representative of potential risks posed by sediment to receptors in the streambed. In addition, the sediments of interest have not been characterized since the completion of a removal action at Sites 6 and 7 (i.e., the excavation and disposal of contaminated soils and wastes), and a remedial action consisting of a vegetated soil cover at Sites 6 and 7 is being constructed at this time (see ROD for OU-7). Based on available information, these response actions are projected to mitigate any potential unacceptable risks presented by sediment potentially impacted by Area B. In this case, no action is necessary to directly address the sediments of concern.

X. SELECTED REMEDY

Based on the risk assessment, Site 5 soils and Area B surface water and sediment do not present an unacceptable risk to human health or the environment. In this case, the Navy and EPA select a remedy of no action for these media. The Navy and EPA believe that this remedy is protective of human health and the environment. There are no costs associated with this remedy. Additional stream monitoring will be performed to confirm that any future impacts on sediment by Area B have been mitigated by previous and ongoing response actions. A workplan describing the confirmation sampling and analysis program will be developed, submitted to EPA and PADEP for comment, and implemented to achieve the confirmation monitoring goals. This workplan will, at a minimum, require the periodic collection and analysis of sediment samples. For each stream monitoring event, a report summarizing the results of the confirmation monitoring will be prepared and submitted to EPA and PADEP for comment.

XI. RESPONSIVENESS SUMMARY

In a Proposed Plan released for public comment on August 7, 2000, the Navy, with the support of the EPA, identified No Action as the preferred remedy for OU-10. A public comment period on the Proposed Plan was open from August 7, 2000 through September 5, 2000. A public meeting was held on August 16, 2000 to present the Proposed Plan for OU-10 and to solicit any verbal comments on the Proposed Plan. No comments were received during the meeting. Written comments received during the public comment period are contained in Appendix D.

This Responsiveness Summary presents a review of the community involvement in the CERCLA process at NAWC and provides a summary of the comments received during the public comment period for OU-10 along with responses to those comments.

A. Background on Community Involvement

The Navy and NAWC Warminster have had a comprehensive public involvement program for the last ten years. The Navy organized a Technical Review Committee (TRC) in January 1989 to review and discuss NAWC CERCLA issues with local community officials and concerned citizens. The TRC was reorganized into the Restoration Advisory Board (RAB) in November 1993. The RAB consists of representatives of the Navy, EPA, PADEP, the Bucks County Health Department, the Northampton Township Municipal Authority, the Warminster Township Municipal Authority, Ivyland Borough, and Upper Southampton Township, as well as members of the community and concerned environmental organizations.

In 1994, the Navy prepared a Community Relations Plan for environmental activities at the base. Community relation activities have been conducted in accordance with this plan. These activities have included regular technical and restoration activity meetings with local officials, communications with the media and the establishment of information repositories. The RAB and a technical subcommittee (TSC), consisting of representatives from the RAB, have met on a regular monthly basis since its formation. The RAB has been assisting in the planning and review of environmental investigation, remedial alternative evaluation, and remediation activities, along with future land use planning. The RI/FS and the Proposed Plan for OU-9 were discussed at the RAB meetings.

RAB meeting minutes along with reports presenting the results and findings of investigations are maintained in two local information repositories that contain the Administrative Record for NAWC Warminster. One repository is located at the Naval Facilities Engineering Command Office (Northern Division) located at 10 Industrial Highway, Lester, Pennsylvania. The other repository is located in a local library; Bucks County Library located at 150 South Pine Street, Doylestown, Pennsylvania.

Community relation activities for OU-10 include the items below:

- The documents concerning the investigation and analysis at OU-10 were presented in RAB and TSC meetings and draft copies of RI documents were provided to all RAB members for review, discussion, and comment.

- The documents concerning the investigations and analysis at OU-10, as well as a copy of the Proposed Plan, were placed in the information repositories.

- The Navy mailed copies of the Proposed Plan to about 400 local area residents whose names appeared on the RAB mailing list.

- Newspaper announcements on the availability of documents and the public meeting and comment period were published in the *Bucks County Courier Times, Philadelphia Inquirer,* and *Intelligencer.*

- The Navy established a 30-day public comment period starting August 7, 2000 and ending September 5, 2000.

- A Public Meeting was held on August 16, 2000 to present the Proposed Plan and to answer questions concerning OU-10. Approximately 10 people, including representatives of the local municipalities, attended the meeting.

B. Summary of Comments and Responses

The local community and representatives of local municipalities did not express significant concern regarding the preferred No Action alternative presented in the Proposed Plan. One commentor expressed concern about the proposed no action remedy; these comments are provided below. The Navy and EPA have taken these concerns into consideration and believe that No Action adequately and appropriately addresses the contamination associated with OU-10 in a cost effective and responsible manner.

Comment 1: One commentor was not satisfied with the proposed no action remedy for Site 5 soils. In order to protect the health and safety of present and future residents, the commentor recommended that contaminated soils at Site 5 should be permanently removed.

Response 1: As part of the remedial investigation, a comprehensive risk assessment was conducted with available RI sampling data to estimate the potential risks posed to human health and the environment by Site 5 soils and surface water and sediment potentially impacted by Area B. Both carcinogenic and noncarcinogenic human health risks were evaluated under a set of potential exposure scenarios, including ingestion of Site 5 surface and subsurface soils, dermal or direct contact with Site 5 soils, and inhalation of fugitive dusts associated with these same soils. The risk assessment determined that carcinogenic and non-carcinogenic risks associated with both surface and subsurface soils at Site 5 were acceptable for residential children, residential adults, lifetime residents, and adult workers. Thus, it is not necessary to remove the Site 5 soils to protect human health.

Comment 2: One commentor expressed concern with the no action remedy proposed for surface water and sediment potentially impacted by Area B. The commentor recommended that a permanent stormwater management system, consisting of collection basins and drainage contouring, should be constructed instead.

Response 2: The human health risk assessment evaluated potential risks to children by surface water and sediment impacted by Area B. Carcinogenic and noncarcinogenic risks were evaluated for an adolescent child exposed to the stream via wading. These risks were well

within the acceptable range. Thus, it is not necessary to address the Area B stream to protect human health.

The assessment of ecological risks found that while Area B sediment presented potential risks of concern to ecological receptors, the estimated ecological risks may be attributable to non-Navy property and not representative of potential risks posed by sediment to receptors in the streambed of Southampton Creek and its unnamed tributaries. ~~While~~ the sediments of interest have not been characterized since the completion of a removal action at Sites 6 and 7 (i.e., the excavation and disposal of contaminated soils and wastes), and a remedial action consisting of a vegetated soil cover at Sites 6 and 7 is being constructed at this time (see ROD for OU-7). Based on available information, these response actions are projected to mitigate any potential unacceptable risks presented by sediment potentially impacted by Area B. In this case, no action is necessary to directly address the sediments of concern. Additional stream monitoring will be conducted to confirm that any potential unacceptable risks have been mitigated.

In addition,

APPENDIX A

FIGURES

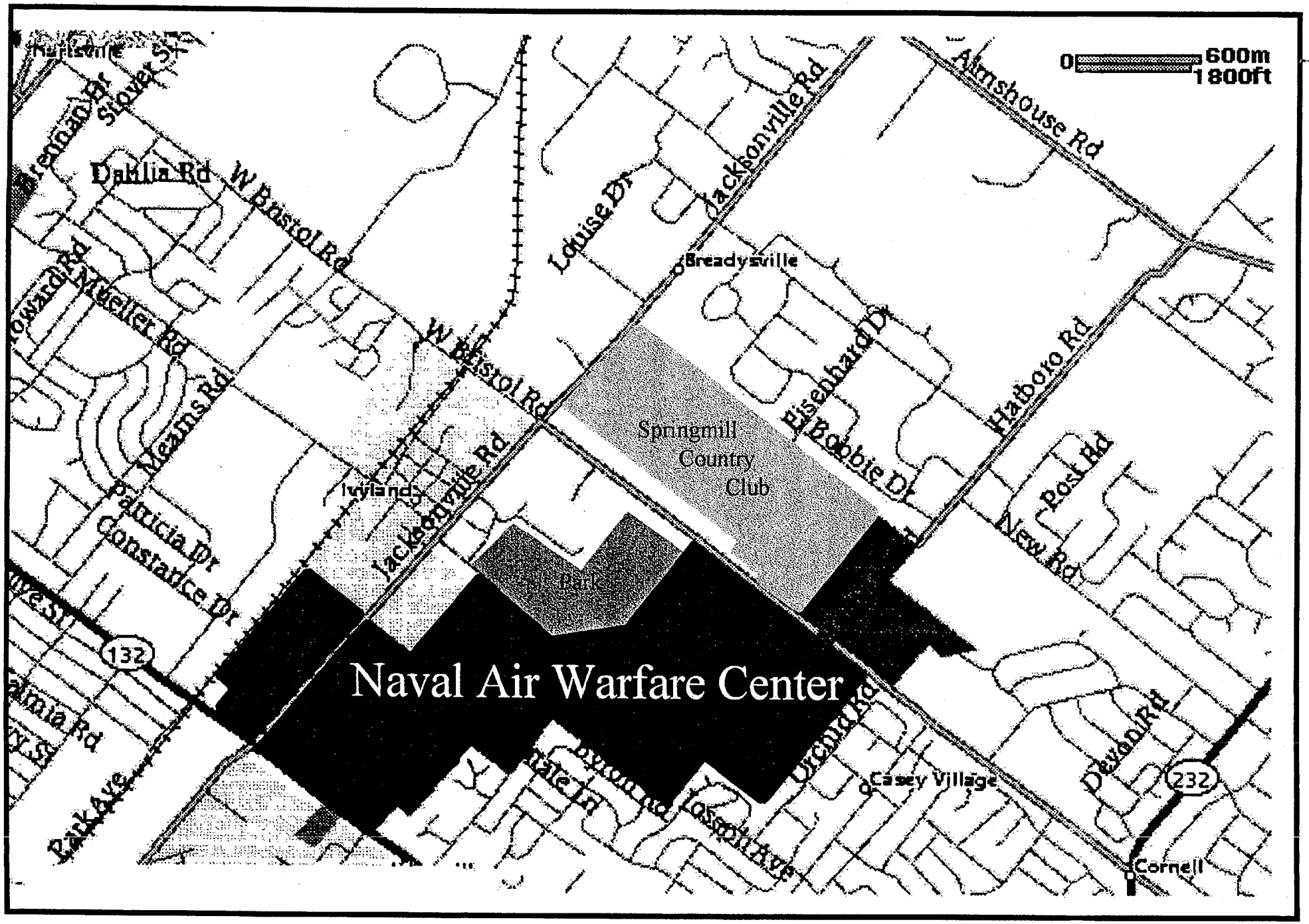


Figure 1. The former NAWC, Warminster, PA

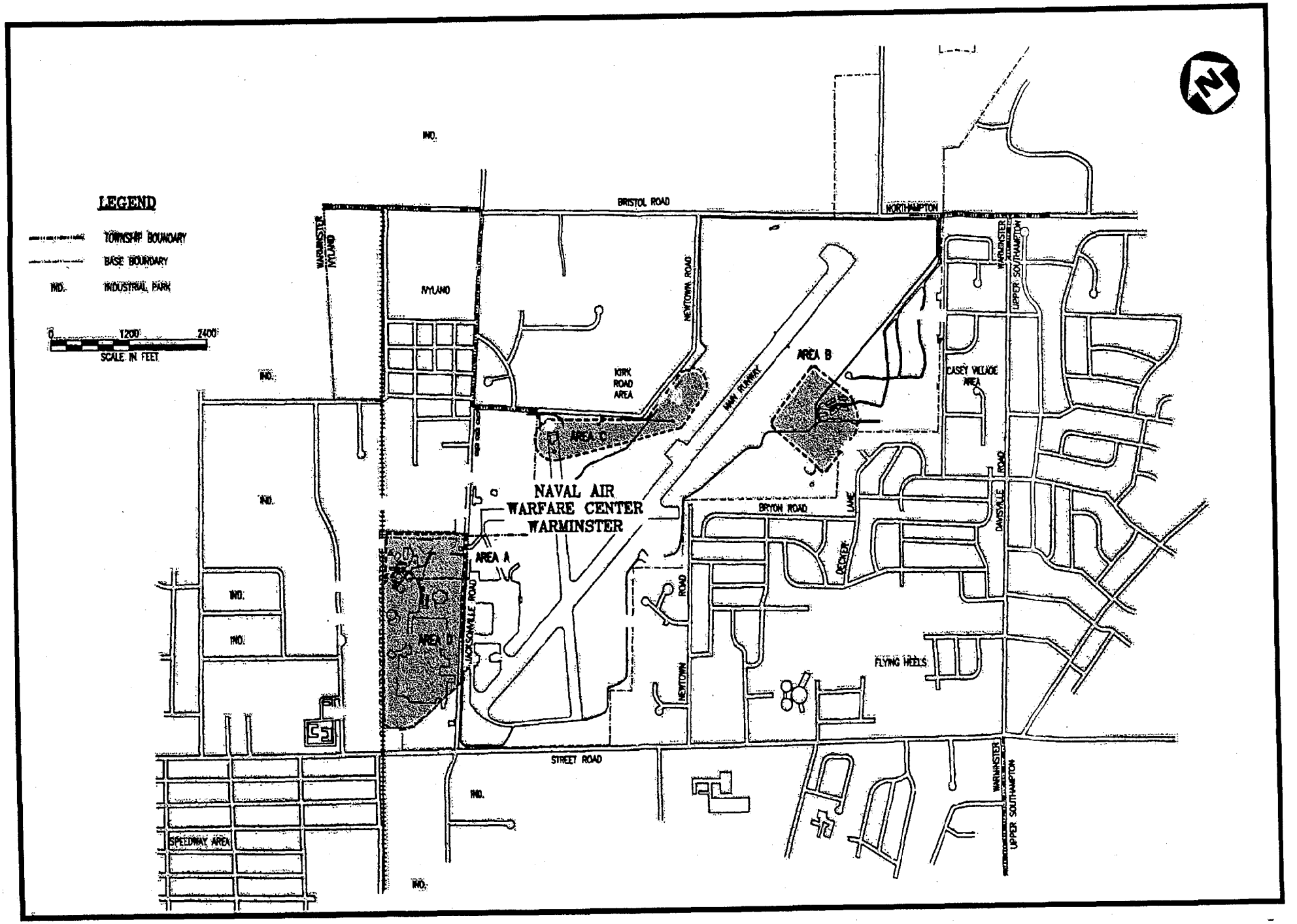
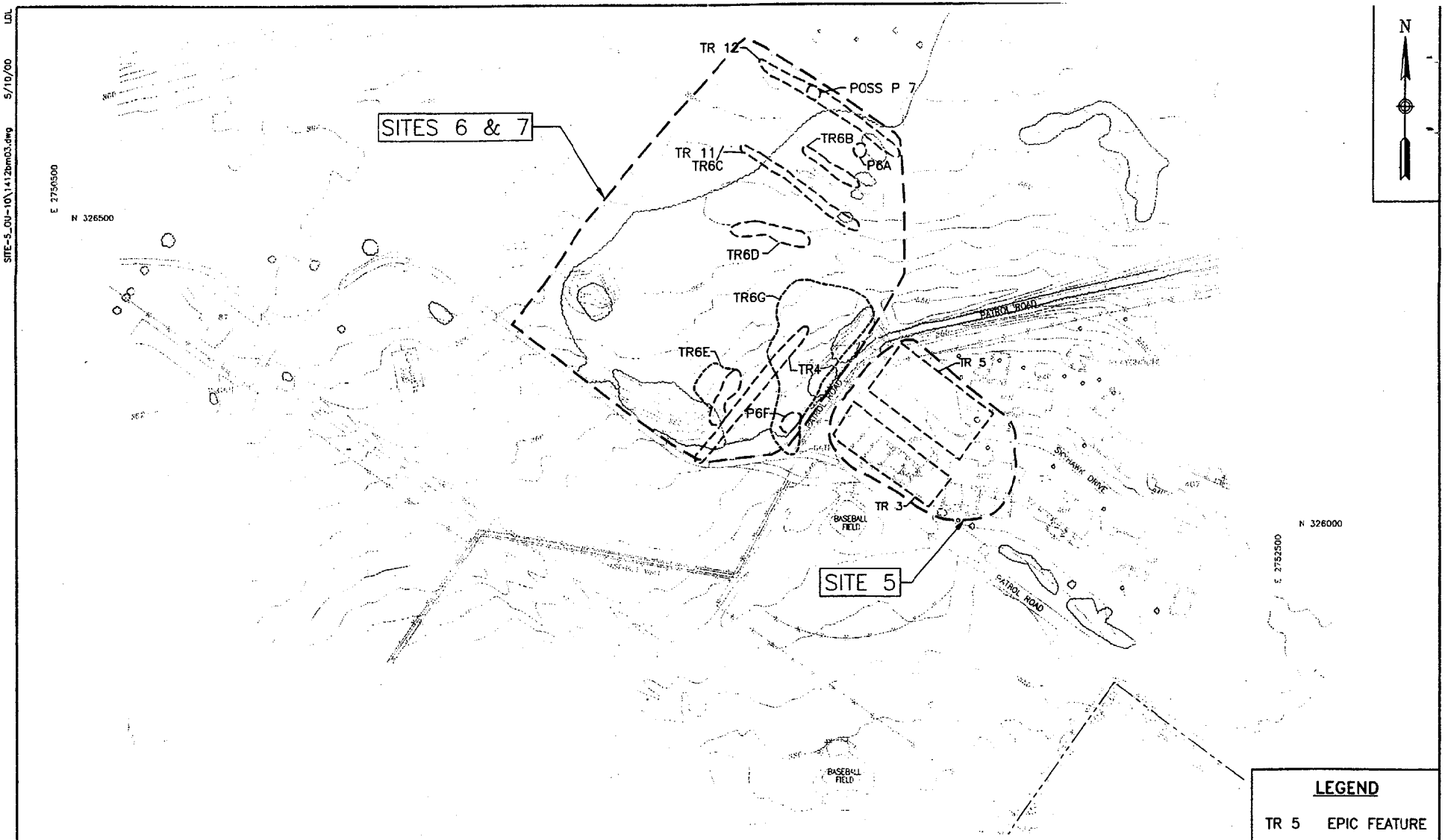


Figure 2. NAWC Site Location Map



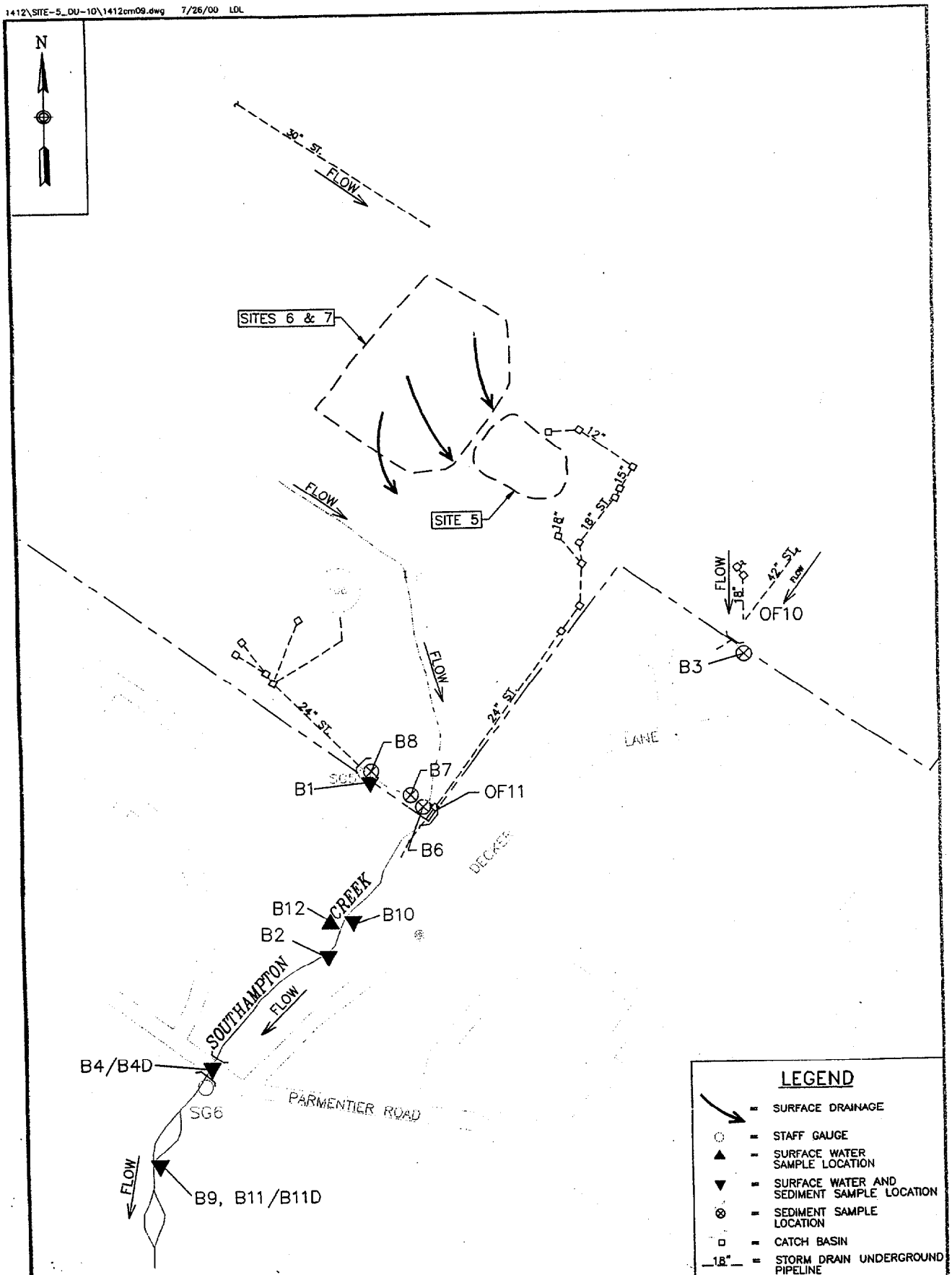
DRAWN BY LDL DATE 7/7/00	Tetra Tech NUS, Inc.	AREA B LAYOUT FORMER NAWC WARMINSTER WARMINSTER, PENNSYLVANIA	CONTRACT NO. 1412
CHECKED BY DATE			OWNER NO. 6010
REVISED BY DATE			APPROVED BY DATE 12 Jul 00
SCALE AS NOTED			DRAWING NO. REV.

