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1999

EPASuperfund
Record of Decision:

Naval Air Development Center (8 Areas)
OU 5 Site 8
Warminster Township, PA
9/29/1999

Department of the Navy	
Record of Decision for OU-5	
Naval Air Warfare Center	
Warminster, Pennsylvania	**SEPTEMBER 1999**

DECLARATION

SITE NAME AND LOCATION

Naval Air Development Center
Warminster Township
Bucks County, Pennsylvania

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the determination that no further action is necessary to protect human health and the environment for Operable Unit Five (OU-5) at the former Naval Air Development Center in Warminster Township, Bucks County, Pennsylvania (the "Site"), chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, 42 U.S.C. § 9601 et seq. and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 C.F.R. Part 300. This decision is based on the Administrative Record for this Site.

In January 1993, the facility was renamed 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), concurs with the selected remedy for OU-5 at the Site.

DESCRIPTION OF THE SELECTED REMEDY

A no further action alternative is the selected remedy for OU-5 at the Site. OU-5 consists of soil, sediment, and surface water associated with Site 8. A 1999 removal action eliminated the unacceptable risk associated with lead-contaminated soils. Post-removal verification sampling and subsequent Remedial Investigation activities support the no further action remedial alternative.

STATUTORY DETERMINATIONS

The no further action remedy selection is based upon post-removal verification sampling and the risk assessment results from the Remedial Investigation for OU-5, which indicate that no further action is necessary at OU-5 to be protective of human health and the environment. A five-year review will not be necessary for OU-5.

Thomas C. Ames

Thomas C. Ames
BRAC Environmental Coordinator
Naval Air Warfare Center
Naval Air Warfare Center, Warminster

9/23/99
Date

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

9/29/99
Date

RECORD OF DECISION
NAVAL AIR WARFARE CENTER
WARMINSTER, PA
SITE 8, OU-5

September 1999

DECISION SUMMARY

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DECISION SUMMARY

I. SITE BACKGROUND

NAWC is a 824-acre facility located in Warminster Township, Northampton Township and Ivyland Borough, Bucks County, Pennsylvania (see Figure 1). Per the Base Realignment and Closure Act (BRAC), NAWC ceased operations on 30 September 1996. The majority of NAWC, including Site 8 (see Figure 2 for location), 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-site areas include various buildings and other complexes connected by paved roads, the runway and ramp area, mowed fields, and a small wooded area.

Commissioned in 1944, the facility's main function was research, development, testing, and evaluation for naval aircraft systems. 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. These wastes included paints, solvents, sludges from industrial wastewater treatment, and waste oils that were disposed in pits, trenches, and/or landfills on the facility property.

NAWC was listed on the Superfund National Priorities List in 1989. This list includes sites where uncontrolled hazardous substance releases present the most significant potential threats to human health and the environment. The areas of concern identified to date by the Navy at NAWC include eight reported waste disposal locations (see Figure 2) covering more than seven acres, including:

- Three waste disposal pits (sites 1, 3, and 6)
- Two sludge disposal pit areas (sites 2 and 7)
- Two landfills (sites 4 and 5)

Also included among the reported waste disposal locations is Site 8, which is located at the end of a runway located within an area the RI refers to as Area C (See Figure 3).

The Navy initially reported Site 8 as a disposal site in a Navy Shore Activity Disposal Fact Form in 1980. The site was reported to consist of a 75-by-75-foot portion of the runway surrounded on three sides by a double berm. An evaluation of the historical aerial photographs has since found that two areas on the runway were used for fire training exercises from 1961 to 1986. Flammable materials were poured on the runway, ignited and extinguished to simulate fire-training procedures in these two

areas. Reportedly, up to 3000 gallons of contaminated aviation fuels were burned per year from 1961 to 1980, when the Fact Form was compiled. Initially, fire-training exercises were conducted in an area about 240 feet from the end of the runway. Aerial photos found this area characterized by dark staining on the runway and ponding of dark liquids next to the western perimeter of the runway. In later years, the fire-training activities were conducted in an area at the end of the runway. In the case of each area, berms were used to contain the fuel. Surface water was often observed to collect within these bermed areas during rainfall events. In the case of each area, aerial photos indicate surface runoff bypassing the berms and draining to soil along the western perimeter of the runway. In addition, aerial photos indicated several potential pits in the runway in the vicinity of the older fire-training area.

Site 8 now is also considered to include an area of the runway immediately south of the older fire training area, which was used to test the resistance of aviation suits to fire. This area included a corrugated metal building (Structure S1) where the durability of flight suits in fire was tested. This testing was initiated between 1965 and 1967. The floor of Structure S1 reportedly was covered with water. Flammable liquids would be poured on the water and ignited. Flight suits were then passed through the flames to test the ability of the suit to withstand fire. Structure S1 was dismantled and removed in 1997. A review of historical aerial photos of the area of Structure S1 did not reveal features, which would suggest impacts on the adjacent areas.

To date, Site 8 and the other reported disposal locations have been addressed under CERCLA by a Remedial Investigation (RI), which has been conducted in three phases. Site 8 has been investigated under each of these phases. The Phase I RI was initiated in late 1988 and was completed in 1990, with the release of the Phase I (or Stage 1) RI report. Phase I included surveying and mapping of the volatile organic compounds (VOCs) in soil gas, detecting buried materials through electromagnetic surveys, performance of exploratory soil borings and the installation and sampling of groundwater monitoring wells. In addition, test pits were excavated, nearby wells were inventoried, and a bedrock fracture-trace analysis was conducted.