FIGURE 3

SITE-5_OU-10\1412bm03.dwg 5/10/00 LDL

1412bm03.dwg

1412\SITE-5_DU-10\1412cm09.dwg 7/26/00 LDL



0 300 600
SCALE IN FEET

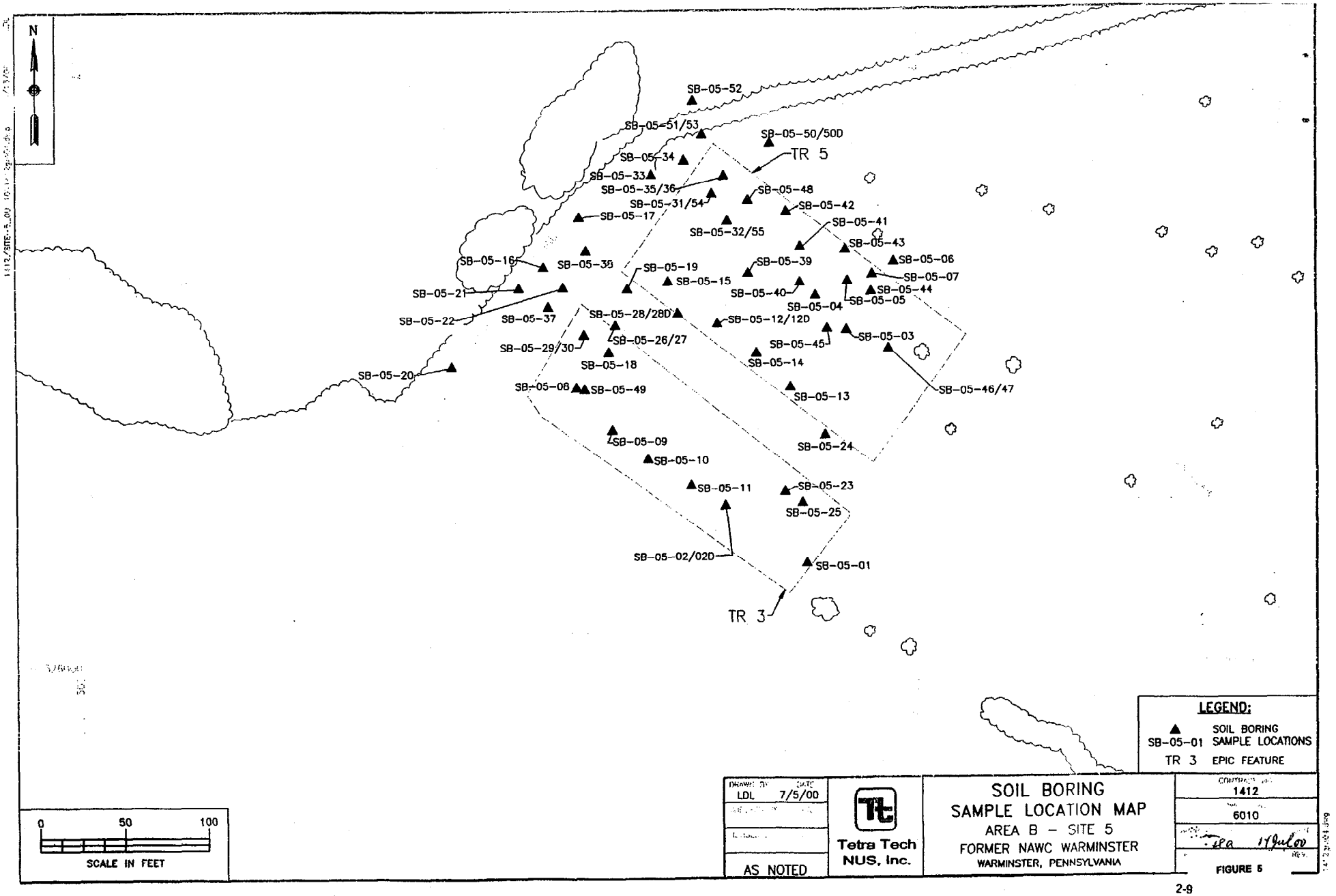
DRAWN BY LDL/EEH	DATE 7/27/00
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

Tetra Tech NUS, Inc.

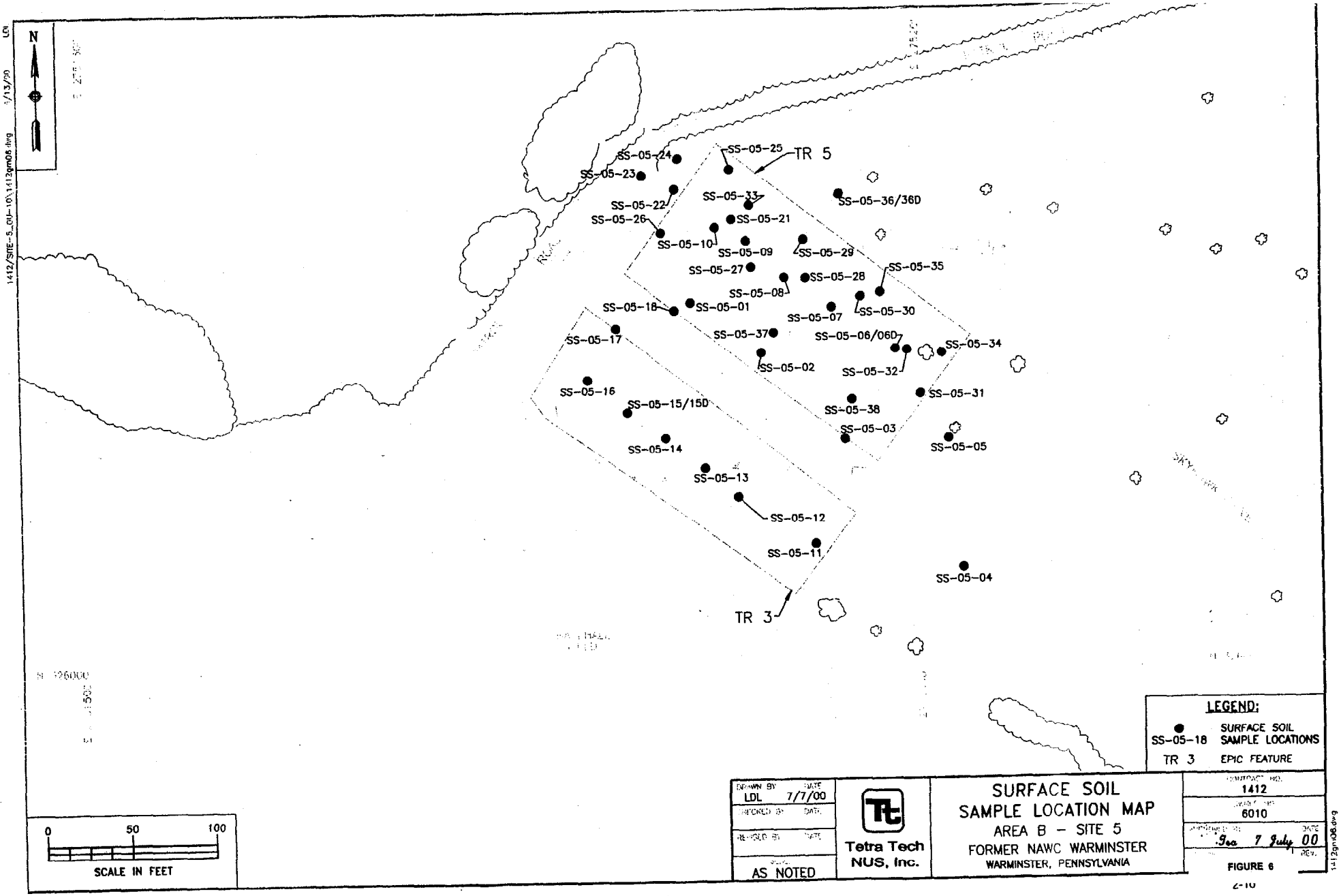
DRAINAGE PATTERNS
AREA B
FORMER NAWC WARMINSTER
WARMINSTER, PENNSYLVANIA

CONTRACT NO. 1412
OWNER NO. 5020
APPROVED BY DATE 29 Jul 00
DRAWING NO. REV.

FIGURE 4

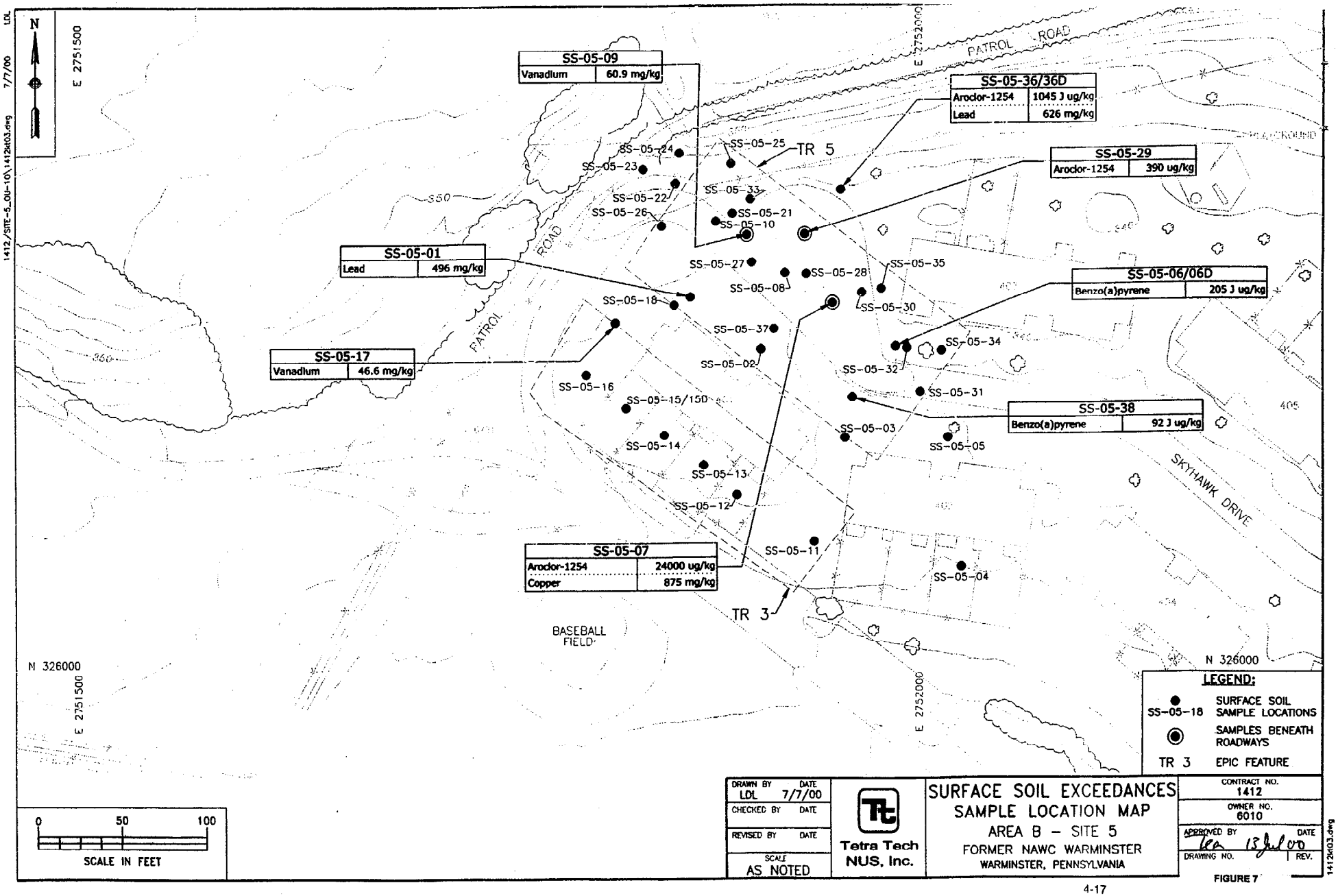


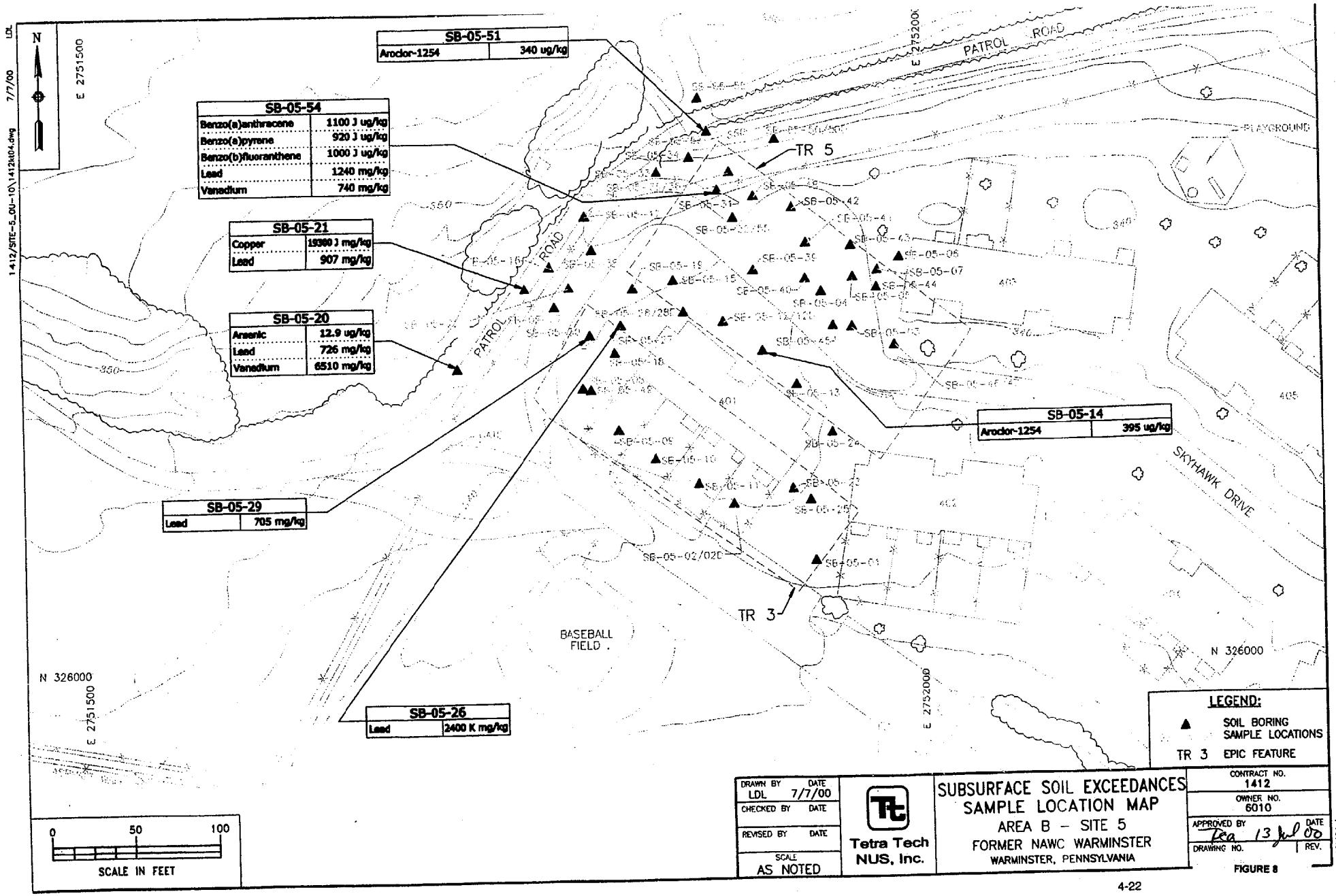
DRAWN BY LDL DATE 7/5/00	Tetra Tech NUS, Inc.	SOIL BORING SAMPLE LOCATION MAP AREA B – SITE 5 FORMER NAWC WARMINSTER WARMINSTER, PENNSYLVANIA	CONTRACT NO. 1412 6010 FIGURE 5
AS NOTED			

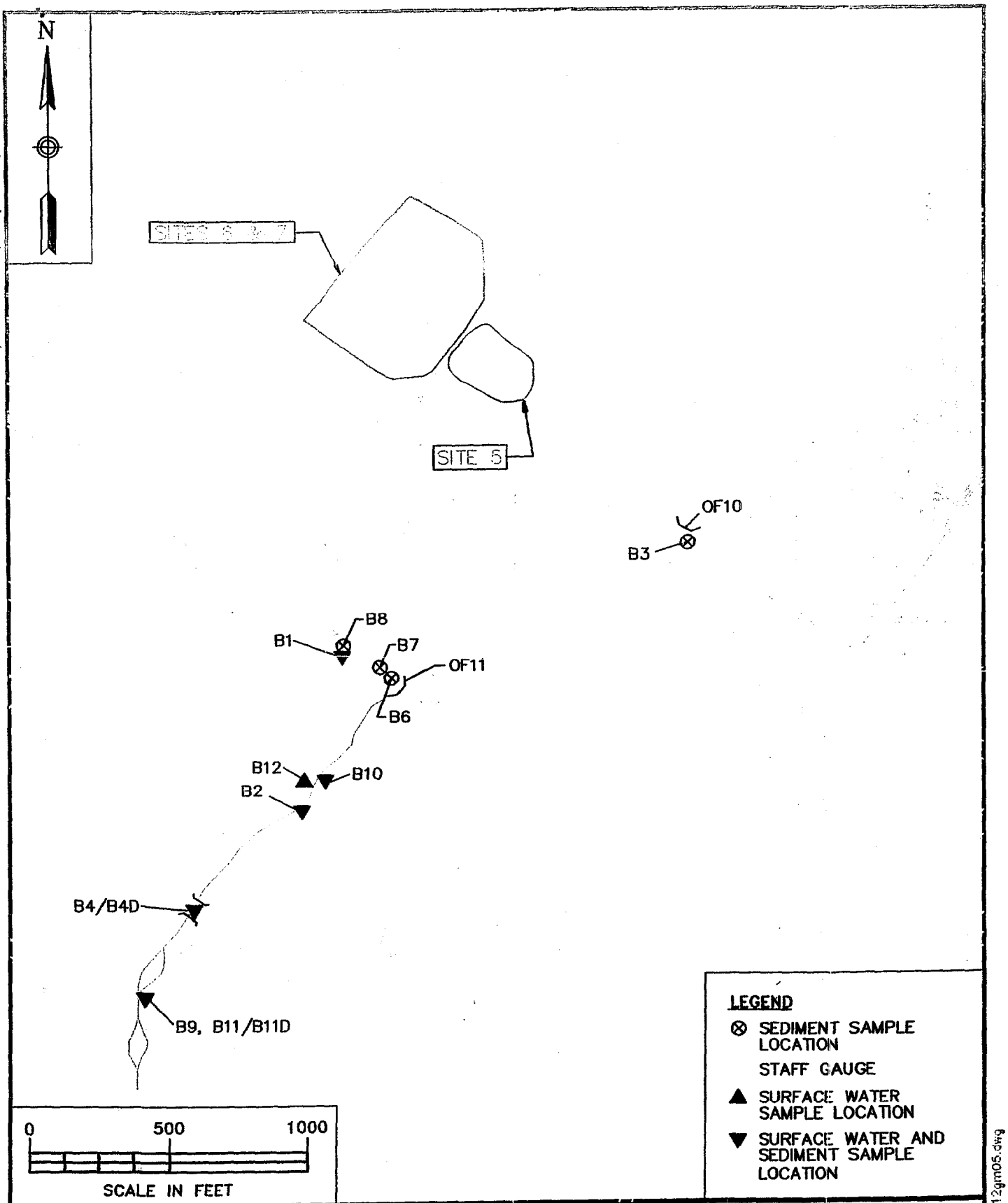


DRAWN BY LDL DATE 7/7/00	Tetra Tech NUS, Inc.	SURFACE SOIL SAMPLE LOCATION MAP AREA B – SITE 5 FORMER NAWC WARMINSTER WARMINSTER, PENNSYLVANIA	CONTRACT NO. 1412
CHECKED BY DATE			WORK ORD. NO. 6010
REVISED BY DATE			APPROVED BY Jsa DATE 7 July 00
SCALE AS NOTED			REV. FIGURE 6

1412/SITE-5_OU-10\1412gm06.dwg


N
E 2751500
E 2752000
PATROL ROAD
SS-05-09
Vanadium 60.9 mg/kg
SS-05-36/36D
Aroclor-1254 1045 J ug/kg
Lead 626 mg/kg
SS-05-29
Aroclor-1254 390 ug/kg
SS-05-01
Lead 496 mg/kg
SS-05-06/06D
Benzo(a)pyrene 205 J ug/kg
SS-05-17
Vanadium 46.6 mg/kg
SS-05-38
Benzo(a)pyrene 92 J ug/kg
SS-05-07
Aroclor-1254 24000 ug/kg
Copper 875 mg/kg
TR 5
TR 3
SS-05-24
SS-05-25
SS-05-23
SS-05-22
SS-05-26
SS-05-33
SS-05-21
SS-05-10
SS-05-27
SS-05-28
SS-05-35
SS-05-08
SS-05-30
SS-05-18
SS-05-37
SS-05-34
SS-05-02
SS-05-32
SS-05-16
SS-05-31
SS-05-15/15D
SS-05-03
SS-05-05
SS-05-14
SS-05-13
SS-05-12
SS-05-11
SS-05-04
SKYHAWK DRIVE
BASEBALL FIELD
N 326000
E 2751500
E 2752000
LEGEND:
SS-05-18 SURFACE SOIL SAMPLE LOCATIONS
SAMPLES BENEATH ROADWAYS
TR 3 EPIC FEATURE
0 50 100
SCALE IN FEET
DRAWN BY LDL DATE 7/7/00
CHECKED BY DATE
REVISED BY DATE
SCALE AS NOTED
Tetra Tech NUS, Inc.
SURFACE SOIL EXCEEDANCES
SAMPLE LOCATION MAP
AREA B – SITE 5
FORMER NAWC WARMINSTER
WARMINSTER, PENNSYLVANIA
CONTRACT NO. 1412
OWNER NO. 6010
APPROVED BY DATE
DRAWING NO. REV.
FIGURE 7
1412/SITE-5_OU-10\1412kt03.dwg
7/7/00 LDL

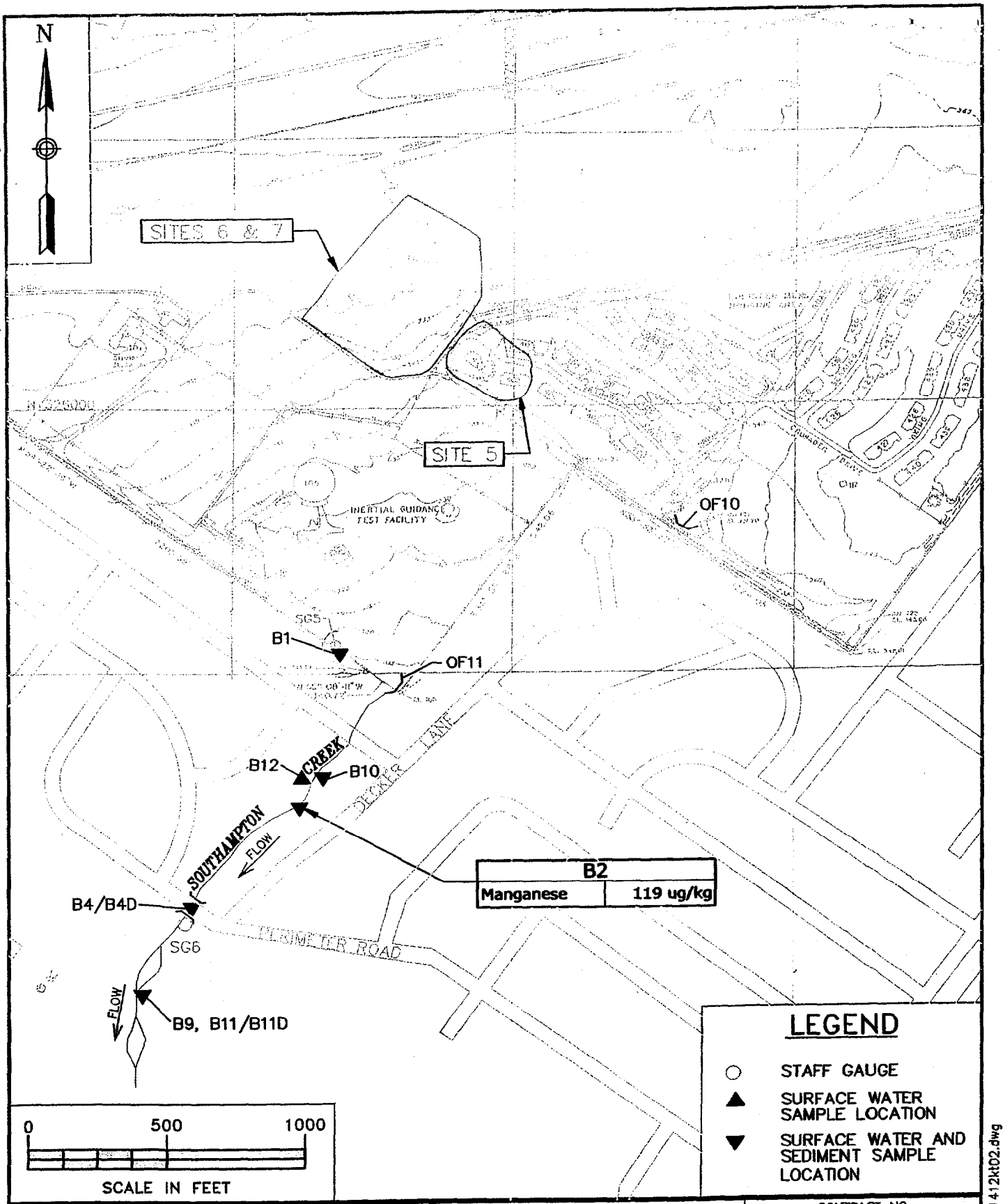

SB-05-51
Aroclor-1254 340 ug/kg
SB-05-54
Benzo(a)anthracene 1100 J ug/kg
Benzo(a)pyrene 920 J ug/kg
Benzo(b)fluoranthene 1000 J ug/kg
Lead 1240 mg/kg
Vanadium 740 mg/kg
SB-05-21
Copper 19300 J mg/kg
Lead 907 mg/kg
SB-05-20
Arsenic 12.9 ug/kg
Lead 726 mg/kg
Vanadium 6510 mg/kg
SB-05-29
Lead 705 mg/kg
SB-05-26
Lead 2400 K mg/kg
SB-05-14
Aroclor-1254 395 ug/kg
TR 5
TR 3
PATROL ROAD
PLAYGROUND
SKYHAWK DRIVE
BASEBALL FIELD
N 326000
E 2751500
E 2752000
LEGEND:
SOIL BORING SAMPLE LOCATIONS
TR 3 EPIC FEATURE
SCALE IN FEET
0 50 100
DRAWN BY LDL DATE 7/7/00
CHECKED BY DATE
REVISED BY DATE
SCALE AS NOTED
Tetra Tech NUS, Inc.
SUBSURFACE SOIL EXCEEDANCES SAMPLE LOCATION MAP
AREA B – SITE 5
FORMER NAWC WARMINSTER
WARMINSTER, PENNSYLVANIA
CONTRACT NO. 1412
OWNER NO. 6010
APPROVED BY DATE
DRAWING NO. REV.
FIGURE 8
1412/SITE-5_OU-10\1412kt04.dwg



DRAWN BY EEH/LDL DATE 7/5/00	Tetra Tech NUS, Inc.	AREA B SURFACE WATER/SEDIMENT SAMPLE LOCATIONS FORMER NAWC WARMINSTER WARMINSTER, PENNSYLVANIA	CONTRACT NO. 1412
CHECKED BY DATE			OWNER NO. 6010
REVISED BY DATE			APPROVED BY DATE 12 Jul 00
SCALE AS NOTED			DRAWING NO. REV.

FIGURE 9

1412/SITE5_OU-10\1412gm05.dwg 6/6/00

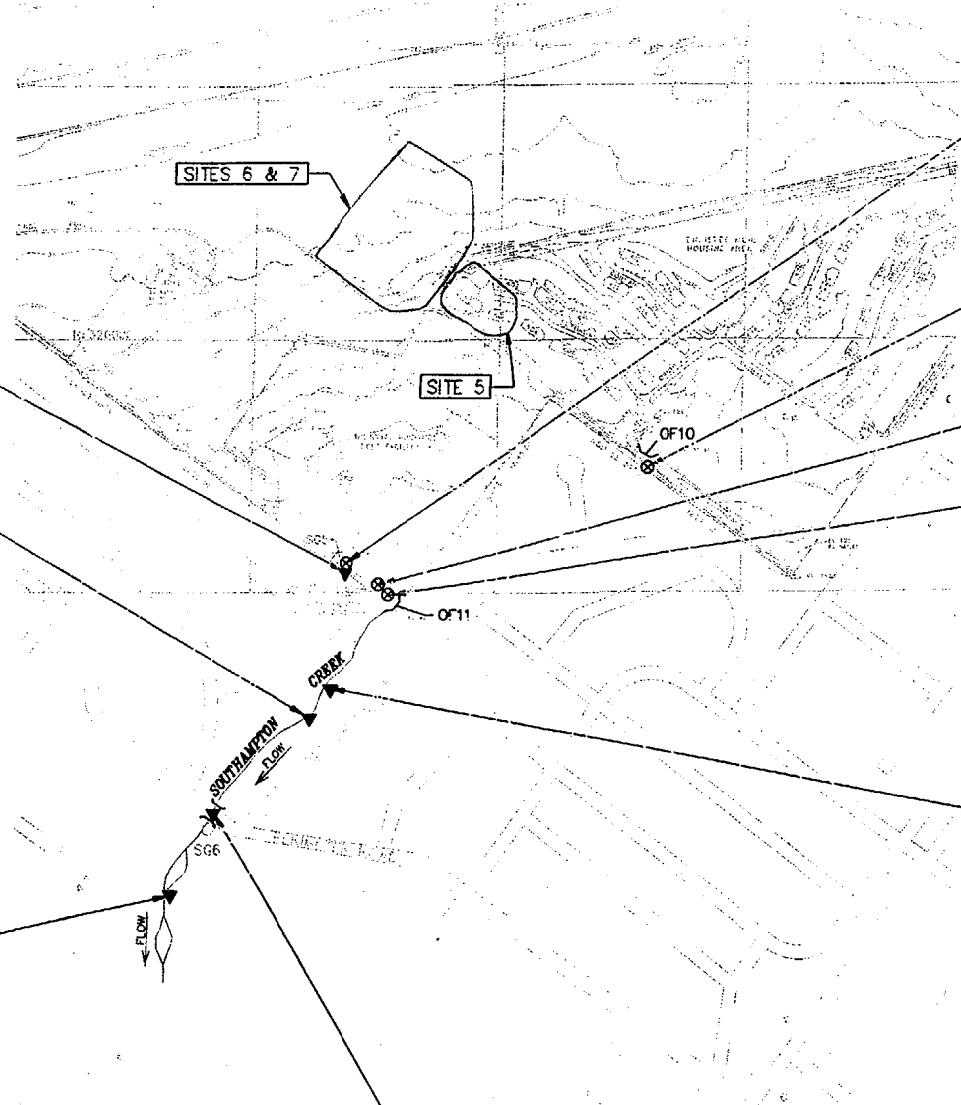


1412/SITE5_OU-10\1412kt02.dwg 7/7/00 ldl

DRAWN BY LDL DATE 7/7/00	Tetra Tech NUS, Inc.	SURFACE WATER EXCEEDANCES AREA B STREAM FORMER NAWC WARMINSTER WARMINSTER, PENNSYLVANIA	CONTRACT NO. 1412
CHECKED BY DATE			OWNER NO. 6010
REVISED BY DATE			APPROVED BY DATE 13 Jul 00
SCALE AS NOTED			DRAWING NO. REV.

FIGURE 10

1412/SITE5_OU-10\1412kt02.dwg



B1	
Aroclor-1260	1900 ug/kg
Anthracene	200 J ug/kg
Benzo(a)anthracene	530 ug/kg
Benzo(a)pyrene	450 ug.kg
Butylethylphthalate	120 J ug/kg
Chrysene	550 ug/kg
Fluorene	65 J ug/kg
Fluoranthene	1100 J ug/kg
Pyrene	430 J ug/kg
Cadmium	1.3 K mg/kg
Copper	59.5 K mg/kg

B2	
Copper	41.3 K mg/kg
Lead	168 mg/kg
Manganese	628 K mg/kg
Zinc	486 J mg/kg

B9	
Acenaphthene	110 J ug/kg
Anthracene	330 J ug/kg
Benzo(a)anthracene	1300 J ug/kg
Benzo(a)pyrene	880 J ug/kg
Benzo(g,h,i)perylene	720 J ug/kg
Bis(2-ethylhexyl)phthalate	1900 J ug/kg
Chrysene	1500 J ug/kg
Fluoranthene	3400 J ug/kg
Fluorene	190 J ug/kg
Indeno(1,2,3-cd)pyrene	600 J ug/kg
Pyrene	2900 J ug/kg

B11/B11D	
Acenaphthene	100 J ug/kg
Anthracene	253 J ug/kg
Fluoranthene	1630 J ug/kg
Fluorene	160 J ug/kg
Benzo(a)anthracene	580 J ug/kg
Benzo(a)pyrene	490 J ug/kg
Chrysene	588 J ug/kg
Pyrene	1380 J ug/kg

B4/B4D	
Cadmium	1.4 K mg/kg

B8	
DDE	9 J ug/kg
Aroclor-1260	580 J ug/kg

B3	
Cadmium	1.9 K mg/kg
Lead	66.1 J mg/kg

B7	
Aroclor-1260	380 J ug/kg

B6	
Aroclor-1260	270 J ug/kg

B10	
Acenaphthene	470 J ug/kg
Anthracene	1400 J ug/kg
Benzo(a)anthracene	5200 ug/kg
Benzo(a)pyrene	4400 ug.kg
Benzo(b)fluoranthene	7100 ug/kg
Benzo(g,h,i)perylene	2000 J ug/kg
Bis(2-ethylhexyl)phthalate	18000 ug/kg
DDE	24 J ug/kg
DDT	430 J ug/kg
Fluoranthene	17000 J ug/kg
Fluorene	600 J ug/kg
Indeno(1,2,3-cd)pyrene	2400 J ug/kg
Pyrene	9900 J ug/kg
Chrysene	5600 J ug/kg
Dieldrin	13 J ug/kg
Alpha-chlordane	15 J ug/kg
N-Nitrosodiphenylamine	1700 J ug/kg
Zinc	262 mg/kg

LEGEND

- ⊗ SEDIMENT SAMPLE LOCATION
- ○ STAFF GAUGE
- ▼ SURFACE WATER AND SEDIMENT SAMPLE LOCATION

0 500 1000
SCALE IN FEET

DRAWN BY LDL/EEH	DATE 7/21/00
CHECKED BY	DATE
REVISED BY	DATE
SCALE AS NOTED	

Tetra Tech NUS, Inc.

SEDIMENT EXCEEDANCES
AREA B STREAM
FORMER NAWC WARMINSTER
WARMINSTER, PENNSYLVANIA

CONTRACT NO. 1412
OWNER NO. 5010
APPROVED BY Pa DATE 29 Jul 00
DRAWING NO. REV.