The Phase II RI began at the end of 1991 and was completed in 1992 and included the installation of additional monitoring wells, sampling of groundwater, and the performance of hydraulic tests to assess aquifer characteristics. Both the Phase I and Phase II RI investigated the nature and extent of groundwater contamination within the vicinity of Sites 1, 2, and 3 (Area A), Sites 5, 6, and 7 (Area B) and Sites 4 and 8 (Area C).

The Phase III RI was initiated in 1993 and completed in 1996 and included further investigation of the nature and extent of contaminated groundwater attributable to Areas A, B and C, as well as potentially contaminated soils, buried wastes and surface water associated with these areas. Since that time, RI work addressing groundwater and soil has been performed in more recently designated Area D.

Based on the findings of the Phase II RI work, the Navy and EPA issued a Record of Decision in 1995, which selected a remedy of pumping and treatment of Area C groundwater. This remedy has since been constructed and is now in operation. Construction of the remedy included the placement of a groundwater transfer line parallel to and 20 to 30 feet from the western perimeter of the runway area, which includes Site 8.

Based on the findings of the Phase III RI, the Navy determined that lead levels in certain surface soil at Site 8 presented an unacceptable risk to human health. The soils of concern were located immediately next to the western side of the runway adjacent to Structure S1, the former flight suit test area. In response, the Navy completed a removal action at Site 8, eliminating the unacceptable risk associated with the lead-contaminated soils. Due to the time-critical nature of this response, there was no proposed plan issued. This action included the excavation and removal of soils containing the elevated lead levels and subsequent disposal in an off-base landfill (see Figure 5 for area of soil removal). Post-removal verification sampling was conducted to characterize conditions at Site 8 after the removal action. Upon receipt and evaluation of the verification sampling results, the excavation area was backfilled with clean fill and topsoil.

The results of all RI work addressing soil, sediment and surface water associated with Site 8 are described or summarized in the Final RI report for OU-5 issued by the Navy in August 1999. This report characterizes Site 8 both prior to and after the removal action and contains a full assessment of any risk posed by OU-5 after the removal action.

II. SCOPE AND ROLE OF OPERABLE UNIT FIVE (OU-5)

Section 300.430 (a)(1)(ii)(A) of the NCP, 40 C.F.R. Section 300.430(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 phased 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, the Navy has organized work to date into five operable units. These operable units (OUs) are as follows:

OU-1: Area A and B groundwater
OU-2: Off-base private wells
OU-3: Area C groundwater
OU-4: Area D groundwater
OU-5: Soil, sediment, and surface water at Site 8

This Navy and EPA selected an interim remedy for OU-1 in a ROD signed on September 29, 1993, while a removal action for OU-2 was selected by the EPA in a

Removal Action Memorandum signed on July 14, 1993. The Navy and EPA selected a final remedy for OU-3 in a ROD signed March 10, 1995 while an interim remedy for OU-4 was selected in a ROD signed by the Navy and EPA on September 30, 1997. The selected remedies for OU-1, OU-3, and OU-4 are all operational at this time, while the removal addressing OU-2 has been completed. This ROD documents the selected remedy for OU-5.

III. SITE CHARACTERISTICS

A. Hydrology

NAWC is located in an upland area lying between two local drainage basins, the Little Neshaminy Creek Basin to the north and the Southampton Creek Basin to the south. The northern 65 percent of the Site, including Site 8, drains toward several unnamed tributaries of Little Neshaminy Creek.

Site 8 is drained primarily by a concrete swale located about 100 feet northwest of the runway extension. The swale discharges directly to an intermittent stream through a culvert beneath Kirk Road north of the site. The intermittent stream is channelized and flows to the north approximately 750 feet until it joins with an unnamed tributary of Little Neshaminy Creek. The intermittent stream was dry during base flow conditions observed during Phase I sampling. During Phase II and II, there was no surface water flow within the intermittent stream; however, pools of standing water were evident within the channel. This indicates that most surface water flow in this stream takes place during and shortly after precipitation.

B. Meteorology

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.

C. Ecology

The immediate area of Site 8 consists primarily of mowed fields, while areas immediately north of Site 8 and Kirk Road include lawns, wooded areas, and wetlands associated with the unnamed tributary of Little Neshaminy Creek. There are no known permanent threatened or endangered species on or near the Site; however, some transient species may traverse the area.

D. Soils

The Site is underlain by soils of the Lansdale-Lawrenceville Association. This unit consists of nearly level to sloping, moderately well drained soils and well-drained soils on uplands. The soils are deep and have a medium-textured surface layer and a medium-textured or moderately coarse-textured subsoil. They formed in material weathered from shale and sandstone and in silty, windblown deposits. According to soil borings conducted as part of the RI, the soil thickness at Site 8 ranged from 7 to 10 feet. The soils encountered in these borings were generally described as brown to reddish-brown silty clay to clayey silt.

IV. REMEDIAL INVESTIGATION RESULTS

A. Surface Soil

Surface soil samples were collected from a total of forty-one (41) locations during the course of RI work. The depth of the samples was 2 to 36 inches below ground surface. No soils with odors, elevated organic vapor readings or staining were encountered. Figure 4 identifies the locations sampled during the Phase III RI and contaminant concentrations which exceeded screening criteria indicative of a potential unacceptable risk. These sample results indicated the presence of lead levels ranging from 759 mg/kg to 3159 mg/kg in soils within an area along the western side of the runway. In response, approximately 575 tons of surface soils were removed from the subject area in February 1999. The soil excavation measured 131 feet in length, 20 feet in width, and 2 to 2.5 feet in depth (see Figure 5 for area of soil removal).

After completion of the soil removal, seventeen (17) verification samples were collected from the bottom and sides of the removal excavation and analyzed for lead. The verification sample results indicated that three samples collected within the area addressed by the removal contained lead levels exceeding screening criteria indicative of a potential unacceptable risk. The subject levels ranged from 475 mg/kg to 733 mg/kg. Several additional samples were collected after Phase III to complete the characterization of the surface soils. Figure 5 provides the locations of samples which characterize the quality of surface soils present at this time (i.e. post-removal) and detected concentrations which exceed screening criteria potentially indicative of an unacceptable risk, while Table 1 provides the occurrence and distribution of organics and inorganics detected in the subject samples. Verification sample results (rather than pre-removal results) are incorporated for the area addressed by the removal action.

B. Subsurface Soil

A total of twenty-seven (27) subsurface soil samples were collected as part of the Phase III RI and limited post-Phase III RI sampling. Twenty-four (24) samples were collected from soil borings while three (3) were collected from test pits. The samples ranged from 5.5 to 9 feet below the ground surface. Five (5) of the subject borings were advanced through the paving of the runway. No soils with odors, elevated organic vapor levels or staining were encountered. Figure 6 shows the subsurface soil sample locations, along with contaminant concentrations that exceeded screening levels potentially indicative of an unacceptable risk. Table 2 presents the occurrence and distribution of organics and inorganics detected in the samples collected.

C. Surface Water and Sediment

The locations of surface water and sediment samples collected as part of the Phase II and Phase III RI are shown on Figure 7. A total of three (3) surface water samples and six (6) sediment samples were collected downstream of Site 8.

Sample locations C6, C11 and C12 were within the intermittent stream, which receives surface drainage from Site 8. The occurrence and distribution of inorganics and organics in sediment samples collected at these locations are presented in Tables 3 and 4, respectively. Table 5 presents the occurrence and distribution of total inorganics in a surface water sample collected in this intermittent stream. No inorganics were detected in the subject surface water sample.

The RI considered sample locations C8, C10 and C13 to be background samples. However these samples are downstream and within a reasonable distance of Site 8 and the sample results for these locations may be considered in evaluating the impacts of Site 8. The subject samples were collected in a perennial stream. The occurrence and distribution of total inorganics and organics in sediment samples at these locations are presented in Tables 6 and 7 respectively, while the occurrence and distribution of total inorganics in surface water samples at these locations is presented in Table 8. No organics were detected at the subject surface water locations.

V. SUMMARY OF SITE RISKS

As part of the final RI, a risk assessment was conducted with the RI data summarized above to estimate the potential risks to human health posed soils, sediments and surface water associated with Site 8.

In the case of soils, the risk assessment addressed conditions after the performance of

the removal action. To assess these risks, the potential exposure scenarios identified below were assumed.

- Ingestion, inhalation and dermal contact with soils.
- Ingestion and dermal contact with 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 X 10^{-6} (an increase of one case of cancer for one million people exposed) to 1 X 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% or less is considered acceptable.

The risk assessment in the final RI found the maximum carcinogenic risk posed by soils at Site 8 would occur if one assumed a lifetime of exposure to surface soils as a resident. In this case, the total incremental carcinogenic risk was determined to be 2.94 x 10^{-5}. The primary contributor to the calculated risk was the concentration of arsenic. However, the majority of the detected arsenic also is present in background samples and appears to naturally occurring. The calculated risk falls within the acceptable range of 1 x 10^{-6} to 1 x 10^{-4}, and may be considered acceptable. In assessing non-carcinogenic risks posed by soil, the highest HI identified was 0.6. In this case, exposure of a residential child to surface soil was assumed. This value falls below the acceptable level of 1.0. The assessment of risk posed by lead in soils found that the estimated percentage of children with a blood level above 10 ug/dl was 0.35%, which is below the protective level of 5%.

The risk assessment for sediment in surface water associated with Site 8 found the recreational adolescents would incur an incremental carcinogenic risk of 1.25 x 10^{-7}. An HI of 0.02 was estimated in the case of recreational adolescent contact with sediments. Each value falls within the respective acceptable range. The risk assessment did not identify any carcinogenic risk associated with surface water, while the assessment of non-carcinogenic risk estimated an HI of 0.001 for recreational adolescents. These findings indicate that sediment and surface water associated with Site 8 do not present a threat to human health.

A summary of all Site 8 carcinogenic and non-carcinogenic risks for each exposure scenario is presented in Table 9.

Surface and subsurface soil sampling data was evaluated to determine whether Site 8 may be a past or present source of tetrachloroethylene (PCE) in Area C groundwater.

A remedy is currently being implemented to address the PCE levels of concern. PCE was detected in only one soil sample collected as part of the RI for Site 8. The detected level was well below the screening level established to identify a potential threat to groundwater. Based on this data, Site 8 does not appear to be a past or present source of PCE in Area C groundwater. In addition, RI data otherwise suggests that Site 8 soils present no threat to groundwater quality.