FIGURE 11

1412/SITE-5_OU-10/1412kt07.dwg 7/21/00 EEH

APPENDIX B

TABLES

TABLE 1

OCCURRENCE AND DISTRIBUTION OF ORGANICS AND INORGANICS IN SITE 5 SURFACE SOIL
NAWC WARMINSTER, PENNSYLVANIA

Substance	Background Data							Site Related Data						
	Freq. of Detection	Range of Positive Detection				Mean of All Data	Sampling Round and Location of Maximum	Freq. of Detection	Range of Positive Detection				Mean of All Data	Sampling Round and Location of Maximum	Concentration
		Min		Max					Min		Max				
Aluminum	29/29	4780		18100		13200	BG-12	36/36	8590		18500		12500	SS-05-33	13200
Antimony	1/29	13.6	J	13.6	J	3.69	BG-16	21/31	0.27	L	8.8	L	2.89	SS-05-16	4.9
Arsenic	25/29	0.28		12.1	J	3.92	BG-11	35/36	0.39	K	7.9	L	4.23	SS-05-01	4.76
Barium	25/29	34.1		225		58.6	BG-28	36/36	40	K	311	K	103	SS-05-36-D	118
Beryllium	25/29	0.31		1.7	J	0.78	BG-23-DUP	36/36	0.59		1.6		0.925	SS-05-28	0.991
Cadmium	0/29			-				18/34	0.63	K	10.5		1.88	SS-05-08	4.05
Calcium	23/29	240		1910		655	BG-24	36/36	644	J	35400		2780	SS-05-09	3000
Chromium	29/29	7.9	J	35.3	J	19.3	BG-12	36/36	12.4		49.2	K	23.4	SS-05-36-D	25.4
Cobalt	25/29	1.6		22.1		8.27	BG-23-DUP	36/36	5		21.3	K	9.78	SS-05-27	10.7
Copper	27/29	3.6	J	30.6		11.7	BG-29	36/36	6.8		875		133	SS-05-07	297
Cyanide	0/20			-				1/16	0.56	L	0.56	L	0.459	SS-05-16	0.519
Iron	29/29	6980		410500		33700	BG-04	36/36	12900		48300		23100	SS-05-01	25500
Lead	29/29	1.6	J	96.5	J	12	BG-13	36/36	7.5		1020		85.1	SS-05-36-D	130
Magnesium	25/29	518		4960		1960	BG-24	36/36	1290		16000		2770	SS-05-09	3070
Manganese	29/29	30.9		2010		425	BG-28	36/36	130		2550	J	640	SS-05-37	785
Mercury	1/29	0.37		0.37		0.0413	BG-23	20/28	0.07		12		0.688	SS-05-08	1.63
Nickel	18/29	4.1	J	21.7	J	9.34	BG-23-DUP	36/36	6.3	K	83.2		18.7	SS-05-08	21.7
Potassium	25/29	89.1		3050		679	BG-24	36/36	307		4660		1130	SS-05-09	1380
Selenium	0/29			-				3/13	0.96	K	2.6	L	0.663	SS-05-37	1.09
Silver	0/29			-				27/29	0.73		87.2	K	12.2	SS-05-36	29.2
Sodium	4/29	55.2		86.7		80.9	BG-25	14/15	85.7	L	831		184	SS-05-10	269
Thallium	3/29	0.37		0.42		0.374	BG-23-DUP	7/36	0.47	K	2	K	0.694	SS-05-01	0.818
Vanadium	29/29	15.4		45		29.4	BG-12	36/36	19.5		60.9		32.6	SS-05-09	35.3
Zinc	25/29	9		60		25.7	BG-13	36/36	18.4		4180	L	273	SS-05-37	371
4,4'-DDD	1/21	16	J	16	J	2.66	BG-12	6/30	4.1	J	27	L	4.23	SS-05-29	5.07
4,4'-DDE	1/21	820		820		40.9	BG-12	6/35	4	K	9.5	J	3.3	SS-05-26	3.77
4,4'-DDT	1/21	1440	J	1440	J	70.5	BG-12	5/35	4.7	J	14		3.22	SS-05-35	3.6
Alpha-Chlordane	0/21			-				3/32	2.3		2.9	J	1.46	SS-05-08	1.59
Aroclor-1242	0/21			-				3/36	16	J	260		31.8	SS-05-30	32.9
Aroclor-1254	1/21	51		51		38.6	BG-13	19/36	20	J	24000		754	SS-05-07	312
Beta-BHC	0/21			-				1/36	5.6	L	5.6	L	1.4	SS-05-28	1.48
Dieldrin	0/21			-				1/33	25	L	25	L	3.21	SS-05-29	3.36
Endosulfan Sulfate	0/21			-				2/35	4.3	J	10	J	2.77	SS-05-21	2.97

TABLE 1
OCCURRENCE AND DISTRIBUTION OF ORGANICS AND INORGANICS IN SITE 5 SURFACE SOIL
NAWC WARMINSTER, PENNSYLVANIA

Substance	Background Data: Freq. of Detection	Background Data: Range of Positive Detection: Min.			Background Data: Range of Positive Detection: Max.		Background Data: Mean of All Data	Background Data: Sample Round and Location of Maximum	Site-Related Data: Freq. of Detection	Site-Related Data: Range of Positive Detection: Min.			Site-Related Data: Range of Positive Detection: Max.		Site-Related Data: Mean of All Data	Site-Related Data: Sample Round and Location of Maximum	Site-Related Data: Concentration
Endrin	0/21		-						4/36	4.1	J	-	810	J	24.7	SS-05-07	6.57
Endrin Aldehyde	0/21		-						2/33	5.7	L	-	6.7	L	2.77	SS-05-37	3
Gamma-Chlordane	0/21		-						3/31	3.5	J	-	6.1		1.36	SS-05-38	1.53
2-Methylnaphthalene	0/11		-						1/29	160	J	-	160	J	317	SS-05-08	160
Benz(a)anthracene	0/11		-						3/29	74	J	-	330	J	321	SS-05-06-DUP	293
Benzo(a)pyrene	0/11		-						3/29	67	J	-	270	J	318	SS-05-06-DUP	270
Benzo(b)fluoranthene	1/11	58	J	-	58	J	185	BG-13	3/29	50	J	-	120	J	313	SS-05-06-DUP	120
Benzo(g,h,i)perylene	0/11		-						3/29	52	J	-	100	J	313	SS-05-06-DUP	100
Benzo(k)fluoranthene	1/11	46	J	-	46	J	184	BG-13	2/29	48	J	-	90	J	314	SS-05-22	90
Bis(2-ethylhexyl)phthalate	1/11	50	J	-	50	J	154	BG-16	6/17	39	J	-	270	J	408	SS-05-08	270
Chrysene	1/11	51	J	-	51	J	185	BG-13	3/29	100	J	-	450		326	SS-05-06-DUP	301
Di-n-butylphthalate	0/11		-						1/24	48	J	-	48	J	359	SS-05-06-DUP	48
Dibenz(a,h)anthracene	0/11		-						1/29	40	J	-	40	J	317	SS-05-38	40
Fluoranthene	1/11	92	J	-	92	J	188	BG-13	5/29	42	J	-	170	J	306	SS-05-22	170
Indeno(1,2,3-cd)pyrene	0/11		-						2/29	41	J	-	60	J	316	SS-05-22	60
Naphthalene	0/11		-						1/29	47	J	-	47	J	314	SS-05-08	47
Phenanthrene	1/11	51	J	-	51	J	185	BG-13	4/29	42	J	-	120	J	310	SS-05-06-DUP	120
Pyrene	1/11	100	J	-	100	J	189	BG-13	6/29	46	J	-	310	J	313	SS-05-06-DUP	290
2-Butanone	0/19		-						2/18	35		-	42	J	9.19	SS-05-28	11.6
2-Hexanone	0/19		-						2/29	31		-	51		7.93	SS-05-21	8.72
4-Methyl-2-pentanone	0/19		-						1/31	6	J	-	6	J	5.63	SS-05-28	5.84
Acetone	4/19	8	J	-	12	J	45.7	BG-24	10/18	94		-	170		70	SS-05-07	95.5
Benzene	0/19		-						4/31	1	J	-	2	J	3.6	SS-05-08	2
Carbon Disulfide	0/19		-						1/31	1	J	-	1	J	3.77	SS-05-28	1
Chloroethane	0/19		-						1/31	2	J	-	2	J	3.82	SS-05-37	2
Chloromethane	2/19	3	J	-	3	J	44.8	BG-26	2/31	1	J	-	5	J	3.87	SS-05-37	4.53
Ethylbenzene	0/19		-						1/31	3	J	-	3	J	3.84	SS-05-21	3
Methylene Chloride	0/19		-						3/5	2	J	-	320		67.2	SS-05-12	320
Toluene	3/19	2	J	-	2	J	44.6	BG-17	16/31	1	J	-	40		4.97	SS-05-21	6.5
Trichloroethene	0/19		-						5/31	5	J	-	33		5.29	SS-05-06-DUP	6.19
Xylene (Total)	0/19		-						4/31	1	J	-	19	J	7.31	SS-05-21	8.21

Notes:

TABLE 1
OCCURRENCE AND DISTRIBUTION OF ORGANICS AND INORGANICS IN SITE 5 SURFACE SOIL
NAWC WARMINSTER, PENNSYLVANIA

	Background Data						Site-Related Data					
Substance	Frequency of Detection	Range of Positive Detection Min	Max	Number of All Data	Sample Quantitation Limit Range Min	Max	Frequency of Detection	Range of Positive Detection Min	Max	Number of All Data	Sample Quantitation Limit Range Min	Max	Representative Concentration

Units are mg/kg for inorganics, ug/kg for organics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result.
Mean of all data includes positive detections and non-detected results. Detection limits are divided by two.
The determination of representative concentrations is based on comparison of maximum to the 95 % UCL, which is presented in a separate table.
Frequency of detection refers to number of times compound was detected among all samples versus total number of samples.
Number of samples may vary based on the number of usable results.

TABLE 2

OCCURRENCE AND DISTRIBUTION OF ORGANICS AND INORGANICS IN SITE 5 SUBSURFACE SOIL
NAWC WARMINSTER, PENNSYLVANIA

Substance	Background Data						Site-Related Data						
	Freq. of Detection	Range of Positive Detection Min		Max	Mean of All Data	Sampling Round and Location of Maximum	Freq. of Detection	Range of Positive Detection Min		Max	Mean of All Data	Sampling Round and Location of Maximum	Representative Concentration
Aluminum	29/29	4780	-	18100	13200	BG-12	55/55	3490	-	20700	12600	SB-05-29	13400
Antimony	1/29	13.6 J	-	13.6 J	3.69	BG-16	28/36	0.26 L	-	50.4 J	3.95	SB-05-21	7.94
Arsenic	25/29	0.28	-	12.1 J	3.92	BG-11	46/53	0.37 K	-	12.9	2.22	SB-05-20	3.06
Barium	25/29	34.1	-	225	58.6	BG-28	54/54	27.7	-	1030	182	SB-05-29	217
Beryllium	25/29	0.31	-	1.7 J	0.78	BG-23-DUP	53/53	0.42	-	3.7	1.32	SB-05-08	1.5
Cadmium	0/29	0	-	0	0		13/54	0.31 K	-	137	4.65	SB-05-29	5.5
Calcium	23/29	240	-	1910	655	BG-24	53/53	361 K	-	22000	2800	SB-05-20	3300
Chromium	29/29	7.9 J	-	35.3 J	19.3	BG-12	55/55	1.9 K	-	305	28.8	SB-05-20	32.2
Cobalt	25/29	1.6	-	22.1	8.27	BG-23-DUP	54/54	3.1	-	30.1	13.4	SB-05-14	15
Copper	27/29	3.6 J	-	30.6	11.7	BG-29	42/42	2.5 L	-	19300 J	636	SB-05-21	802
Cyanide	0/20	0	-	0	0		1/3	1.5	-	1.5	1.15	SB-05-22	1.5
Iron	29/29	6980	-	410500	33700	BG-04	55/55	2690	-	92600	28600	SB-05-51	33700
Lead	29/29	1.6 J	-	96.5 J	12	BG-13	54/54	2.4 K	-	2400 K	138	SB-05-26	142
Magnesium	25/29	518	-	4960	1960	BG-24	53/53	639	-	8660 J	3950	SB-05-43	4420
Manganese	29/29	30.9	-	2010	425	BG-28	55/55	42.9	-	9240 J	740	SB-05-08	937
Mercury	1/29	0.37	-	0.37	0.0413	BG-23	22/50	0.05 L	-	2.6	0.248	SB-05-51	0.347
Nickel	18/29	4.1 J	-	21.7 J	9.34	BG-23-DUP	55/55	4.5 K	-	625	39	SB-05-20	39.3
Potassium	25/29	89.1	-	3050	679	BG-24	54/54	229	-	6950	2110	SB-05-43	2840
Selenium	0/29	0	-	0	0		4/30	0.45	-	1.3 K	0.375	SB-05-05	0.426
Silver	0/29	0	-	0	0		33/52	2.4	-	111	13.6	SB-05-55	38.3
Sodium	4/29	55.2	-	86.7	80.9	BG-25	38/38	46.1	-	677	190	SB-05-22	226
Thallium	3/29	0.37	-	0.42	0.374	BG-23-DUP	7/52	0.45	-	1.1 K	0.622	SB-05-18	0.703
Vanadium	29/29	15.4	-	45	29.4	BG-12	54/54	13	-	6510	160	SB-05-20	61.6
Zinc	25/29	9	-	60	25.7	BG-13	52/52	12.7	-	4760 L	265	SB-05-29	286
4,4'-DDD	1/21	16 J	-	16 J	2.66	BG-12	5/41	9.6 J	-	12000	297	SB-05-54	19.4
4,4'-DDE	1/21	820	-	820	40.9	BG-12	5/40	5.6	-	2600 K	68.3	SB-05-54	11.1
4,4'-DDT	1/21	1440 J	-	1440 J	70.5	BG-12	4/41	6.2	-	6300	157	SB-05-54	13.3
Alpha-Chlordane	0/21	0	-	0	0		2/40	4.6 J	-	5.7 J	1.85	SB-05-40	1.85
Aroclor-1242	0/21	0	-	0	0		1/41	100 J	-	100 J	33.8	SB-05-51	32.7
Aroclor-1248	0/21	0	-	0	0		1/41	315	-	315	37	SB-05-14	34
Aroclor-1254	1/21	51	-	51	38.6	BG-13	9/41	22 J	-	395	59	SB-05-14	63
Beta-BHC	0/21	0	-	0	0		1/41	1.9 J	-	1.9 J	1.65	SB-05-21	1.57
Dieldrin	0/21	0	-	0	0		1/41	8.8	-	8.8	3.35	SB-05-51	3.24
Endosulfan Sulfate	0/21	0	-	0	0		2/41	5.5 J	-	25 J	3.82	SB-05-40	3.72

TABLE 2
OCCURRENCE AND DISTRIBUTION OF ORGANICS AND INORGANICS IN SITE 5 SUBSURFACE SOIL
NAWC WARMINSTER, PENNSYLVANIA

Substance	Background Data					Site-Related Data				
	Frequency of Detection	Range of Positive Detection Min	Range of Positive Detection Max	Mean of All Data	Sampling Round and Location of Max	Frequency of Detection	Range of Positive Detection Min	Range of Positive Detection Max	Mean of All Data	Sampling Round and Location of Max	Representative Concentration
Gamma-Chlordane	0/21	0	0	0		2/41	4.7 J	6.8 J	1.86	SB-05-40	1.85
Methoxychlor	0/21	0	0	0		1/41	70 L	70 L	17.8	SB-05-35	17.2
1,4-Dichlorobenzene	1/11	43 J	43 J	184	BG-11	1/32	220 J	220 J	332	SB-05-51	220
Benz(a)anthracene	0/11	0	0	0		1/32	1100 J	1100 J	316	SB-05-54	384
Benzo(a)pyrene	0/11	0	0	0		1/32	920 J	920 J	310	SB-05-54	375
Benzo(b)fluoranthene	1/11	58 J	58 J	185	BG-13	3/32	38 J	1000 J	302	SB-05-54	371
Benzo(g,h,i)perylene	0/11	0	0	0		1/32	960 J	960 J	311	SB-05-54	377
Bis(2-ethylhexyl)phthalate	1/11	50 J	50 J	154	BG-16	4/26	48 J	180 J	239	SB-05-51	180
Chrysene	1/11	51 J	51 J	185	BG-13	2/32	77 J	2000 J	336	SB-05-54	403
Di-n-butylphthalate	0/11	0	0	0		2/25	41 J	57 J	390	SB-05-38	57
Fluoranthene	1/11	92 J	92 J	188	BG-13	5/33	36 L	1500 J	305	SB-05-54	378
Naphthalene	0/11	0	0	0		1/32	120 J	120 J	347	SB-05-14	120
Phenanthrene	1/11	51 J	51 J	185	BG-13	3/32	86 J	1800 J	326	SB-05-54	389
Pyrene	1/11	100 J	100 J	189	BG-13	4/32	37 J	2500 J	344	SB-05-54	417
1,1-Dichloroethene	0/19	0	0	0		2/53	2 J	2 J	4.11	SB-05-51	2
2-Butanone	0/19	0	0	0		8/41	2 J	91	8.83	SB-05-05	9.27
2-Hexanone	0/19	0	0	0		2/51	1 J	2 J	5.49	SB-05-29	2
4-Methyl-2-pentanone	0/19	0	0	0		6/52	1 J	4 J	5.26	SB-05-27	4
Acetone	4/19	8 J	12 J	45.7	BG-24	4/20	94	300 J	39.4	SB-05-29	76.7
Benzene	0/19	0	0	0		3/53	2 J	16 J	4.31	SB-05-29	4.84
Carbon Disulfide	0/19	0	0	0		4/53	3 J	13	4.37	SB-05-26	4.91
Ethylbenzene	0/19	0	0	0		2/53	2 J	3 J	4.08	SB-05-29	3
Tetrachloroethene	0/19	0	0	0		1/52	4 J	14	4.15	SB-05-02-DUP	4.65
Toluene	3/19	2 J	2 J	44.6	BG-17	13/53	1 J	15	4.23	SB-05-04	4.89
Vinyl Chloride	0/19	0	0	0		1/53	7 J	7 J	4.18	SB-05-54	4.69
Xylene (Total)	0/19	0	0	0		6/53	1 J	34 J	7.39	SB-05-35	8.17

Notes:

Units are mg/kg for inorganics, ug/kg for organics.
Number of sample results excludes rejected data or blank-qualified data. Duplicates are consolidated into one result.
Mean of all data includes positive detections and non-detected results. Detection limits are divided by two.
The determination of representative concentrations is based on comparison of maximum to the 95 % UCL, which is presented in a separate table.
Frequency of detection refers to number of times compound was detected among all samples versus total number of samples.

TABLE 3

OCCURRENCE AND DISTRIBUTION OF TOTAL INORGANICS IN SURFACE WATER AT AREA B

NAWC WARMINSTER, PENNSYLVANIA

(ug/L)

	BACKGROUND	SITE-RELATED			
SUBSTANCE	REPRESENTATIVE CONCENTRATION*	FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION**	STATISTICAL DISTRIBUTION	REPRESENTATIVE CONCENTRATION
BARIUM	100	3 / 4	80.9 - 94.2	NORMAL OVER LOGNORMAL	94.2
CALCIUM	28100	3 / 3	21800 - 24300	NONPARAMETRIC DIST	24300
IRON	895	1 / 1	388	NONPARAMETRIC DIST	388
MAGNESIUM	11150	3 / 3	8270 - 9090	NONPARAMETRIC DIST	9090
MANGANESE	154	3 / 3	55 - 119	NONPARAMETRIC DIST	119
NICKEL	-	1 / 4	20	NORMAL	17.5
POTASSIUM	1545	3 / 3	910 - 1180	NONPARAMETRIC DIST	1180
SODIUM	16150	3 / 3	9760 - 13600	NONPARAMETRIC DIST	13600
THALLIUM	-	1 / 4	4.9	NORMAL	4.3
ZINC	30.60	2 / 2	9 - 27.6	NONPARAMETRIC DIST	27.6

* = REPRESENTATIVE CONCENTRATION FOR BACKGROUND IS PRESENTED IN TABLE X-X

** = QUALIFIERS FOR DATA ARE PRESENTED IN DATA PRESENTATION TABLES

TABLE 4

OCCURRENCE AND DISTRIBUTION OF ORGANICS IN SURFACE WATER AT AREA B

NAWC WARMINSTER, PENNSYLVANIA

(ug/L)

SUBSTANCE	BACKGROUND	SITE-RELATED			
	REPRESENTATIVE CONCENTRATION*	FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION**	STATISTICAL DISTRIBUTION	REPRESENTATIVE CONCENTRATION
BIS(2-ETHYLHEXYL)PHTHALAT	-	1 / 2	1	NONPARAMETRIC DIST	1

* = REPRESENTATIVE CONCENTRATION FOR BACKGROUND IS PRESENTED IN TABLE X-X

** = QUALIFIERS FOR DATA ARE PRESENTED IN DATA PRESENTATION TABLES

TABLE 5

OCCURRENCE AND DISTRIBUTION OF INORGANICS IN SEDIMENT AT AREA B

NAWC WARMINSTER, PENNSYLVANIA

(mg/kg)

	BACKGROUND	SITE-RELATED			
SUBSTANCE	REPRESENTATIVE CONCENTRATION*	FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION**	STATISTICAL DISTRIBUTION	REPRESENTATIVE CONCENTRATION
ALUMINUM	5805	4 / 4	4770 - 8090	NORMAL OVER LOGNORMAL	7560
ARSENIC	3.7	4 / 4	3.3 - 3.6	NONPARAMETRIC DIST	3.60
BARIUM	53.8	4 / 4	45.6 - 68.5	NONPARAMETRIC DIST	68.5
BERYLLIUM	0.7	4 / 4	0.63 - 0.88	NONPARAMETRIC DIST	0.88
CADMIUM	1.4	2 / 2	1.3 - 1.9	NONPARAMETRIC DIST	1.9
CALCIUM	8300	4 / 4	1270 - 3490	NONPARAMETRIC DIST	3490
CHROMIUM	16.6	4 / 4	9.3 - 18.3	NONPARAMETRIC DIST	18.3
COBALT	7.2	3 / 3	5.4 - 7.6	NONPARAMETRIC DIST	7.6
COPPER	18.4	4 / 4	20.6 - 59.5	NONPARAMETRIC DIST	59.5
IRON	15800	4 / 4	10900 - 21300	NONPARAMETRIC DIST	21300
LEAD	27.8	4 / 4	38.7 - 168	NONPARAMETRIC DIST	168
MAGNESIUM	5165	4 / 4	1750 - 2640	NONPARAMETRIC DIST	2640
MANGANESE	284	4 / 4	135 - 628	NORMAL	554.78
NICKEL	14.2	4 / 4	8.6 - 16.8	NONPARAMETRIC DIST	16.8
POTASSIUM	1325	4 / 4	397 - 767	NONPARAMETRIC DIST	767
SILVER	-	1 / 2	0.71	NONPARAMETRIC DIST	0.71
THALLIUM	-	1 / 4	0.96	NONPARAMETRIC DIST	0.96
VANADIUM	25.4	4 / 4	13.6 - 22.7	NONPARAMETRIC DIST	22.7
ZINC	129	4 / 4	111 - 486	NONPARAMETRIC DIST	486

* = REPRESENTATIVE CONCENTRATION FOR BACKGROUND IS PRESENTED IN TABLE X-X

** = QUALIFIERS FOR DATA ARE PRESENTED IN DATA PRESENTATION TABLES

TABLE 6

OCCURRENCE AND DISTRIBUTION OF ORGANICS IN SEDIMENT AT AREA B

NAWC WARMINSTER, PENNSYLVANIA

(ug/kg)

	BACKGROUND	SITE-RELATED			
SUBSTANCE	REPRESENTATIVE CONCENTRATION*	FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION**	STATISTICAL DISTRIBUTION	REPRESENTATIVE CONCENTRATION
4,4'-DDE	-	2 / 5	9 - 24	NONPARAMETRIC DIST	24
4,4'-DDT	-	1 / 5	430	NORMAL OVER LOGNORMAL	270.55
ALDRIN	-	3 / 5	3.6 - 4.7	NONPARAMETRIC DIST	4.7
ALPHA-CHLORDANE	5.85	1 / 5	15	NORMAL OVER LOGNORMAL	10.03
AROCLOR-1260	-	4 / 5	270 - 1900	NONPARAMETRIC DIST	1900
DELTA-BHC	-	1 / 5	4	NONPARAMETRIC DIST	4.00
DIELDRIN	-	1 / 5	13	NORMAL	9.41
METHOXYCHLOR	-	1 / 5	79	NORMAL	55.91
4-METHYLPHENOL	-	2 / 2	450 - 560	NONPARAMETRIC DIST	560
ACENAPHTHENE	110	1 / 2	470	NONPARAMETRIC DIST	470
ANTHRACENE	330	2 / 2	200 - 1400	NONPARAMETRIC DIST	1400
BENZ(A)ANTHRACENE	1300	2 / 2	530 - 5200	NONPARAMETRIC DIST	5200
BENZO(A)PYRENE	880	2 / 2	450 - 4400	NONPARAMETRIC DIST	4400
BENZO(B)FLUORANTHENE	1300	2 / 2	690 - 7100	NONPARAMETRIC DIST	7100
BENZO(G,H,I)PERYLENE	720	2 / 2	390 - 2000	NONPARAMETRIC DIST	2000
BENZO(K)FLUORANTHENE	1000	2 / 2	250 - 2100	NONPARAMETRIC DIST	2100
BIS(2-ETHYLHEXYL)PHTHALAT	1900	2 / 2	580 - 18000	NONPARAMETRIC DIST	18000
BUTYLBENZYLPHTHALATE	-	1 / 2	120	NONPARAMETRIC DIST	120
CARBAZOLE	287.5	2 / 2	120 - 1100	NONPARAMETRIC DIST	1100
CHRYSENE	1500	2 / 2	550 - 5600	NONPARAMETRIC DIST	5600
DI-N-BUTYLPHTHALATE	-	1 / 2	5100	NONPARAMETRIC DIST	5100
DI-N-OCTYLPHTHALATE	-	1 / 2	79	NONPARAMETRIC DIST	79
DIBENZ(A,H)ANTHRACENE	96	1 / 2	55	NONPARAMETRIC DIST	55
FLUORANTHENE	3400	2 / 2	1200 - 17000	NONPARAMETRIC DIST	17000
FLUORENE	190	2 / 2	65 - 600	NONPARAMETRIC DIST	600
INDENO(1,2,3-CD)PYRENE	600	2 / 2	320 - 2400	NONPARAMETRIC DIST	2400
N-NITROSODIPHENYLAMINE	-	1 / 2	1700	NONPARAMETRIC DIST	1700
PYRENE	2900	2 / 2	1200 - 9900	NONPARAMETRIC DIST	9900

* = REPRESENTATIVE CONCENTRATION FOR BACKGROUND IS PRESENTED IN TABLE X-X

** = QUALIFIERS FOR DATA ARE PRESENTED IN DATA PRESENTATION TABLES

TABLE 7

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
NAWC WARMINSTER, PENNSYLVANIA - SITE 5, SURFACE SOIL

Scenario Timeframe: Current/Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Surface Soil

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data (1)	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Aluminum	mg/kg	12500	13200	18500		mg/kg	13200	95%UCL-T	Wlg>=Wt& Wno	12500	Mean-T	CTE uses LgAV
Cadmium	mg/kg	1.88	4.05	10.5		mg/kg	4.05	95%UCL-T	Wlg>=Wt& Wno	2.02	Mean-T	CTE uses LgAV
Copper	mg/kg	133	297	875		mg/kg	297	95%UCL-T	Wt >Wlg>=Wno	140	Mean-T	CTE uses LgAV
Lead	mg/kg	85.1	130	1020		mg/kg	77.5	Mean-T	IEUBK Uses Lg	77.5	Mean-T	IEUBK Uses Lg
Manganese	mg/kg	640	785	2550	J	mg/kg	785	95%UCL-T	Wlg>=Wt& Wno	640	Mean-T	CTE uses LgAV
Mercury	mg/kg	0.688	1.63	12		mg/kg	1.63	95%UCL-T	Wlg>=Wt& Wno	0.5	Mean-T	CTE uses LgAV
Silver	mg/kg	12.2	29.2	87.2	K	mg/kg	29.2	95%UCL-T	Wlg>=Wt& Wno	14.2	Mean-T	CTE uses LgAV
Thallium	mg/kg	0.694	0.818	2	K	mg/kg	0.818	95%UCL-T	Wt >Wlg>=Wno	0.661	Mean-T	CTE uses LgAV
Vanadium	mg/kg	32.6	35.3	60.9		mg/kg	35.3	95%UCL-T	Wlg>=Wt& Wno	32.6	Mean-T	CTE uses LgAV
Zinc	mg/kg	273	371	4180	L	mg/kg	371	95%UCL-T	Wlg>=Wt& Wno	207	Mean-T	CTE uses LgAV
Aroclor-1242	ug/kg	31.8	32.9	260		ug/kg	32.9	95%UCL-T	Wt >Wlg>=Wno	26.9	Mean-T	CTE uses LgAV
Aroclor-1254	ug/kg	754	312	24000		ug/kg	312	95%UCL-T	Wt >Wlg>=Wno	141	Mean-T	CTE uses LgAV
Benz(a)anthracene	ug/kg	321	293	330	J	ug/kg	293	95%UCL-T	Wt >Wlg>=Wno	213	Mean-T	CTE uses LgAV
Benzo(a)pyrene	ug/kg	318	290	270	J	ug/kg	270	Max	Max < U95log	211	Mean-T	CTE uses LgAV
Benzo(b)fluoranthene	ug/kg	313	286	120	J	ug/kg	120	Max	Max < U95log	120	RME Conc	Log AVG > Max
Benzo(k)fluoranthene	ug/kg	314	287	90	J	ug/kg	90	Max	Max < U95log	90	RME Conc	Log AVG > Max
Chrysene	ug/kg	326	301	450		ug/kg	301	95%UCL-T	Wt >Wlg>=Wno	220	Mean-T	CTE uses LgAV
Dibenz(a,h)anthracene	ug/kg	317	295	40	J	ug/kg	40	Max	Max < U95log	40	RME Conc	Log AVG > Max
Indeno(1,2,3-cd)pyrene	ug/kg	316	296	60	J	ug/kg	60	Max	Max < U95log	60	RME Conc	Log AVG > Max

(1) Represents the 95% UCL of normal data for normal distributions; Represents the log-transformed 95% UCL for lognormal distributions.

Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Minimum variance unbiased estimate of arithmetic mean for lognormally distributed data (Mean-T); Mean of Normal Data (Mean-N).

NA - Not Applicable.

TABLE 8

MEDIUM-SPECIFIC EXPOSURE POINT CONCENTRATION SUMMARY
NAWC WARMINSTER, PENNSYLVANIA - SITE 5, SUBSURFACE SOIL

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Subsurface Soil

Chemical of Potential Concern	Units	Arithmetic Mean	95% UCL of Normal Data (1)	Maximum Detected Concentration	Maximum Qualifier	EPC Units	Reasonable Maximum Exposure			Central Tendency		
							Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale	Medium EPC Value	Medium EPC Statistic	Medium EPC Rationale
Aluminum	mg/kg	12600	13400	20700		mg/kg	13400	95%UCL-N	Wt >Wno> Wig	12600	Mean-N	CTE uses AVG
Arsenic	mg/kg	2.22	3.06	12.9		mg/kg	3.06	95%UCL-T	Wt >Wig>=Wno	2.21	Mean-T	CTE uses LgAV
Barium	mg/kg	182	217	1030		mg/kg	217	95%UCL-T	Wt >Wig>=Wno	169	Mean-T	CTE uses LgAV
Cadmium	mg/kg	4.65	5.5	137		mg/kg	5.5	95%UCL-T	Wt >Wig>=Wno	2.47	Mean-T	CTE uses LgAV
Copper	mg/kg	636	802	19300	J	mg/kg	802	95%UCL-T	Wt >Wig>=Wno	237	Mean-T	CTE uses LgAV
Iron	mg/kg	28600	33700	92600		mg/kg	33700	95%UCL-T	Wt >Wig>=Wno	28500	Mean-T	CTE uses LgAV
Lead	mg/kg	138	142	2400	K	mg/kg	72.7	Mean-T	IEUBK Uses Lg	72.7	Mean-T	IEUBK Uses Lg
Manganese	mg/kg	740	937	9240	J	mg/kg	937	95%UCL-T	Wt >Wig>=Wno	693	Mean-T	CTE uses LgAV
Mercury	mg/kg	0.248	0.347	2.6		mg/kg	0.347	95%UCL-T	Wt >Wig>=Wno	0.17	Mean-T	CTE uses LgAV
Nickel	mg/kg	39	39.3	625		mg/kg	39.3	95%UCL-T	Wt >Wig>=Wno	30	Mean-T	CTE uses LgAV
Silver	mg/kg	13.6	38.3	111		mg/kg	38.3	95%UCL-T	Wt >Wig>=Wno	15.3	Mean-T	CTE uses LgAV
Thallium	mg/kg	0.622	0.703	1.1	K	mg/kg	0.703	95%UCL-T	Wt >Wig>=Wno	0.57	Mean-T	CTE uses LgAV
Vanadium	mg/kg	160	61.6	6510		mg/kg	61.6	95%UCL-T	Wt >Wig>=Wno	45.7	Mean-T	CTE uses LgAV
Zinc	mg/kg	265	286	4760	L	mg/kg	286	95%UCL-T	Wt >Wig>=Wno	170	Mean-T	CTE uses LgAV
4,4'-DDD	ug/kg	297	19.4	12000		ug/kg	19.4	95%UCL-T	Wt >Wig>=Wno	9.03	Mean-T	CTE uses LgAV
4,4'-DDE	ug/kg	68.3	11.1	2600	K	ug/kg	11.1	95%UCL-T	Wt >Wig>=Wno	6.23	Mean-T	CTE uses LgAV
4,4'-DDT	ug/kg	157	13.3	6300		ug/kg	13.3	95%UCL-T	Wt >Wig>=Wno	6.95	Mean-T	CTE uses LgAV
Aroclor-1242	ug/kg	33.8	32.7	100	J	ug/kg	32.7	95%UCL-T	Wt >Wig>=Wno	27	Mean-T	CTE uses LgAV
Aroclor-1248	ug/kg	37	34	315		ug/kg	34	95%UCL-T	Wt >Wig>=Wno	27.4	Mean-T	CTE uses LgAV
Aroclor-1254	ug/kg	59	63	395		ug/kg	63	95%UCL-T	Wt >Wig>=Wno	44.1	Mean-T	CTE uses LgAV
Benz(a)anthracene	ug/kg	316	384	1100	J	ug/kg	384	95%UCL-T	Wt >Wig>=Wno	265	Mean-T	CTE uses LgAV
Benzo(a)pyrene	ug/kg	310	375	920	J	ug/kg	375	95%UCL-T	Wt >Wig>=Wno	262	Mean-T	CTE uses LgAV
Benzo(b)fluoranthene	ug/kg	302	371	1000	J	ug/kg	371	95%UCL-T	Wt >Wig>=Wno	252	Mean-T	CTE uses LgAV
Chrysene	ug/kg	336	403	2000	J	ug/kg	403	95%UCL-T	Wt >Wig>=Wno	270	Mean-T	CTE uses LgAV

(1) Represents the 95% UCL of normal data for normal distributions; Represents the log-transformed 95% UCL for lognormal distributions.
Statistics: Maximum Detected Value (Max); 95% UCL of Normal Data (95% UCL-N); 95% UCL of Log-transformed Data (95% UCL-T); Minimum variance unbiased estimate of arithmetic mean for lognormally distribute
Mean of Normal Data (Mean-N).
NA - Not Applicable.

TABLE 9

CALCULATION OF NON-CANCER HAZARDS - CHILD RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	1.53E-01	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.53E-01
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	4.68E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	4.68E-02
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	3.43E-03	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	8.58E-02
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	8.95E-04	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	9.07E-03	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	3.78E-01
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	1.88E-05	mg/kg-day	1.00E-04	mg/kg-day	N/A	N/A	1.88E-01
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	3.37E-04	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	6.75E-02
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	9.45E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.35E-01
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	4.08E-04	mg/kg-day	7.00E-03	mg/kg-day	N/A	N/A	5.83E-02
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	4.29E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.43E-02
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	3.80E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	3.60E-06	mg/kg-day	2.00E-05	mg/kg-day	N/A	N/A	1.80E-01
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	3.39E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	3.12E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	1.39E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	1.04E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	3.48E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	4.62E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	6.93E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												1.31E+00

TABLE 9 (continued)
CALCULATION OF NON-CANCER HAZARDS - CHILD RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal Absorption	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	7.24E-04	mg/kg-day	2.70E-01	mg/kg-day	N/A	N/A	2.68E-03
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	2.22E-07	mg/kg-day	5.00E-05	mg/kg-day	N/A	N/A	4.45E-03
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	1.63E-05	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	6.79E-04
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	4.25E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	4.31E-05	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	1.79E-03
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	8.94E-08	mg/kg-day	1.50E-05	mg/kg-day	N/A	N/A	5.96E-03
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	1.60E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.20E-04
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	4.49E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	6.41E-04
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	1.94E-06	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	1.38E-02
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	2.04E-05	mg/kg-day	7.50E-02	mg/kg-day	N/A	N/A	2.71E-04
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	1.81E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	1.71E-07	mg/kg-day	2.00E-05	mg/kg-day	N/A	N/A	8.56E-03
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	1.61E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	1.48E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	6.59E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	4.94E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	1.65E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	2.20E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	3.29E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												3.92E-02
												Total of Routes	1.35E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 10

CALCULATION OF NON-CANCER HAZARDS - CHILD RESIDENT PARTICULATE DUST INHALATION FROM SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Inhalation of Particulates from Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	1.66E-05	mg/kg-day	--	--	--	mg/kg-day	--
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	5.10E-09	mg/kg-day	--	--	--	mg/kg-day	--
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	3.74E-07	mg/kg-day	--	--	--	mg/kg-day	--
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	9.77E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	9.89E-07	mg/kg-day	--	--	1.43E-05	mg/kg-day	6.92E-02
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	2.05E-09	mg/kg-day	--	--	8.60E-05	mg/kg-day	2.39E-05
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	3.68E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	1.03E-09	mg/kg-day	--	--	--	mg/kg-day	--
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	4.45E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	4.68E-07	mg/kg-day	--	--	--	mg/kg-day	--
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	4.15E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	3.93E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	3.69E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	3.40E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	1.51E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	1.13E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	3.79E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	5.04E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	7.56E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												6.92E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 11

CALCULATION OF NON-CANCER HAZARDS - ADULT RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	1.81E-02	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.81E-02
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	5.55E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	5.55E-03
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	4.07E-04	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	1.02E-02
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	1.06E-04	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	1.08E-03	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	4.48E-02
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	2.23E-06	mg/kg-day	1.00E-04	mg/kg-day	N/A	N/A	2.23E-02
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	4.00E-05	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	8.00E-03
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	1.12E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.60E-02
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	4.84E-05	mg/kg-day	7.00E-03	mg/kg-day	N/A	N/A	6.91E-03
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	5.08E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.69E-03
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	4.51E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	4.27E-07	mg/kg-day	2.00E-05	mg/kg-day	N/A	N/A	2.14E-02
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	4.01E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	3.70E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	1.64E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	1.23E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	4.12E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	5.48E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	8.22E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												1.55E-01

TABLE 11 (continued)
CALCULATION OF NON-CANCER HAZARDS - ADULT RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal Absorption	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	5.37E-04	mg/kg-day	2.70E-01	mg/kg-day	N/A	N/A	1.99E-03
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	1.65E-07	mg/kg-day	5.00E-05	mg/kg-day	N/A	N/A	3.30E-03
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	1.21E-05	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	5.03E-04
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	3.15E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	3.19E-05	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	1.33E-03
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	6.63E-08	mg/kg-day	1.50E-05	mg/kg-day	N/A	N/A	4.42E-03
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	1.19E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	2.38E-04
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	3.33E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	4.75E-04
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	1.44E-06	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	1.03E-02
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	1.51E-05	mg/kg-day	7.50E-02	mg/kg-day	N/A	N/A	2.01E-04
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	1.34E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	1.27E-07	mg/kg-day	2.00E-05	mg/kg-day	N/A	N/A	6.35E-03
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	1.19E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	1.10E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	4.88E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	3.66E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	1.22E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	1.63E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	2.44E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												2.91E-02
												Total of Routes	1.84E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 12

CALCULATION OF NON-CANCER HAZARDS - ADULT RESIDENT PARTICULATE DUST INHALATION FROM SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Inhalation of Particulates from Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	5.26E-06	mg/kg-day	--	--	--	mg/kg-day	--
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	1.61E-09	mg/kg-day	--	--	--	mg/kg-day	--
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	1.18E-07	mg/kg-day	--	--	--	mg/kg-day	--
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	3.09E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	3.13E-07	mg/kg-day	--	--	1.43E-05	mg/kg-day	2.19E-02
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	6.50E-10	mg/kg-day	--	--	8.60E-05	mg/kg-day	7.55E-06
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	1.16E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	3.26E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	1.41E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	1.48E-07	mg/kg-day	--	--	--	mg/kg-day	--
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	1.31E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	1.24E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	1.17E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	1.08E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	4.78E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	3.59E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	1.20E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	1.59E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	2.39E-11	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												2.19E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 13

CALCULATION OF NON-CANCER HAZARDS - CHILD RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	1.55E-01	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.55E-01
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	3.54E-05	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.18E-01
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	2.51E-03	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	3.58E-02
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	6.35E-05	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	6.35E-02
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	9.27E-03	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.32E-01
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	3.89E-01	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.30E+00
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	8.40E-04	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	1.08E-02	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	4.51E-01
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	4.01E-06	mg/kg-day	1.00E-04	mg/kg-day	N/A	N/A	4.01E-02
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	4.54E-04	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.27E-02
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	4.42E-04	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	8.85E-02
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	8.12E-06	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.16E-01
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	7.12E-04	mg/kg-day	7.00E-03	mg/kg-day	N/A	N/A	1.02E-01
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	3.30E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.10E-02
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	2.24E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	1.28E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	1.54E-07	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	3.07E-04
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	3.78E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	3.93E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	7.28E-07	mg/kg-day	2.00E-05	mg/kg-day	N/A	N/A	3.64E-02
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	4.44E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	4.33E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	4.29E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	4.66E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												2.77E+00