An Ecological Risk Assessment (ERA) was also conducted with Phase II and Phase III RI data to assess potential risks posed by sediments and surface water to the environment. The focus of the ERA was potential contaminant inputs from Site 8 to the tributary of Little Neshaminy Creek north of Kirk Road, which receives runoff from Site 8. The ERA concluded that the potential risks posed to ecological receptors by the subject surface and sediment were insignificant and identified no unacceptable risk to the environment.

VI. SELECTED REMEDY

The results of the risk assessment conducted as part of the RI indicate that, based on available information, soils, sediment, and surface water associated with Site 8 do not present an unacceptable risk to human health and the environment. In this case, the Navy, with the support of EPA, selects a remedy of No Action. There are no costs associated with this remedy. Based on available information, the Navy and EPA believe that this remedy would be protective of human health and the environment and would be cost-effective.

VII. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Since 1988, the plans and results of CERCLA investigations and actions have been presented to a Technical Review Committee or a Restoration Advisory Board (RAB) which has been established by the Navy for the Site. Members of the RAB at this time include representatives of Bucks County Health Department, Warminster Township, Warminster Township Municipal Authority, Northampton Township, Northampton Municipal Authority and Ivyland Borough.

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 20, 1999, presenting the preferred remedy for OU-5. The Proposed Plan and RI report for OU-5 became available for review at the time and are among documents, which comprise the CERCLA Administrative Record for NAWC. The Administrative Record is available for review by the public at the following information repositories:

- Caretaker Site Office

Jacksonville Road (Building located on West Side)
P.O. Box 2609
Warminster, Pennsylvania 18974-0061

- 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-5 was published in the Philadelphia Inquirer, Intelligencer, Public Spirit and Courier Times. Additionally, the Proposed Plan and the Notice of Availability were mailed to local municipal and government agencies in the vicinity of the Site and over 400 residents in the vicinity of the Site.

The public comment period for the Proposed Plan was from August 23, 1999 to September 22, 1999. A public availability session was held at the Ivyland Marine Corps Barracks, Jacksonville Road, Warminster, Pennsylvania on September 8, 1999 to present the RI, and Proposed Plan, answer questions, and to solicit and accept both oral and written comments on the Proposed Plan and the RI. Two individuals attended and no oral or written comments were received during this public availability session.

A Responsiveness Summary, included as part of this ROD, has been prepared to respond to significant comments, criticisms, and new relevant information received during the public comment period. Upon signing the ROD, the Navy will publish a notice of availability of this ROD in the Philadelphia Inquirer, Intelligencer, Public Spirit and Courier Times and place the ROD in the Administrative Record located at the repositories mentioned above.

This Record of Decision presents the selected remedial action for OU-5 at the Site chosen in accordance with CERCLA and, to the extent practicable, the National Contingency Plan (NCP).

VIII. RESPONSIVENESS SUMMARY

One comment was received by the Navy and EPA during the public comment period from August 23, 1999 to September 22, 1999. The comment and response of the Navy and EPA are identified below.

COMMENT: Were the sediments of the stream, which drains Site 8, tested?

RESPONSE: As discussed in Section IV.C. of this ROD, the sediments of subject stream were tested during Phase II and Phase III of the RI. A total of four (4) samples were collected. The sample results were evaluated under both the Human Health and

Ecological Risk Assessments conducted as part of the RI (see Section V of this ROD). Based on the subject test results, the risk assessments indicate that the sediments do not present an unacceptable risk to human health or the environment.

APPENDIX A.

TABLE 1
OCCURRENCE AND DISTRIBUTION OF ORGANICS AND INORGANICS IN SITE 8 SURFACE SOIL (POST-REMOVAL)
NAWC WARMINSTER, PENNSYLVANIA

	Background Data			Site-Related Data				
Substance	Freq. of Detection	Range of Positive Detection Min. - Max.	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	Exposure Point Concentration
1,2,3,4,6,7,8-HpCDD	0/0	-		7/13	0.0073 J - 3.6 J	0.365	SS-08-10-D	3.6
1,2,3,4,6,7,8-HpCDF	0/0	-		2/7	0.1731 J - 0.1756 J	0.236	SS-08-02	0.176
1,2,3,4,7,8-HxCDF	0/0	-		3/13	0.0048 J - 0.007 J	0.0231	SS-08-03	0.007
OCDD	0/0	-		13/13	0.087 J - 22 J	2.77	SS-08-10	13.9
OCDF	0/0	-		1/5	0.0379 J	0.491	SS-08-08	0.0379
Aluminum	29/29	4780 - 18100	BG-12	16/16	9940 - 16300	12300	SS-08-28-D	13000
Arsenic	25/29	0.28 - 12.1 J	BG-11	36/36	2 - 13.9	6.05	SS-08-16	6.7
Barium	25/27	34.1 - 225	BG-29	16/16	42.3 - 124	73	SS-08-17	84.9
Beryllium	25/29	0.31 - 1.7 K	BG-23-D	12/12	0.62 - 1.1	0.788	SS-08-07	0.858
Cadmium	0/29	-		8/15	0.53 L - 6.3	1.85	SS-08-10	4.59
Calcium	23/27	240 - 1910	BG-24	15/15	776 - 19500	4770	SS-08-14	10500
Chromium	29/29	7.9 J - 35.3 JK	BG-12	16/16	11.8 L - 46.1	19.7	SS-08-14	23.1
Cobalt	25/28	1.6 - 22.1	BG-23-D	14/14	5.4 - 12.3	8.84	SS-08-28-D	9.86
Copper	27/29	3.6 K - 30.6	BG-29	16/16	4.3 - 92.6 J	22.6	SS-08-10	40.5
Iron	29/29	6980 - 410500	BG-30	16/16	13000 - 25800	17700	SS-08-28-D	19300
Lead	29/29	1.6 J - 96.5 J	BG-13	41/41	9.4 - 732 K	119	SS-08-38	214
Magnesium	25/29	518 - 4960	BG-24	15/15	1840 - 12100	4390	SS-08-14	6100
Manganese	29/29	30.9 - 2010	BG-28	16/16	247 - 722 J	433	SS-08-18	508
Mercury	1/27	0.37	BG-23	2/14	0.06 L - 0.1	0.0425	SS-08-08	0.0552
Nickel	18/25	4.1 J - 21.7 J	BG-23-D	11/11	9.1 - 15.7	11	SS-08-28-D	12
Potassium	25/27	89.1 - 3050	BG-24	15/15	436 - 1840	846	SS-08-17	1060
Selenium	0/20	-		2/16	0.7 K - 0.72 K	0.417	SS-08-14-D	0.463
Sodium	4/18	55.2 - 86.7	BG-25	5/5	61.1 - 1110 J	418	SS-08-18	867
Vanadium	29/29	15.4 - 45	BG-12	20/20	19.3 - 45.8 J	29.9	SS-08-53	32.8
Zinc	25/27	9 - 60	BG-13	16/16	24.9 - 456	92.3	SS-08-14	165
4,4'-DDD	1/20	18 JP	BG-12	1/14	4.7 P	2.03	SS-08-10	2.2
4,4'-DDT	1/20	1440 JP	BG-12	3/14	5 J - 23 J	3.92	SS-08-14-D	5.71
Aldrin	0/20	-		1/14	3.2 J	1.08	SS-08-14-D	1.19
Aroclor-1254	1/20	51	BG-13	3/14	13 J - 83	24.8	SS-08-10	31
Endrin	0/20	-		1/14	6.7 P	2.11	SS-08-10	2.35
1,4-Dichlorobenzene	1/11	43 J	BG-11	1/14	43	251	SS-08-18	43
2-Methylnaphthalene	0/11	-		1/18	130 J	207	SS-08-10	130
Anthracene	0/11	-		1/18	590	285	SS-08-17	348
Benz(a)anthracene	0/11	-		10/18	80 J - 980	215	SS-08-17	271
Benzo(a)pyrene	0/11	-		10/18	79 J - 930	228	SS-08-17	287
Benzo(b)fluoranthene	1/11	58 J	BG-13	10/18	120 J - 1600	311	SS-08-17	402
Benzo(g,h,i)perylene	0/11	-		8/18	61 J - 410	167	SS-08-17	218
Benzo(k)fluoranthene	1/11	46 J	BG-13	9/18	58 J - 270 J	156	SS-08-14	193
Bis(2-ethylhexyl)phthalate*	0/0	-		1/10	1700 J - 1800 J	350	SS-08-14-D	554
Butylbenzylphthalate*	0/0	-		1/2	400 J - 600	350	SS-08-14	600
Carbazole	0/11	-		1/18	310 J	270	SS-08-17	310
Chrysene	1/11	51 J	BG-13	10/18	77 J - 980	250	SS-08-17	331
Di-n-butylphthalate	0/0	-		2/5	50 J - 54 J	137	SS-08-10	54
Dibenz(a,h)anthracene	0/11	-		3/18	46 J - 120 J	242	SS-08-17	120
Fluoranthene	1/11	92 J	BG-13	10/18	150 J - 2000	338	SS-08-17	426
Fluorene	0/11	-		1/18	540	282	SS-08-17	342
Indeno(1,2,3-cd)pyrene	0/11	-		7/18	59 J - 410	185	SS-08-17	245
Naphthalene	0/11	-		2/18	48 J - 56 J	195	SS-08-10	56
Pentachlorophenol	0/11	-		1/14	43 J	442	SS-08-10	43
Phenanthrene	1/11	51 J	BG-13	10/18	72 J - 2100	275	SS-08-17	351
Pyrene	1/11	100 J	BG-13	10/18	130 J - 1600	314	SS-08-17	397
Methylene Chloride	0/13	-		2/8	7 J - 7 J	6.25	SS-08-14-D	6.8
Tetrachloroethene	0/19	-		1/13	3 J	5.77	SS-08-08	3
Toluene	3/19	2 J	BG-17	5/13	2 J - 3 J	4.69	SS-08-05	3

Notes:

* - Minimum and maximum detected site-related concentrations are based on duplicate samples.