TABLE 13 (continued)

CALCULATION OF NON-CANCER HAZARDS - CHILD RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal Absorption	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	7.35E-04	mg/kg-day	2.70E-01	mg/kg-day	N/A	N/A	2.72E-03
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	5.37E-07	mg/kg-day	2.85E-04	mg/kg-day	N/A	N/A	1.89E-03
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	1.19E-05	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	1.70E-04
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	3.02E-07	mg/kg-day	5.00E-05	mg/kg-day	N/A	N/A	6.04E-03
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	4.40E-05	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	1.83E-03
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	1.85E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	6.16E-03
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	3.99E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	5.14E-05	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	2.14E-03
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	1.90E-08	mg/kg-day	1.50E-05	mg/kg-day	N/A	N/A	1.27E-03
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	2.16E-06	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	1.08E-03
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	2.10E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	4.20E-04
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	3.86E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	5.51E-04
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	3.38E-06	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	2.41E-02
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	1.57E-05	mg/kg-day	7.50E-02	mg/kg-day	N/A	N/A	2.09E-04
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	1.06E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	6.09E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	7.30E-09	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	1.46E-05
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	1.79E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	1.87E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	3.46E-08	mg/kg-day	2.00E-05	mg/kg-day	N/A	N/A	1.73E-03
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	2.11E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	2.06E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	2.04E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	2.21E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												5.04E-02
												Total of Routes	2.82E+00

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 14

CALCULATION OF NON-CANCER HAZARDS - CHILD RESIDENT PARTICULATE DUST INHALATION FROM SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Particulates
Exposure Point: Inhalation of Particulates from Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	1.69E-05	mg/kg-day	--	--	--	mg/kg-day	--
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	3.86E-09	mg/kg-day	--	--	--	mg/kg-day	--
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	2.73E-07	mg/kg-day	--	--	1.43E-04	mg/kg-day	1.91E-03
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	6.93E-09	mg/kg-day	--	--	--	mg/kg-day	--
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	1.01E-06	mg/kg-day	--	--	--	mg/kg-day	--
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	4.25E-05	mg/kg-day	--	--	--	mg/kg-day	--
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	9.16E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	1.18E-06	mg/kg-day	--	--	1.43E-05	mg/kg-day	8.26E-02
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	4.37E-10	mg/kg-day	--	--	8.60E-05	mg/kg-day	5.09E-06
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	4.95E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	4.83E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	8.86E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	7.76E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	3.60E-07	mg/kg-day	--	--	--	mg/kg-day	--
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	2.45E-11	mg/kg-day	--	--	--	mg/kg-day	--
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	1.40E-11	mg/kg-day	--	--	--	mg/kg-day	--
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	1.68E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	4.12E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	4.29E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	7.94E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	4.84E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	4.73E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	4.68E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	5.08E-10	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												8.45E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 15

CALCULATION OF NON-CANCER HAZARDS - ADULT RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Ingestion	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	1.84E-02	mg/kg-day	1.00E+00	mg/kg-day	N/A	N/A	1.84E-02
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	4.19E-06	mg/kg-day	3.00E-04	mg/kg-day	N/A	N/A	1.40E-02
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	2.97E-04	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	4.25E-03
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	7.53E-06	mg/kg-day	1.00E-03	mg/kg-day	N/A	N/A	7.53E-03
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	1.10E-03	mg/kg-day	4.00E-02	mg/kg-day	N/A	N/A	2.75E-02
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	4.62E-02	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.54E-01
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	9.96E-05	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	1.28E-03	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	5.35E-02
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	4.75E-07	mg/kg-day	1.00E-04	mg/kg-day	N/A	N/A	4.75E-03
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	5.38E-05	mg/kg-day	2.00E-02	mg/kg-day	N/A	N/A	2.69E-03
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	5.25E-05	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	1.05E-02
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	9.63E-07	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	1.38E-02
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	8.44E-05	mg/kg-day	7.00E-03	mg/kg-day	N/A	N/A	1.21E-02
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	3.92E-04	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	1.31E-03
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	2.66E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	1.52E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	1.82E-08	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	3.64E-05
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	4.48E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	4.66E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	8.63E-08	mg/kg-day	2.00E-05	mg/kg-day	N/A	N/A	4.32E-03
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	5.26E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	5.14E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	5.08E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	5.52E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												3.28E-01

TABLE 15 (continued)
CALCULATION OF NON-CANCER HAZARDS - ADULT RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Dermal Absorption	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	5.45E-04	mg/kg-day	2.70E-01	mg/kg-day	N/A	N/A	2.02E-03
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	3.98E-07	mg/kg-day	2.85E-04	mg/kg-day	N/A	N/A	1.40E-03
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	8.83E-06	mg/kg-day	7.00E-02	mg/kg-day	N/A	N/A	1.26E-04
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	2.24E-07	mg/kg-day	5.00E-05	mg/kg-day	N/A	N/A	4.48E-03
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	3.26E-05	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	1.36E-03
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	1.37E-03	mg/kg-day	3.00E-01	mg/kg-day	N/A	N/A	4.57E-03
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	2.96E-06	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	3.81E-05	mg/kg-day	2.40E-02	mg/kg-day	N/A	N/A	1.59E-03
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	1.41E-08	mg/kg-day	1.50E-05	mg/kg-day	N/A	N/A	9.41E-04
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	1.60E-06	mg/kg-day	2.00E-03	mg/kg-day	N/A	N/A	7.99E-04
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	1.56E-06	mg/kg-day	5.00E-03	mg/kg-day	N/A	N/A	3.12E-04
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	2.86E-08	mg/kg-day	7.00E-05	mg/kg-day	N/A	N/A	4.09E-04
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	2.51E-06	mg/kg-day	1.40E-04	mg/kg-day	N/A	N/A	1.79E-02
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	1.16E-05	mg/kg-day	7.50E-02	mg/kg-day	N/A	N/A	1.55E-04
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	7.89E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	4.52E-09	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	5.41E-09	mg/kg-day	5.00E-04	mg/kg-day	N/A	N/A	1.08E-05
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	1.33E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	1.38E-08	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	2.56E-08	mg/kg-day	2.00E-05	mg/kg-day	N/A	N/A	1.28E-03
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	1.56E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	1.53E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	1.51E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	1.64E-07	mg/kg-day	--	mg/kg-day	N/A	N/A	--
	(Total)												3.73E-02
												Total of Routes	3.66E-01

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 16
CALCULATION OF NON-CANCER HAZARDS - ADULT RESIDENT PARTICULATE DUST INHALATION FROM SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Particulates
Exposure Point: Inhalation of Particulates from Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Hazard Calculation (1)	Intake (Non-Cancer)	Intake (Non-Cancer) Units	Reference Dose	Reference Dose Units	Reference Concentration	Reference Concentration Units	Hazard Quotient
Inhalation	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	5.34E-06	mg/kg-day	--	--	--	mg/kg-day	--
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	1.22E-09	mg/kg-day	--	--	--	mg/kg-day	--
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	8.65E-08	mg/kg-day	--	--	1.43E-04	mg/kg-day	6.05E-04
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	2.19E-09	mg/kg-day	--	--	--	mg/kg-day	--
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	3.20E-07	mg/kg-day	--	--	--	mg/kg-day	--
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	1.34E-05	mg/kg-day	--	--	--	mg/kg-day	--
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	2.90E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	3.73E-07	mg/kg-day	--	--	1.43E-05	mg/kg-day	2.61E-02
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	1.38E-10	mg/kg-day	--	--	8.60E-05	mg/kg-day	1.61E-06
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	1.57E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	1.53E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	2.80E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	2.45E-08	mg/kg-day	--	--	--	mg/kg-day	--
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	1.14E-07	mg/kg-day	--	--	--	mg/kg-day	--
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	7.73E-12	mg/kg-day	--	--	--	mg/kg-day	--
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	4.42E-12	mg/kg-day	--	--	--	mg/kg-day	--
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	5.30E-12	mg/kg-day	--	--	--	mg/kg-day	--
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	1.30E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	1.35E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	2.51E-11	mg/kg-day	--	--	--	mg/kg-day	--
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	1.53E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	1.49E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	1.48E-10	mg/kg-day	--	--	--	mg/kg-day	--
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	1.61E-10	mg/kg-day	--	--	--	mg/kg-day	--
	(Total)												2.67E-02

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for hazard calculation.

TABLE 17

CALCULATION OF CANCER RISKS - CHILD RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	1.31E-02	mg/kg-day	--	1/(mg/kg-day)	--
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	4.01E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	2.94E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	7.67E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	7.77E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	1.61E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	2.89E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	8.10E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	3.50E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	3.67E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	3.26E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	6.52E-08
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	3.09E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	6.18E-07
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	2.90E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	2.12E-07
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	2.67E-07	mg/kg-day	7.30E+00	1/(mg/kg-day)	1.95E-06
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	1.19E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	8.67E-08
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	8.91E-08	mg/kg-day	7.30E-02	1/(mg/kg-day)	6.51E-09
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	2.98E-07	mg/kg-day	7.30E-03	1/(mg/kg-day)	2.18E-09
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	3.96E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.89E-07
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	5.94E-08	mg/kg-day	7.30E-01	1/(mg/kg-day)	4.34E-08
	(Total)										3.27E-06

TABLE 17 (continued)

CALCULATION OF CANCER RISKS - CHILD RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	6.21E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	1.91E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	1.40E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	3.65E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	3.69E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	7.67E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	1.37E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	3.85E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	1.66E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	1.75E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	1.55E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	3.10E-09
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	1.47E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	2.94E-08
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	1.38E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	1.27E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	5.64E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	4.23E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	1.42E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	1.88E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	2.82E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										3.24E-08
										Total of Routes	3.31E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 18

CALCULATION OF CANCER RISKS - CHILD RESIDENT PARTICULATE DUST INHALATION FROM SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Inhalation of Particulates from Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	1.43E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	4.38E-10	mg/kg-day	6.30E+00	1/(mg/kg-day)	2.76E-09
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	3.21E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	8.37E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	8.48E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	1.76E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	3.15E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	8.84E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	3.81E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	4.01E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	3.55E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	7.11E-12
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	3.37E-11	mg/kg-day	2.00E+00	1/(mg/kg-day)	6.74E-11
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	3.17E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	2.92E-11	mg/kg-day	3.10E+00	1/(mg/kg-day)	9.04E-11
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	1.30E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	9.72E-12	mg/kg-day	--	1/(mg/kg-day)	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	3.25E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	4.32E-12	mg/kg-day	--	1/(mg/kg-day)	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	6.48E-12	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										2.92E-09

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 19

CALCULATION OF CANCER RISKS - ADULT RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	6.20E-03	mg/kg-day	--	1/(mg/kg-day)	--
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	1.90E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	1.39E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	3.64E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	3.69E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	7.66E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	1.37E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	3.84E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	1.66E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	1.74E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	1.55E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	3.09E-08
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	1.47E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	2.93E-07
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	1.38E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	1.00E-07
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	1.27E-07	mg/kg-day	7.30E+00	1/(mg/kg-day)	9.26E-07
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	5.64E-08	mg/kg-day	7.30E-01	1/(mg/kg-day)	4.11E-08
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	4.23E-08	mg/kg-day	7.30E-02	1/(mg/kg-day)	3.09E-09
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	1.41E-07	mg/kg-day	7.30E-03	1/(mg/kg-day)	1.03E-09
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	1.88E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	1.37E-07
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	2.82E-08	mg/kg-day	7.30E-01	1/(mg/kg-day)	2.06E-08
	(Total)										1.55E-06

TABLE 19 - (continued)

CALCULATION OF CANCER RISKS - ADULT RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	1.84E-04	mg/kg-day	–	1/(mg/kg-day)	–
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	5.65E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	4.14E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	1.08E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	1.10E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	2.27E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	4.07E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	1.14E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	4.92E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	5.18E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	4.59E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	9.18E-09
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	4.35E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	8.70E-08
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	4.09E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	3.77E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	1.67E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	1.26E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	4.20E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	5.58E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	8.37E-09	mg/kg-day	–	1/(mg/kg-day)	–
	(Total)										9.62E-08
										Total of Routes	1.65E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 20

CALCULATION OF CANCER RISKS - ADULT RESIDENT PARTICULATE DUST INHALATION FROM SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Inhalation of Particulates from Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	1.80E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	5.53E-10	mg/kg-day	6.30E+00	1/(mg/kg-day)	3.49E-09
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	4.06E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	1.06E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	1.07E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	2.23E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	3.99E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	1.12E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	4.82E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	5.07E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	4.50E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	8.99E-12
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	4.26E-11	mg/kg-day	2.00E+00	1/(mg/kg-day)	8.53E-11
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	4.00E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	3.69E-11	mg/kg-day	3.10E+00	1/(mg/kg-day)	1.14E-10
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	1.64E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	1.23E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	4.11E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	5.47E-12	mg/kg-day	--	1/(mg/kg-day)	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	8.20E-12	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										3.69E-09

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 21

CALCULATION OF CANCER RISKS - CHILD RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	1.33E-02	mg/kg-day	--	1/(mg/kg-day)	--
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	3.03E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	4.55E-06
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	2.15E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	5.45E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	7.94E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	3.34E-02	mg/kg-day	--	1/(mg/kg-day)	--
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	7.20E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	9.28E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	3.44E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	3.89E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	3.79E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	6.96E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	6.10E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	2.83E-04	mg/kg-day	--	1/(mg/kg-day)	--
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	1.92E-08	mg/kg-day	2.40E-01	1/(mg/kg-day)	4.61E-09
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	1.10E-08	mg/kg-day	3.40E-01	1/(mg/kg-day)	3.74E-09
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	1.32E-08	mg/kg-day	3.40E-01	1/(mg/kg-day)	4.48E-09
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	3.24E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	6.48E-08
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	3.37E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	6.73E-08
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	6.24E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.25E-07
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	3.80E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	2.78E-07
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	3.71E-07	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.71E-06
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	3.67E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	2.68E-07
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	3.99E-07	mg/kg-day	7.30E-03	1/(mg/kg-day)	2.91E-09
	(Total)										8.07E-06

TABLE 21 (continued)
CALCULATION OF CANCER RISKS - CHILD RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	6.30E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	4.61E-08	mg/kg-day	1.58E+00	1/(mg/kg-day)	7.27E-08
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	1.02E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	2.59E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	3.77E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	1.59E-04	mg/kg-day	–	1/(mg/kg-day)	–
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	3.42E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	4.41E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	1.63E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	1.85E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	1.80E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	3.31E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	2.90E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	1.35E-06	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	9.13E-10	mg/kg-day	2.40E-01	1/(mg/kg-day)	2.19E-10
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	5.22E-10	mg/kg-day	3.40E-01	1/(mg/kg-day)	1.78E-10
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	6.26E-10	mg/kg-day	3.40E-01	1/(mg/kg-day)	2.13E-10
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	1.54E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	3.08E-09
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	1.60E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	3.20E-09
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	2.96E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	5.93E-09
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	1.81E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	1.76E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	1.75E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	1.90E-08	mg/kg-day	–	1/(mg/kg-day)	–
	(Total)										8.55E-08
										Total of Routes	8.16E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 22

CALCULATION OF CANCER RISKS - CHILD RESIDENT PARTICULATE DUST INHALATION FROM SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Particulates
Exposure Point: Inhalation of Particulates from Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Child

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	1.45E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	3.31E-10	mg/kg-day	1.51E+01	1/(mg/kg-day)	4.99E-09
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	2.34E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	5.94E-10	mg/kg-day	6.30E+00	1/(mg/kg-day)	3.74E-09
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	8.66E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	3.64E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	7.85E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	1.01E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	3.75E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	4.25E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	4.14E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	7.59E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	6.65E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	3.09E-08	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	2.10E-12	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	1.20E-12	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	1.44E-12	mg/kg-day	3.40E-01	1/(mg/kg-day)	4.89E-13
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	3.53E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	7.07E-12
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	3.67E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	7.35E-12
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	6.81E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.36E-11
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	4.15E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	4.05E-11	mg/kg-day	3.10E+00	1/(mg/kg-day)	1.26E-10
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	4.01E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	4.35E-11	mg/kg-day	–	1/(mg/kg-day)	–
	(Total)										8.89E-09

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 23

CALCULATION OF CANCER RISKS - ADULT RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	6.29E-03	mg/kg-day	–	1/(mg/kg-day)	–
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	1.44E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	2.16E-06
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	1.02E-04	mg/kg-day	–	1/(mg/kg-day)	–
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	2.58E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	3.77E-04	mg/kg-day	–	1/(mg/kg-day)	–
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	1.58E-02	mg/kg-day	–	1/(mg/kg-day)	–
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	3.41E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	4.40E-04	mg/kg-day	–	1/(mg/kg-day)	–
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	1.63E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	1.85E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	1.80E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	3.30E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	2.89E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	1.34E-04	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	9.11E-09	mg/kg-day	2.40E-01	1/(mg/kg-day)	2.19E-09
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	5.21E-09	mg/kg-day	3.40E-01	1/(mg/kg-day)	1.77E-09
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	6.25E-09	mg/kg-day	3.40E-01	1/(mg/kg-day)	2.12E-09
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	1.54E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	3.07E-08
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	1.60E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	3.19E-08
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	2.96E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	5.92E-08
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	1.80E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	1.32E-07
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	1.76E-07	mg/kg-day	7.30E+00	1/(mg/kg-day)	1.29E-06
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	1.74E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	1.27E-07
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	1.89E-07	mg/kg-day	7.30E-03	1/(mg/kg-day)	1.38E-09
	(Total)										3.83E-06

TABLE 23 : (continued)

CALCULATION OF CANCER RISKS - ADULT RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	1.87E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	1.37E-07	mg/kg-day	1.58E+00	1/(mg/kg-day)	2.16E-07
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	3.03E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	7.67E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	1.12E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	4.70E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	1.01E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	1.31E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	4.84E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	5.48E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	5.34E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	9.81E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	8.59E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	3.99E-06	mg/kg-day	--	1/(mg/kg-day)	--
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	2.71E-09	mg/kg-day	2.40E-01	1/(mg/kg-day)	6.49E-10
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	1.55E-09	mg/kg-day	3.40E-01	1/(mg/kg-day)	5.26E-10
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	1.86E-09	mg/kg-day	3.40E-01	1/(mg/kg-day)	6.31E-10
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	4.58E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	9.12E-09
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	4.74E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	9.49E-09
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	8.79E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.76E-08
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	5.36E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	5.23E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	5.18E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	5.62E-08	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										2.54E-07
										Total of Routes	4.08E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 24

CALCULATION OF CANCER RISKS - ADULT RESIDENT PARTICULATE DUST INHALATION FROM SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Particulates
Exposure Point: Inhalation of Particulates from Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Adult

Exposure *Route*	Chemical *of Potential* Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	1.83E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	4.18E-10	mg/kg-day	1.51E+01	1/(mg/kg-day)	6.31E-09
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	2.96E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	7.51E-10	mg/kg-day	6.30E+00	1/(mg/kg-day)	4.73E-09
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	1.10E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	4.60E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	9.93E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	1.28E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	4.74E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	5.37E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	5.23E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	9.61E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	8.42E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	3.91E-08	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	2.65E-12	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	1.52E-12	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	1.82E-12	mg/kg-day	3.40E-01	1/(mg/kg-day)	6.18E-13
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	4.47E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	8.94E-12
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	4.65E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	9.29E-12
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	8.61E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.72E-11
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	5.25E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	5.12E-11	mg/kg-day	3.10E+00	1/(mg/kg-day)	1.59E-10
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	5.07E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	5.51E-11	mg/kg-day	–	1/(mg/kg-day)	–
	(Total)										1.12E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 25