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 8 SUBSURFACE SOIL (POST-REMOVAL)
NAWC WARMINSTER, PENNSYLVANIA

	Background Data			Site-Related Data				
Substance	Freq. of Detection	Range of Positive Detection Min. - Max.	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	Exposure Point Concentration
OCDD		-		1/4	4.4 J	2.71	SB-08-04	4.23
Aluminum	29/29	4780 - 18100	BG-12	23/23	6020 - 16000	11200	TP01-08-02	13100
Antimony	1/21	13.6 J	BG-16	1/17	14.9 J	4.72	SB-08-19	5.4
Arsenic	25/29	0.28 - 12.1 J	BG-11	22/22	0.61 - 6.6	3.1	SB-08-22	4.49
Barium	25/27	34.1 - 225	BG-28	23/23	16.1 - 113	43.6	TP01-08-02	56.6
Beryllium	25/29	0.31 - 1.7 K	BG-23-D	21/21	0.29 - 2.2	0.684	TP02-08-03	0.848
Calcium	23/27	240 - 1910	BG-24	22/22	492 - 10110	1260	SB-08-19	1440
Chromium	29/29	7.9 J - 35.3 JK	BG-12	23/23	7.1 - 26.1 J	14.6	SB-08-10	16.9
Cobalt	25/28	1.6 - 22.1	BG-23-D	23/23	4.6 - 22.6	9.71	TP01-08-02	11.5
Copper	27/29	3.6 K - 30.6	BG-29	22/22	5.8 L - 353.65 J	30.6	SB-08-19	34.6
Iron	29/29	6980 - 410500	BG-30	22/23	7060 - 27450	14800	SB-08-19	17300
Lead	29/29	1.6 J - 98.5 J	BG-13	26/26	1.9 - 26.7 J	7.52	SB-08-18	10
Magnesium	25/29	518 - 4960	BG-24	22/22	832 - 6975	2140	SB-08-19	2640
Manganese	29/29	30.9 - 2010	BG-28	23/23	143 - 1230	533	TP01-08-02	678
Mercury	1/27	0.37	BG-23	1/23	0.1 L	0.0301	SB-08-02	0.034
Nickel	18/25	4.1 J - 21.7 J	BG-23-D	10/10	5.8 - 17.1	10.9	TP02-08-03-D	13
Potassium	25/27	89.1 - 3050	BG-24	21/22	145 - 2270	583	TP02-08-03	793
Selenium	0/20	-		1/23	0.63 K	0.32	SB-08-10	0.35
Sodium	4/18	55.2 - 86.7	BG-25	14/14	71.5 - 1470	186	SB-08-19	240
Thallium	3/29	0.37 - 0.42	BG-23-D	2/22	0.43 - 9.1 J	0.691	SB-08-19	0.639
Vanadium	29/29	15.4 - 45	BG-12	27/27	9.8 - 52.5	26.1	SB-08-23	31.7
Zinc	25/27	9 - 60	BG-13	22/22	5.1 - 47.6	18.7	SB-08-18	25.2
Endosulfan I	0/20	-		1/7	0.71 J	0.722	SB-08-08	0.71
Gamma-Chlordane	0/20	-		1/7	2	0.801	SB-08-18	2
2-Nitrophenol	0/11	-		1/19	42 J	181	SB-08-02	42
4-Nitrophenol	0/11	-		1/19	38 J	435	SB-08-02	38
Benz(a)anthracene	0/11	-		1/23	120 J	188	SB-08-18	120
Benzo(a)pyrene	0/11	-		1/23	140 J	188	SB-08-18	140
Benzo(b)fluoranthene	1/11	58 J	BG-13	1/23	190 J	191	SB-08-18	190
Benzo(g,h,i)perylene	0/11	-		1/23	80 J	188	SB-08-18	80
Benzo(k)fluoranthene	1/11	46 J	BG-13	1/23	110 J	187	SB-08-18	110
Chrysene	1/11	51 J	BG-13	1/23	170 J	190	SB-08-18	170
Fluoranthene	1/11	92 J	BG-13	1/23	320 J	196	SB-08-18	205
Indeno(1,2,3-cd)pyrene	0/11	-		1/23	94 J	188	SB-08-18	94
Phenanthrene	1/11	51 J	BG-13	1/23	180 J	190	SB-08-18	180
Phenol	0/11	-		1/19	920	227	SB-08-02	258
Pyrene	1/11	100 J	BG-13	1/23	290 J	195	SB-08-18	202

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.
Number of samples may vary based on the number of usable results.

TABLE 3

OCCURRENCE AND DISTRIBUTION OF INORGANICS IN SEDIMENT AT SITE 8

WARMINSTER, PENNSYLVANIA

(mg/kg)

SUBSTANCE	BACKGROUND REPRESENTATIVE CONCENTRATION*	SITE-RELATED FREQUENCY OF DETECTION	SITE-RELATED RANGE OF POSITIVE DETECTION**	SITE-RELATED STATISTICAL DISTRIBUTION	SITE-RELATED REPRESENTATIVE CONCENTRATION
ALUMINUM	4000	3 / 3	3700 - 6750	NONPARAMETRIC DIST	6750
ARSENIC	2.8	2 / 2	3.4 - 4.2	NONPARAMETRIC DIST	4.20
BARIUM	40.8	2 / 3	49.8 - 74.6	NONPARAMETRIC DIST	74.6
BERYLLIUM	0.62	2 / 2	0.65 - 0.95	NONPARAMETRIC DIST	0.95
CADMIUM	-	1 / 1	0.2	NONPARAMETRIC DIST	0.2
CALCIUM	1290	2 / 2	3430 - 20300	NONPARAMETRIC DIST	20300
CHROMIUM	11.7	3 / 3	14 - 20.5	NONPARAMETRIC DIST	20.5
COBALT	4.4	3 / 3	6 - 9.3	NONPARAMETRIC DIST	9.3
COPPER	7.5	2 / 2	19.5 - 34.6	NONPARAMETRIC DIST	34.6
IRON	11200	3 / 3	16200 - 25400	NORMAL OVER LOGNORMAL	25400
LEAD	24.8	3 / 3	20.4 - 38.5	NONPARAMETRIC DIST	38.5
MAGNESIUM	1320	2 / 2	3290 - 12700	NONPARAMETRIC DIST	12700
MANGANESE	220	3 / 3	307 - 848	NONPARAMETRIC DIST	848
NICKEL	6	2 / 2	10 - 10.6	NONPARAMETRIC DIST	10.6
POTASSIUM	421	2 / 2	924 - 982	NONPARAMETRIC DIST	982
SODIUM	340	1 / 1	732	NONPARAMETRIC DIST	732
VANADIUM	13.6	3 / 3	18 - 34.2	NONPARAMETRIC DIST	34.2
ZINC	57.2	3 / 3	59 - 78.5	NONPARAMETRIC DIST	78.5