CALCULATION OF CANCER RISKS - LIFETIME RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	6.20E-03	mg/kg-day	--	1/(mg/kg-day)	--
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	1.90E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	1.39E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	3.64E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	3.69E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	7.66E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	1.37E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	3.84E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	1.66E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	1.74E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	4.80E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	9.61E-08
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	4.55E-07	mg/kg-day	2.00E+00	1/(mg/kg-day)	9.11E-07
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	4.28E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	3.12E-07
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	3.94E-07	mg/kg-day	7.30E+00	1/(mg/kg-day)	2.88E-06
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	1.75E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	1.28E-07
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	1.31E-07	mg/kg-day	7.30E-02	1/(mg/kg-day)	9.59E-09
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	4.39E-07	mg/kg-day	7.30E-03	1/(mg/kg-day)	3.21E-09
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	5.84E-08	mg/kg-day	7.30E+00	1/(mg/kg-day)	4.26E-07
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	8.76E-08	mg/kg-day	7.30E-01	1/(mg/kg-day)	6.39E-08
	(Total)										4.83E-06

TABLE 25 (continued)

CALCULATION OF CANCER RISKS - LIFETIME RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Surface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	1.84E-04	mg/kg-day	--	1/(mg/kg-day)	--
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	5.65E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	4.14E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	1.08E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	1.10E-05	mg/kg-day	--	1/(mg/kg-day)	--
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	2.27E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	4.07E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	1.14E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	4.92E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	5.18E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	6.14E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.23E-08
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	5.82E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.16E-07
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	4.09E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	3.77E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	1.67E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	1.26E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	4.20E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	5.58E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	8.37E-09	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										1.29E-07
										Total of Routes	4.96E-06

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 26

CALCULATION OF CANCER RISKS - LIFETIME RESIDENT PARTICULATE DUST INHALATION FROM SITE 5 SURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Surface Soil
Exposure Medium: Particulates
Exposure Point: Inhalation of Particulates from Site 5 Surface Soil
Receptor Population: Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Aluminum	1.32E+04	mg/kg	1.32E+04	mg/kg	M	1.80E-06	mg/kg-day	--	1/(mg/kg-day)	--
	Cadmium	4.05E+00	mg/kg	4.05E+00	mg/kg	M	9.91E-10	mg/kg-day	6.30E+00	1/(mg/kg-day)	6.24E-09
	Copper	2.97E+02	mg/kg	2.97E+02	mg/kg	M	4.06E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Lead	7.75E+01	mg/kg	7.75E+01	mg/kg	M	1.06E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Manganese	7.85E+02	mg/kg	7.85E+02	mg/kg	M	1.07E-07	mg/kg-day	--	1/(mg/kg-day)	--
	Mercury	1.63E+00	mg/kg	1.63E+00	mg/kg	M	2.23E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Silver	2.92E+01	mg/kg	2.92E+01	mg/kg	M	3.99E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Thallium	8.18E-01	mg/kg	8.18E-01	mg/kg	M	1.12E-10	mg/kg-day	--	1/(mg/kg-day)	--
	Vanadium	3.53E+01	mg/kg	3.53E+01	mg/kg	M	4.82E-09	mg/kg-day	--	1/(mg/kg-day)	--
	Zinc	3.71E+02	mg/kg	3.71E+02	mg/kg	M	5.07E-08	mg/kg-day	--	1/(mg/kg-day)	--
	Aroclor-1242	3.29E+01	ug/kg	3.29E+01	ug/kg	M	8.05E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.61E-11
	Aroclor-1254	3.12E+02	ug/kg	3.12E+02	ug/kg	M	7.63E-11	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.53E-10
	Benz(a)anthracene	2.93E+02	ug/kg	2.93E+02	ug/kg	M	4.00E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(a)pyrene	2.70E+02	ug/kg	2.70E+02	ug/kg	M	6.61E-11	mg/kg-day	3.10E+00	1/(mg/kg-day)	2.05E-10
	Benzo(b)fluoranthene	1.20E+02	ug/kg	1.20E+02	ug/kg	M	1.64E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Benzo(k)fluoranthene	9.00E+01	ug/kg	9.00E+01	ug/kg	M	1.23E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Chrysene	3.01E+02	ug/kg	3.01E+02	ug/kg	M	4.11E-11	mg/kg-day	--	1/(mg/kg-day)	--
	Dibenz(a,h)anthracene	4.00E+01	ug/kg	4.00E+01	ug/kg	M	5.47E-12	mg/kg-day	--	1/(mg/kg-day)	--
	Indeno(1,2,3-cd)pyrene	6.00E+01	ug/kg	6.00E+01	ug/kg	M	8.20E-12	mg/kg-day	--	1/(mg/kg-day)	--
	(Total)										6.62E-09

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 27

CALCULATION OF CANCER RISKS - LIFETIME RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Ingestion	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	6.29E-03	mg/kg-day	–	1/(mg/kg-day)	–
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	4.47E-06	mg/kg-day	1.50E+00	1/(mg/kg-day)	6.70E-06
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	1.02E-04	mg/kg-day	–	1/(mg/kg-day)	–
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	2.58E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	3.77E-04	mg/kg-day	–	1/(mg/kg-day)	–
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	1.58E-02	mg/kg-day	–	1/(mg/kg-day)	–
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	3.41E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	4.40E-04	mg/kg-day	–	1/(mg/kg-day)	–
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	1.63E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	1.85E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	1.80E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	3.30E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	2.89E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	1.34E-04	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	2.83E-08	mg/kg-day	2.40E-01	1/(mg/kg-day)	6.80E-09
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	1.62E-08	mg/kg-day	3.40E-01	1/(mg/kg-day)	5.51E-09
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	1.94E-08	mg/kg-day	3.40E-01	1/(mg/kg-day)	6.60E-09
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	4.77E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	9.55E-08
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	4.96E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	9.93E-08
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	9.20E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.84E-07
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	5.61E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	4.09E-07
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	5.47E-07	mg/kg-day	7.30E+00	1/(mg/kg-day)	4.00E-06
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	5.42E-07	mg/kg-day	7.30E-01	1/(mg/kg-day)	3.95E-07
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	5.88E-07	mg/kg-day	7.30E-03	1/(mg/kg-day)	4.29E-09
	(Total)										1.19E-05

TABLE 27 (continued)
CALCULATION OF CANCER RISKS - LIFETIME RESIDENT CONTACT (ING. & DER.) WITH SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Subsurface Soil
Exposure Point: Contact (Ing. & Der.) with Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Dermal Absorption	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	1.87E-04	mg/kg-day	–	1/(mg/kg-day)	–
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	1.83E-07	mg/kg-day	1.58E+00	1/(mg/kg-day)	2.88E-07
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	3.03E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	7.67E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	1.12E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	4.70E-04	mg/kg-day	–	1/(mg/kg-day)	–
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	1.01E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	1.31E-05	mg/kg-day	–	1/(mg/kg-day)	–
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	4.84E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	5.48E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	5.34E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	9.81E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	8.59E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	3.99E-06	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	3.62E-09	mg/kg-day	2.40E-01	1/(mg/kg-day)	8.68E-10
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	2.07E-09	mg/kg-day	3.40E-01	1/(mg/kg-day)	7.04E-10
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	2.48E-09	mg/kg-day	3.40E-01	1/(mg/kg-day)	8.43E-10
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	6.10E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.22E-08
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	6.34E-09	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.27E-08
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	1.18E-08	mg/kg-day	2.00E+00	1/(mg/kg-day)	2.35E-08
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	5.36E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	5.23E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	5.18E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	5.62E-08	mg/kg-day	–	1/(mg/kg-day)	–
	(Total)										3.39E-07
										Total of Routes	1.22E-05

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

TABLE 28

CALCULATION OF CANCER RISKS - LIFETIME RESIDENT PARTICULATE DUST INHALATION FROM SITE 5 SUBSURFACE SOIL
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario Timeframe: Future
Medium: Subsurface Soil
Exposure Medium: Particulates
Exposure Point: Inhalation of Particulates from Site 5 Subsurface Soil
Receptor Population: Resident
Receptor Age: Child/Adult

Exposure Route	Chemical of Potential Concern	Medium EPC Value	Medium EPC Units	Route EPC Value	Route EPC Units	EPC Selected for Risk Calculation (1)	Intake (Cancer)	Intake (Cancer) Units	Cancer Slope Factor	Cancer Slope Factor Units	Cancer Risk
Inhalation	Aluminum	1.34E+04	mg/kg	1.34E+04	mg/kg	M	1.83E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Arsenic	3.06E+00	mg/kg	3.06E+00	mg/kg	M	7.49E-10	mg/kg-day	1.51E+01	1/(mg/kg-day)	1.13E-08
	Barium	2.17E+02	mg/kg	2.17E+02	mg/kg	M	2.96E-08	mg/kg-day	–	1/(mg/kg-day)	–
	Cadmium	5.50E+00	mg/kg	5.50E+00	mg/kg	M	1.35E-09	mg/kg-day	6.30E+00	1/(mg/kg-day)	8.48E-09
	Copper	8.02E+02	mg/kg	8.02E+02	mg/kg	M	1.10E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Iron	3.37E+04	mg/kg	3.37E+04	mg/kg	M	4.60E-06	mg/kg-day	–	1/(mg/kg-day)	–
	Lead	7.27E+01	mg/kg	7.27E+01	mg/kg	M	9.93E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Manganese	9.37E+02	mg/kg	9.37E+02	mg/kg	M	1.28E-07	mg/kg-day	–	1/(mg/kg-day)	–
	Mercury	3.47E-01	mg/kg	3.47E-01	mg/kg	M	4.74E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Nickel	3.93E+01	mg/kg	3.93E+01	mg/kg	M	5.37E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Silver	3.83E+01	mg/kg	3.83E+01	mg/kg	M	5.23E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Thallium	7.03E-01	mg/kg	7.03E-01	mg/kg	M	9.61E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Vanadium	6.16E+01	mg/kg	6.16E+01	mg/kg	M	8.42E-09	mg/kg-day	–	1/(mg/kg-day)	–
	Zinc	2.86E+02	mg/kg	2.86E+02	mg/kg	M	3.91E-08	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDD	1.94E+01	ug/kg	1.94E+01	ug/kg	M	2.65E-12	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDE	1.11E+01	ug/kg	1.11E+01	ug/kg	M	1.52E-12	mg/kg-day	–	1/(mg/kg-day)	–
	4,4'-DDT	1.33E+01	ug/kg	1.33E+01	ug/kg	M	3.25E-12	mg/kg-day	3.40E-01	1/(mg/kg-day)	1.11E-12
	Aroclor-1242	3.27E+01	ug/kg	3.27E+01	ug/kg	M	8.00E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.60E-11
	Aroclor-1248	3.40E+01	ug/kg	3.40E+01	ug/kg	M	8.32E-12	mg/kg-day	2.00E+00	1/(mg/kg-day)	1.66E-11
	Aroclor-1254	6.30E+01	ug/kg	6.30E+01	ug/kg	M	1.54E-11	mg/kg-day	2.00E+00	1/(mg/kg-day)	3.08E-11
	Benz(a)anthracene	3.84E+02	ug/kg	3.84E+02	ug/kg	M	5.25E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Benzo(a)pyrene	3.75E+02	ug/kg	3.75E+02	ug/kg	M	9.17E-11	mg/kg-day	3.10E+00	1/(mg/kg-day)	2.84E-10
	Benzo(b)fluoranthene	3.71E+02	ug/kg	3.71E+02	ug/kg	M	5.07E-11	mg/kg-day	–	1/(mg/kg-day)	–
	Chrysene	4.03E+02	ug/kg	4.03E+02	ug/kg	M	5.51E-11	mg/kg-day	–	1/(mg/kg-day)	–
	(Total)										2.01E-08

(1) Specify Medium-Specific (M) or Route-Specific (R) EPC selected for risk calculation.

SUMMARY OF NONCARCINOGENIC AND CARCINOGENIC RISKS, SITE 6 - ALL EXPOSURE PATHWAYS
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario / Receptor	Industrial Adult	Residential Child Age 1-6	Residential Adult	Resident Lifetime*	Recreational Child Age 6-12
HAZARD INDEX					
Surface Soil - Exposure Routes					
Incidental Ingestion	5.53E-02	1.31E+00	1.55E-01	NA	NA
Dermal Contact	4.19E-02	3.92E-02	2.91E-02	NA	NA
Fugitive Dust Inhalation	5.21E-03	6.92E-02	2.19E-02	NA	NA
Subtotal of Surface Soil	**0.1**	**1.4**	**0.21**	**NA**	**NA**
Subsurface Soil - Exposure Routes					
Incidental Ingestion	1.17E-01	2.77E+00	3.28E-01	NA	NA
Dermal Contact	5.38E-02	5.04E-02	3.73E-02	NA	NA
Fugitive Dust Inhalation	6.36E-03	8.45E-02	2.67E-02	NA	NA
Subtotal of Subsurface Soil	**0.177**	**2.90**	**0.392**	**NA**	**NA**
Sediment - Exposure Routes					
Incidental Ingestion	NA	NA	NA	NA	2.13E-02
Dermal Contact	NA	NA	NA	NA	6.54E-03
Subtotal of Sediment	**NA**	**NA**	**NA**	**NA**	**0.03**
Surface Water (Total Inorganics and Organics) - Exposure Routes					
Incidental Ingestion	NA	NA	NA	NA	8.34E-03
Dermal Contact	NA	NA	NA	NA	1.38E-03
Subtotal of Surface Water	**NA**	**NA**	**NA**	**NA**	**0.010**
INCREMENTAL CANCER RISK					
Surface Soil - Exposure Routes					
Incidental Ingestion	5.78E-07	3.27E-06	1.55E-06	4.83E-06	NA
Dermal Contact	1.44E-07	3.24E-08	9.62E-08	1.29E-07	NA
Fugitive Dust Inhalation	9.16E-10	2.92E-09	3.69E-09	6.62E-09	NA
Subtotal of Surface Soil	**7.23E-07**	**3.31E-06**	**1.65E-06**	**4.96E-06**	**NA**
Subsurface Soil - Exposure Routes					
Incidental Ingestion	1.42E-06	8.07E-06	3.83E-06	1.19E-05	NA
Dermal Contact	3.81E-07	8.55E-08	2.54E-07	3.39E-07	NA
Fugitive Dust Inhalation	2.79E-09	8.89E-09	1.12E-08	2.01E-08	NA
Subtotal of Subsurface Soil	**1.80E-06**	**8.16E-06**	**4.10E-06**	**1.23E-05**	**NA**
Sediment - Exposure Routes					
Incidental Ingestion	NA	NA	NA	NA	8.40E-07
Dermal Contact	NA	NA	NA	NA	1.00E-07
Subtotal of Sediment	**NA**	**NA**	**NA**	**NA**	**9.40E-07**
Surface Water (Total Inorganics and Organics) - Exposure Routes					
Incidental Ingestion	NA	NA	NA	NA	1.80E-10
Dermal Contact	NA	NA	NA	NA	2.30E-08
Subtotal of Surface Water	**NA**	**NA**	**NA**	**NA**	**2.32E-08**

* = Lifetime Residential Risks are the summed Cancer Risks for Residential Child (6 year exposure) and Residential Adult (24 year exposure).
NA = Exposure route not applicable in that medium for that receptor.

Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects.

TABLE 30

OCCURRENCE AND COMPARISON OF SOIL EPCs TO SOIL [redacted] GROUNDWATER SOIL SCREENING LEVELS FOR SITE 5 SOILS

NAWC WARMINSTER, PENNSYLVANIA

Substance	Maximum Soil Background Level	SSL DAF 20	Site 5		Detected In On-Base Area B Groundwater (ug/L)
			Surface Soil	Subsurface Soil	
ALUMINUM	18100	--	13200	13400	YES
ANTIMONY	13.6 J	5	4.9	7.94	NO
ARSENIC	12.1 J	29	4.76	3.06	YES
BARIUM	225	1,600	118	217	YES
BERYLLIUM	1.7 J	63	0.991	1.5	YES
CADMIUM	--	8	4.05	5.5	YES
CALCIUM	1910	--	3000	3300	YES
CHROMIUM	35.3 J	38	25.4	32.2	YES
COBALT	22.1	--	10.7	15	YES
COPPER	30.6	--	297	802	NO
CYANIDE	--	40	0.519	1.5	NO
IRON	410500	--	25500	33700	YES
LEAD	96.5 J	400	77.5	72.7	YES
MAGNESIUM	4960	--	3070	4420	YES
MANGANESE	2,010	--	785	937	YES
MERCURY	0.37	--	1.63	0.347	NO
NICKEL	21.7 J	130	21.7	39.3	YES
POTASSIUM	3050	--	1380	2840	YES
SELENIUM	--	5	1.09	0.426	YES
SILVER	--	34	29.2	38.3	NO
SODIUM	86.7	--	269	226	YES
THALLIUM	0.42	0.7	0.12	0.703	NO
VANADIUM	45	6,000	35.3	61.6	NO
ZINC	60	12,000	371	286	NO
1,1-DICHLOROETHENE	--	23,000	--	2	NO
2-BUTANONE	--	--	11.6	9.27	NO
2-HEXANONE	--	--	8.72	2	NO
4-METHYL-2-PENTANONE	--	--	5.84	4	NO
ACETONE	12 J	16,000	95.5	76.7	NO
BENZENE	--	30	2	4.84	YES
CARBON DISULFIDE	--	32,000	1	4.91	YES
CHLOROETHANE	--	1,000	2	--	NO
CHLOROMETHANE	3 J	--	4.53	--	NO
ETHYLBENZENE	--	13,000	3	3	NO
METHYLENE CHLORIDE	--	20	320	--	NO
TETRACHLOROETHENE	--	60	--	4.65	YES
TOLUENE	2 J	12,000	6.5	4.89	NO
TRICHLOROETHENE	--	20	6.19	--	YES
VINYL CHLORIDE	--	10	--	4.69	NO
XYLENES	--	200,000	8.21	8.17	NO
1,4-DICHLOROBENZENE	43 J	2,000	--	220	NO

TABLE 30

OCCURRENCE AND COMPARISON OF SOIL EPCs TO SOIL-TO-GROUNDWATER SOIL SCREENING LEVELS FOR SITE 5 SOILS
NAWC WARMINSTER, PENNSYLVANIA

Subsurface Soil	Maximum Soil Background Level	SSL DAF 20	Site 5 Surface Soil	Site 5 Subsurface Soil	Detected in On Base Area B Groundwater (ug/L)
2-METHYLNAPHTHALENE	--	--	160	--	NO
BENZ(A)ANTHRACENE	--	2,000	293	384	NO
BENZO(A)PYRENE	--	8,000	270	375	NO
BENZO(B)FLUORANTHENE	58 J	5,000	120	371	NO
BENZO(G,H,I)PERYLENE	--	--	100	377	NO
BENZO(K)FLUORANTHENE	46 J	49,000	90	--	NO
BIS(2-ETHYLHEXYL)PHTHALATE	50 J	3,600,000	270	180	NO
CHRYSENE	51 J	160,000	301	403	NO
DIBENZ(A,H)ANTHRACENE	--	2,000	40	--	NO
DI-N-BUTYL PHTHALATE	--	2,300,000	48	57	NO
FLUORANTHENE	92 J	4,300,000	170	378	NO
INDENO(1,2,3-CD)PYRENE	--	14,000	60	--	NO
NAPHTHALENE	--	84,000	47	120	NO
PHENANTHRENE	51 J	--	120	389	NO
PYRENE	100 J	4,200,000	290	417	NO
4,4'-DDD	16 J	16,000	5.1	19.4	NO
4,4'-DDE	820	54,000	3.8	11.1	NO
4,4'-DDT	1440 J	32,000	3.6	13.3	NO
ALPHA-CHLORDANE	--	10,000	1.59	1.85	NO
AROCLOR-1242	--	1,000	32.9	32.7	NO
AROCLOR-1248	--	1,000	--	34	NO
AROCLOR-1254	51	1,000	312	63	NO
BETA-BHC	--	--	1.48	1.57	NO
DIELDRIN	--	4	3.36	3.24	NO
ENDOSULFAN SULFATE	--	--	2.97	3.72	NO
ENDRIN	--	1,000	6.57	--	NO
ENDRIN ALDEHYDE	--	--	3	--	NO
GAMMA-CHLORDANE	--	10,000	1.53	1.85	NO
METHOXYCHLOR	--	160,000	--	17.2	NO

Notes:

* - Exposure point concentrations (EPCs).

Units are mg/kg for inorganics, ug/kg for organics.

Shaded blocks indicate EPC values > SSL and > maximum soil background level.

Reference: EPA, Soil Screening Technical Guidance Document, Appendix A, Table A-1 (assuming DAF = 20). May 1996.

References: RI Report for Area B Groundwater, Tetra Tech NUS. April 2000.

Summary Report for Area B Groundwater Monitoring, Tetra Tech NUS. December 1999

TABLE 31

CARCINOGENIC RISK, WADING, FUTURE RECREATIONAL RECEPTORS - AREA B
SURFACE WATER
NAWC WARMINSTER, PA

SUBSTANCE	SURFACE WATER INGESTION	SURFACE WATER DERMAL CONTACT
BIS(2-ETHYLHEXYL)PHTHALAT	1.8E-10	2.3E-08
NICKEL	N/A	N/A
THALLIUM	N/A	N/A
TOTAL RISK	1.8E-10	2.3E-08

N/A = NOT APPLICABLE, NO TOXICITY VALUE HAS BEEN ESTABLISHED FOR THIS CHEMICAL

TABLE 32
CARCINOGENIC RISK, WADING, FUTURE RECREATIONAL RECEPTORS - AREA B
SEDIMENT
NAWC WARMINSTER, PA

SUBSTANCE	SEDIMENT INGESTION	SEDIMENT DERMAL CONTACT
4,4'-DDE	1.1E-10	5.3E-11
4,4'-DDT	1.2E-09	6.0E-10
4-METHYLPHENOL	N/A	N/A
ACENAPHTHENE	N/A	N/A
ALDRIN	1.1E-09	8.3E-10
ALPHA-CHLORDANE	1.7E-10	8.5E-11
ANTHRACENE	N/A	N/A
AROCLOR-1260	1.9E-07	9.0E-08
BENZ(A)ANTHRACENE	5.0E-08	*
BENZO(A)PYRENE	4.2E-07	*
BENZO(B)FLUORANTHENE	6.8E-08	*
BENZO(G,H,I)PERYLENE	N/A	N/A
BENZO(K)FLUORANTHENE	2.0E-09	*
BIS(2-ETHYLHEXYL)PHTHALA	3.3E-09	2.6E-09
BUTYL BENZYL PHTHALATE	N/A	N/A
CARBAZOLE	2.9E-10	*
CHRYSENE	5.4E-10	*
DELTA-BHC	N/A	N/A
DI-N-BUTYL PHTHALATE	N/A	N/A
DI-N-OCTYL PHTHALATE	N/A	N/A
DIBENZ(A,H)ANTHRACENE	5.3E-09	*
DIELDRIN	2.0E-09	1.6E-09
FLUORANTHENE	N/A	N/A
FLUORENE	N/A	N/A
INDENO(1,2,3-CD)PYRENE	2.3E-08	*
METHOXYCHLOR	N/A	N/A
N-NITROSODIPHENYLAMINE	1.1E-10	8.7E-11
PYRENE	N/A	N/A
ALUMINUM	N/A	N/A
ARSENIC	7.1E-08	3.0E-09
BARIUM	N/A	N/A
BERYLLIUM	5.0E-08	2.0E-07
CADMIUM	N/A	N/A
CHROMIUM	N/A	N/A
COBALT	N/A	N/A
COPPER	N/A	N/A
IRON	N/A	N/A
LEAD	N/A	N/A
MANGANESE	N/A	N/A
NICKEL	N/A	N/A
SILVER	N/A	N/A
THALLIUM	N/A	N/A
ZINC	N/A	N/A
TOTAL RISK	8.9E-07	3.0E-07

N/A = NOT APPLICABLE, NO TOXICITY VALUE HAS BEEN ESTABLISHED FOR THIS CHEMI
* CANCER RISK FOR PAHS NOT ESTIMATED FOR DERMAL EXPOSURE

TABLE 33

NONCARCINOGENIC HQS, WADING, FUTURE RECREATIONAL RECEPTORS - AREA B
SURFACE WATER
NAWC WARMINSTER, PA

SUBSTANCE	SURFACE WATER INGESTION	SURFACE WATER DERMAL CONTACT
BIS(2-ETHYLHEXYL)PHTHALAT	7.7E-06	9.6E-04
NICKEL	1.3E-04	4.1E-05
THALLIUM	8.2E-03	3.8E-04
TOTAL RISK	• 8.34E-03	1.76E-03

N/A = NOT APPLICABLE, NO TOXICITY VALUE HAS BEEN ESTABLISHED FOR THIS CHEMICAL

TABLE 34

NONCARCINOGENIC HQS, WADING, FUTURE RECREATIONAL RECEPTORS - AREA B
SEDIMENT
NAWC WARMINSTER, PENNSYLVANIA

SUBSTANCE	SEDIMENT INGESTION	SEDIMENT DERMAL CONTACT
4,4'-DDE	NA	NA
4,4'-DDT	8.3E-05	4.1E-05
4-METHYLPHENOL	1.7E-05	1.1E-05
ACENAPHTHENE	1.2E-06	9.5E-07
ALDRIN	2.4E-05	1.9E-05
ALPHA-CHLORDANE	2.6E-05	1.3E-05
ANTHRACENE	7.2E-07	4.4E-07
AROCLOR-1260	NA	NA
BENZ(A)ANTHRACENE	NA	NA
BENZO(A)PYRENE	NA	NA
BENZO(B)FLUORANTHENE	NA	NA
BENZO(G,H,I)PERYLENE	NA	NA
BENZO(K)FLUORANTHENE	NA	NA
BIS(2-ETHYLHEXYL)PHTHALA	1.4E-04	1.1E-04
BUTYL BENZYL PHTHALATE	9.2E-08	7.3E-08
CARBAZOLE	NA	NA
CHRYSENE	NA	NA
DELTA-BHC	NA	NA
DI-N-BUTYL PHTHALATE	7.8E-06	3.4E-06
DI-N-OCTYL PHTHALATE	6.1E-07	2.7E-07
DIBENZ(A,H)ANTHRACENE	NA	NA
DIELDRIN	2.9E-05	2.3E-05
FLUORANTHENE	6.5E-05	5.2E-05
FLUORENE	2.3E-06	1.8E-06
INDENO(1,2,3-CD)PYRENE	NA	NA
METHOXYCHLOR	1.7E-06	7.5E-07
N-NITROSODIPHENYLAMINE	NA	NA
PYRENE	5.1E-05	3.1E-05
ALUMINUM	1.2E-03	4.6E-05
ARSENIC	1.8E-03	7.7E-05
BARIUM	1.5E-04	1.5E-04
BERYLLIUM	2.7E-05	1.1E-04
CADMIUM	5.8E-04	4.6E-04
CHROMIUM	2.8E-06	5.6E-06
COBALT	1.9E-05	7.7E-07
COPPER	2.3E-04	1.5E-05
IRON	1.1E-02	4.3E-04
LEAD	NA	NA
MANGANESE	3.7E-03	4.9E-03
NICKEL	1.3E-04	3.4E-05
SILVER	2.2E-05	4.3E-06
THALLIUM	1.8E-03	7.3E-05
ZINC	2.5E-04	3.9E-05
TOTAL RISK	2.13E-02	6.64E-03

N/A = NOT APPLICABLE, NO TOXICITY VALUE HAS BEEN ESTABLISHED FOR THIS CHEMI
ICAL

TABLE 35

SELECTION OF ECOLOGICAL CONTAMINANTS OF CONCERN FOR SURFACE WATER ORGANICS - AREA B

NAWC WARMINSTER, PENNSYLVANIA

(µg/l)

CONTAMINANT OF POTENTIAL CONCERN	EXPOSURE CONCENTRATION	BENCHMARK (µg/l)	ECOLOGICAL EFFECTS QUOTIENT (EEQ)	RETAINED AS COC? (1)
BIS(2-ETHYLHEXYL)PHTHALATE	1	30	0.03	NO

1: COPC was retained as a COC if the benchmark was exceeded or if no benchmark was available

TABLE 36

SELECTION OF ECOLOGICAL CONTAMINANTS OF CONCERN FOR SURFACE WATER INORGANICS (TOTAL METALS) - AREA B

NAWC WARMINSTER, PENNSYLVANIA

(µg/l)

CONTAMINANT OF POTENTIAL CONCERN	EXPOSURE CONCENTRATION	BENCHMARK (µg/l)	ECOLOGICAL EFFECTS QUOTIENT (EEQ)	RETAINED AS COC? (1)
BARIUM	94.2	1000	0.09	NO
MANGANESE	119	14500	0.01	NO
NICKEL	20	176.92	0.11	NO
THALLIUM	4.9	40	0.12	NO
ZINC	27.6	117.65	0.23	NO

1: COPC was retained as a COC if the benchmark was exceeded or if no benchmark was available

TABLE 37

SELECTION OF ECOLOGICAL CONTAMINANTS OF CONCERN FOR SEDIMENT ORGANICS - AREA B
NAWC WARMINSTER, PENNSYLVANIA
(µg/kg)

CONTAMINANT OF POTENTIAL CONCERN	EXPOSURE CONCENTRATION	BENCHMARK (µg/kg)	ECOLOGICAL EFFECTS QUOTIENT (EEQ)	RETAINED AS COC? (1)
Semivolatile Organic Chemicals				
ACENAPHTHENE	470	16	29.38	YES
ANTHRACENE	1400	85.3	16.41	YES
BENZ(A)ANTHRACENE	5200	261	19.92	YES
BENZO(A)PYRENE	4400	430	10.23	YES
BENZO(B)FLUORANTHENE	7100	3200	2.22	YES
BENZO(G,H,I)PERYLENE	2000	670	2.99	YES
BENZO(K)FLUORANTHENE	2100	3200	0.66	NO
BIS(2-ETHYLHEXYL)PHTHALA	18000	1300	13.85	YES
BUTYLBENZYLPHTHALATE	120	63	1.90	YES
CARBAZOLE	1100	NA		YES
CHRYSENE	5600	384	14.58	YES
DI-N-BUTYLPHTHALATE	5100	6200	0.82	NO
DI-N-OCTYLPHTHALATE	79	6200	0.01	NO
DIBENZ(A,H)ANTHRACENE	55	63.4	0.87	NO
FLUORANTHENE	17000	600	28.33	YES
FLUORENE	600	19	31.58	YES
INDENO(1,2,3-CD)PYRENE	2400	600	4.00	YES
4-METHYLPHENOL	560	670	0.84	NO
N-NITROSODIPHENYLAMINE	1700	28	60.71	YES
PYRENE	9900	665	14.89	YES
Pesticides and PCBs				
4,4'-DDE	24	2.2	10.91	YES
4,4'-DDT	430	1	430.00	YES
ALDRIN	4.7	100	0.05	NO
ALPHA-CHLORDANE	15	7	2.14	YES
AROCLOR-1260	1900	5	380.00	YES
DELTA-BHC	4	100	0.04	NO
DIELDRIN	13	2	6.50	YES
METHOXYCHLOR	79	100	0.79	NO

1: COPC was retained as a COC if the benchmark was exceeded or if no benchmark was available

NA = No benchmark available.

TABLE 38

SELECTION OF ECOLOGICAL CONTAMINANTS OF CONCERN FOR SEDIMENT INORGANICS - AREA B

NAWC WARMINSTER, PENNSYLVANIA

(mg/kg)

CONTAMINANT OF POTENTIAL CONCERN	EXPOSURE CONCENTRATION	BENCHMARK (mg/kg) (1)	ECOLOGICAL EFFECTS QUOTIENT (EEQ)	RETAINED AS COC? (1)
ARSENIC	3.6	8.2	0.44	NO
BARIUM	68.5	500	0.14	NO
BERYLLIUM	0.88	NA	-	YES
CADMIUM	1.9	1.2	1.58	YES
CHROMIUM (TOTAL)	18.3	26	0.70	NO
COBALT	7.6	50	0.15	NO
COPPER	59.5	34	1.75	YES
LEAD	168	46.7	3.60	YES
MANGANESE	554.78	460	1.21	YES
NICKEL	16.80	21	0.80	NO
SILVER	0.71	1	0.71	NO
THALLIUM	0.96	NA	-	YES
VANADIUM	22.7	NA	-	YES
ZINC	486	150	3.24	YES

1: COPC was retained as COC if the benchmark was exceeded or no benchmark was available

NA = No benchmark available.

TABLE 39
AXIMUM CONCENTRATION ECOLOGICAL HAZARD QUOTIENT VALUE FROM FOOD-WEB MODEL
AREA B - NAWC WARMINSTER, PENNSYLVANIA

Ecological Contaminants of Concern	Raccoon NOAEL HQ_n	Wren NOAEL HQ_n	Mallard NOAEL HQ_n	Heron NOAEL HQ_n
Acenaphthene	0.09	NA	NA	NA
Alpha chlordane	0.00	0.00	0.00	0.00
Anthracene	0.25	NA	NA	NA
Aroclor 1260	1.04	2.36	0.54	1.99
Benz(a)anthracene	0.94	NA	NA	NA
Benzo(a)pyrene	0.80	NA	NA	NA
Benzo(b)fluoranthene	1.28	NA	NA	NA
Benzo(g,h,i)perylene	0.36	NA	NA	NA
Beryllium	0.13	NA	NA	NA
bis(2-Ethylhexyl)phthalate	0.18	3.66	0.83	3.09
Butylbenzylphthalate	NA	NA	NA	NA
Cadmium	0.20	0.29	0.07	0.25
Carbazole	NA	NA	NA	NA
Chromium	0.00	4.09	0.93	3.45
Chrysene	1.01	NA	NA	NA
Copper	0.39	0.28	0.06	0.24
DDE	0.00	1.79	0.41	1.51
DDT	0.05	32.05	7.27	27.04
Dieldrin	0.06	0.04	0.01	0.03
Fluoranthene	3.08	NA	NA	NA
Fluorene	0.11	NA	NA	NA
Indeno(1,2,3-cd)pyrene	0.43	NA	NA	NA
Lead	2.09	9.76	2.21	8.23
Manganese	0.63	0.12	0.03	0.10
n-nitrosodiphenylamine	NA	NA	NA	NA
Pyrene	1.79	NA	NA	NA
Thallium	12.60	NA	NA	NA
Vanadium	11.57	0.45	0.10	0.38
Zinc	0.30	7.49	1.70	6.32

Refer to Appendix K for supporting documentation

APPENDIX C

PADEP CONCURRENCE LETTER

Pennsylvania Department of Environmental Protection
Lee Park, Suite 6010
555 North Lane
Conshohocken, PA 19428
September 27, 2000

Southeast Regional Office
610-832-6012
Fax 610-832-6022

Mr. Orlando Monaco
Naval Facilities Engineering
Command (NAVFACENGCOM)
Northern Division
Environmental Contracts Branch, Mailstop No. 82
10 Industrial Highway
Lester, PA 19113

Re: Warminster Naval Air Development
Center NPL Site
Record of Decision, Operable Unit 10
Letter of Concurrence
Warminster Township
Bucks County

Dear Mr. Monaco:

The Record of Decision (ROD) dated September 2000 for Operable Unit 10 (OU - 10), which pertains to soils and waste at Site 5, and surface water and sediment potentially impacted by Area B, Warminster Naval Air Development Center (the Site), has been reviewed by the Commonwealth of Pennsylvania's Department of Environmental Protection (Department).

The selected remedy for the Site includes the following major components, as specified in the selected remedy of the ROD:

1. This ROD pertains to the soils and waste at Site 5 and surface water and sediment potentially impacted by Area B, one of several Areas of Concern (AOCs) at the Site, which have been investigated during the last several years.

2. Site 5 is located in the enlisted family housing area that will be retained by the Navy and transferred for use by Naval Air Station Joint Reserve Basin Willow Grove. It was reported as a disposal area. The Remedial Investigation/Risk Assessment (RI/RA) found no risks to human health or the environment in excess of EPA guidelines associated with the soils or wastes at Site 5.

3. Area B is the larger section of the Site that includes Sites 5, 6, and 7. Area B groundwater was addressed in the ROD for OU - 1B, signed in September 2000, and the soils and wastes associated with Sites 6 and 7 were addressed in the ROD for OU – 7, signed in June 2000.

4. The RI/RA found no risks to human health exceeding EPA guidelines for the surface water and sediment potentially affected by Area B. It reported low to moderate ecological risks, but also found that it was not possible to separate risks potentially related to Site sources from those associated with off Site sources.

5. Since there have been recent remedial actions taken at OU – 7, further sampling will be done to assure that that remedy has mitigated any potential Site related risk to the surface water or sediment.

6. The alternative the Navy has selected for this Site is a "No Action" alternative.

The Department hereby concurs with the remedy selected for the Warminster Naval Air Development Center NPL Site OU - 10 for the following reasons and with the following conditions:

Pennsylvania's Land Recycling and Environmental Remediation Standards Act, Act 2 of 1995, 35 P.S. Sections 6026.101 – 6029.909 ("Act2"), Pennsylvania's Solid Waste Management Act, Act 97 of 1980, as amended, 35 P.S. Section 6018.101 et seq. ("Act 97"), and the regulations adopted pursuant to these statutes are ARARs for this response. Implementation of any component or components of this response will not necessarily result in protection from liability pursuant to Act 2, for any party.

This concurrence with the selected remedial actions is not intended to provide any assurance pursuant to CERCLA Section 104(c)(3), 42 U.S.C. Section 9604(c)(3).

The Department reserves its rights and responsibilities to take independent enforcement actions pursuant to state and federal law.

This letter documents the Department's concurrence with the remedies selected by EPA in the ROD for OU - 5 for the Warminster Naval Air Development Center NPL Site. If you have any questions regarding this matter, please feel free to contact me at the above telephone number.

Sincerely,

Joseph A. Feola

Joseph A. Feola
Regional Director
Southeast Regional Office

cc: Mr. Fidler
Mr. Beitler
Mr. Crownover
Mr. Danyliw
Mr. Olewiler
Mr. Hartzell
Mr. Sheehan
Ms. Flipse
Mr. Ostrauskas - EPA
Re 30 (DAF00)271-8

APPENDIX D

PUBLIC COMMENT LETTERS

ROY REINARD, MEMBER
DISTRICT OFFICE
130 BUCK ROAD, SUITE 202
HOLLAND, PENNSYLVANIA 18966
PHONE: (215) 364-3414
FAX: (215) 364-8628
E-mail: Rreinard@pshousegop.com

HARRISBURG OFFICE
P.O. BOX 202020
152 MAIN CAPITOL BUILDING
HARRISBURG, PENNSYLVANIA 17120-2020
PHONE: (717) 787-9033
FAX: (717) 772-8952

HOUSE OF REPRESENTATIVES
COMMONWEALTH OF PENNSYLVANIA
HARRISBURG

COMMITTEES

CHAIRMAN, LIQUOR CONTROL
INSURANCE

September 6, 2000

Mr. Lonnie Monaco
Northern Division
Naval Facilities Engineering
10 Industrial Highway, Mail Stop No. 82
Lester, PA 19113

Re: Public Comments

Dear Mr. Monaco:

I am writing to add my concerns to the public comments regarding the proposed cleanup plan for Operable Unit 10, covering Site 5 Soils and Sediments from Site B.

I have spoken with many residents of this community about the ongoing remediation of this site. They have expressed strong concerns with the overall strategy employed by the Navy in this effort. Their concerns broadly cover two issues. The residents want a thorough cleanup involving removal of contaminated soils, not just a capping of the contaminated areas. They also want a proper stormwater management system to be constructed to handle surface runoff. The runoff that occurred following the July storms is simply unacceptable.

I am not satisfied with the proposed "no action" remedy for Site 5 soils. In order to protect the health and safety of present and future residents, the contaminated soil should be removed permanently. I am also not satisfied with the proposed "remedy" for surface water and sediment impacted by Area B. A

PRINTED ON RECYCLED PAPER

permanent stormwater management system, consisting of collection basins and drainage contouring, should be constructed.

The Navy ceased operations at this facility in September 1996, and still much of the contamination remains. The effort to reuse this property for civilian purposes is not being helped by this cleanup strategy, and I am not satisfied with this approach. The Navy can and should do better.

Sincerely,

ROY REINARD
State Representative
178th Legislative District

RR:ams