* = REPRESENTATIVE CONCENTRATION FOR BACKGROUND IS PRESENTED IN TABLE 2-5

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

TABLE 4
OCCURRENCE AND DISTRIBUTION OF ORGANICS IN SEDIMENT AT SITE 8
WARMINSTER, PENNSYLVANIA
(ug/kg)

SUBSTANCE	BACKGROUND	SITE-RELATED			
	REPRESENTATIVE CONCENTRATION*	FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION**	STATISTICAL DISTRIBUTION	REPRESENTATIVE CONCENTRATION
ACENAPHTHENE	-	1 / 2	120	NONPARAMETRIC DIST	120
ACENAPHTHYLENE	-	1 / 2	60	NONPARAMETRIC DIST	60
ANTHRACENE	97	2 / 2	72 - 290	NONPARAMETRIC DIST	290
BENZ(A)ANTHRACENE	280	2 / 2	280 - 720	NONPARAMETRIC DIST	720
BENZO(A)PYRENE	260	2 / 2	270 - 650	NONPARAMETRIC DIST	650
BENZO(B)FLUORANTHENE	320	2 / 2	230 - 820	NONPARAMETRIC DIST	820
BENZO(G,H,I)PERYLENE	150	1 / 2	320	NONPARAMETRIC DIST	320
BENZO(K)FLUORANTHENE	200	2 / 2	350 - 370	NONPARAMETRIC DIST	370
BIS(2-ETHYLHEXYL)PHTHALAT	200	1 / 1	93	NONPARAMETRIC DIST	93
CARBAZOLE	-	2 / 2	490 - 1100	NONPARAMETRIC DIST	1100
CHRYSENE	340	2 / 2	340 - 740	NONPARAMETRIC DIST	740
DI-N-OCTYLPHTHALATE	-	1 / 2	94	NONPARAMETRIC DIST	94
DIBENZ(A,H)ANTHRACENE	53	1 / 2	140	NONPARAMETRIC DIST	140
DIBENZOFURAN	-	1 / 2	72	NONPARAMETRIC DIST	72
FLUORANTHENE	550	2 / 2	870 - 1200	NONPARAMETRIC DIST	1200
FLUORENE	-	1 / 2	140	NONPARAMETRIC DIST	140
PYRENE	590	2 / 2	540 - 1400	NONPARAMETRIC DIST	1400

* = REPRESENTATIVE CONCENTRATION FOR BACKGROUND IS PRESENTED IN TABLE 2-6

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

TABLE 6

OCCURRENCE AND DISTRIBUTION OF TOTAL INORGANICS IN SURFACE WATER AT SITE 8

WARMINSTER, PENNSYLVANIA

(µg/L)

SUBSTANCE	BACKGROUND	SITE-RELATED			
	REPRESENTATIVE CONCENTRATION*	FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION**	STATISTICAL DISTRIBUTION	REPRESENTATIVE CONCENTRATION
BARIUM	60	1 / 1	93	NONPARAMETRIC DIST	93
CALCIUM	18300	1 / 1	42800	NONPARAMETRIC DIST	42800
IRON	630	1 / 1	186	NONPARAMETRIC DIST	186
MAGNESIUM	7240	1 / 1	13700	NONPARAMETRIC DIST	13700
MANGANESE	83	1 / 1	159	NONPARAMETRIC DIST	159
POTASSIUM	1700	1 / 1	2150	NONPARAMETRIC DIST	2150
SODIUM	9980	1 / 1	42900	NONPARAMETRIC DIST	42900

* = REPRESENTATIVE CONCENTRATION FOR BACKGROUND IS PRESENTED IN TABLE 2-3

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

TABLE 6

OCCURRENCE AND DISTRIBUTION OF INORGANICS IN SEDIMENT IN BACKGROUND - SITE 8

WARMINSTER, PENNSYLVANIA

(mg/kg)

SUBSTANCE	BACKGROUND				
	MEAN	STATISTICAL DISTRIBUTION	FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION*	REPRESENTATIVE CONCENTRATION
ALUMINUM	3390	NONPARAMETRIC DIST	3 / 3	2920 - 4000	4000
ARSENIC	2.55	NONPARAMETRIC DIST	2 / 2	2.3 - 2.8	2.8
BARIUM	32.33	NONPARAMETRIC DIST	2 / 3	31.4 - 40.6	40.6
BERYLLIUM	0.57	NONPARAMETRIC DIST	2 / 2	0.52 - 0.62	0.62
CALCIUM	1175	NONPARAMETRIC DIST	2 / 2	1060 - 1290	1290
CHROMIUM	9.20	NONPARAMETRIC DIST	3 / 3	7.7 - 11.7	11.7
COBALT	4.4	NONPARAMETRIC DIST	1 / 1	4.4 - 4.4	4.4
COPPER	6.45	NONPARAMETRIC DIST	2 / 2	5.4 - 7.5	7.5
IRON	8670	NONPARAMETRIC DIST	3 / 3	5800 - 11200	11200
LEAD	11.5	NONPARAMETRIC DIST	2 / 3	9.8 - 24.6	24.60
MAGNESIUM	1180	NONPARAMETRIC DIST	2 / 2	1040 - 1320	1320
MANGANESE	194.33	NONPARAMETRIC DIST	3 / 3	144 - 220	220
NICKEL	5.2	NONPARAMETRIC DIST	2 / 2	4.4 - 6	6
POTASSIUM	354.5	NONPARAMETRIC DIST	2 / 2	288 - 421	421
SODIUM	182.5	NONPARAMETRIC DIST	1 / 2	340 - 340	340
VANADIUM	12.8	NONPARAMETRIC DIST	3 / 3	11.8 - 13.6	14
ZINC	48.7	NONPARAMETRIC DIST	3 / 3	32.9 - 57.2	57

* = QUALIFIERS FOR DATA ARE PRESENTED IN DATA PRESENTATION TABLES

TABLE 7

OCCURRENCE AND DISTRIBUTION OF ORGANICS IN SEDIMENT IN BACKGROUND - SITE 8

WARMINSTER, PENNSYLVANIA

(ug/kg)

SUBSTANCE	BACKGROUND				
	MEAN	STATISTICAL DISTRIBUTION	FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION*	REPRESENTATIVE CONCENTRATION
ANTHRACENE	1299	NONPARAMETRIC DIST	1 / 2	97	97
BENZ(A)ANTHRACENE	245.00	NONPARAMETRIC DIST	2 / 2	210 - 280	280
BENZO(A)PYRENE	1380	NONPARAMETRIC DIST	1 / 2	260	260
BENZO(B)FLUORANTHENE	1410.00	NONPARAMETRIC DIST	1 / 2	320	320
BENZO(G,H,I)PERYLENE	1325	NONPARAMETRIC DIST	1 / 2	150	150
BENZO(K)FLUORANTHENE	1350	NONPARAMETRIC DIST	1 / 2	200	200
CARBAZOLE	288	NONPARAMETRIC DIST	1 / 1	287.5	288
CHRYSENE	265	NONPARAMETRIC DIST	2 / 2	190 - 340	340
DIBENZ(A,H)ANTHRACENE	1277	NONPARAMETRIC DIST	1 / 2	53	53
FLUORANTHENE	465	NONPARAMETRIC DIST	2 / 2	380 - 550	550
INDENO(1,2,3-CD)PYRENE	1345.00	NONPARAMETRIC DIST	1 / 2	190	190
PYRENE	460	NONPARAMETRIC DIST	2 / 2	330 - 590	590

* = QUALIFIERS FOR DATA ARE PRESENTED IN DATA PRESENTATION TABLES

TABLE 8

OCCURRENCE AND DISTRIBUTION OF TOTAL INORGANICS IN SURFACE WATER IN BACKGROUND - SITE 8

WARMINSTER, PENNSYLVANIA

(ug/L)

SUBSTANCE	BACKGROUND				
	MEAN	STATISTICAL DISTRIBUTION	FREQUENCY OF DETECTION	RANGE OF POSITIVE DETECTION*	REPRESENTATIVE CONCENTRATION
BARIUM	155	NONPARAMETRIC DIST	1 / 2	60	60
CALCIUM	17100	NORMAL OVER LOGNORMAL	2 / 2	15900 - 18300	18300
IRON	630	NONPARAMETRIC DIST	1 / 1	630	630
MAGNESIUM	6915	NONPARAMETRIC DIST	2 / 2	6590 - 7240	7240
MANGANESE	67	NONPARAMETRIC DIST	1 / 2	83	83
POTASSIUM	1415	NONPARAMETRIC DIST	2 / 2	1130 - 1700	1700
SODIUM	9470	NONPARAMETRIC DIST	2 / 2	8980 - 9960	9960

* = QUALIFIERS FOR DATA ARE PRESENTED IN DATA PRESENTATION TABLES

TABLE 9
SUMMARY OF NONCARCINOGENIC AND CARCINOGENIC RISKS, SITE 8 (POST-REMOVAL) - ALL EXPOSURE PATHWAYS
REASONABLE MAXIMUM EXPOSURE
NAWC WARMINSTER, PENNSYLVANIA

Scenario / Receptor	Industrial Adult	Casual User Child Age 1-6	Casual User Pre-Adol./Adol. Age 7-16	Casual User Adult	Casual User Lifetime*	Residential Child	Residential Adult	Resident Lifetime**	Recreational Pre-Adol. Age 7-12
HAZARD INDEX									
Surface Soil - Exposure Routes									
Incidental Ingestion	2.95E-02	1.19E-02	3.42E-03	7.08E-04	NA	3.48E-01	2.06E-02	NA	NA
Dermal Contact	7.44E-02	1.56E-02	1.15E-02	3.56E-03	NA	2.28E-01	5.20E-02	NA	NA
Fugitive Dust Inhalation	7.18E-05	1.16E-05	4.45E-06	3.68E-06	NA	1.02E-03	3.22E-04	NA	NA
Subtotal of Surface Soil	0.1	0.03	0.01	0.004	NA	0.6	0.07	NA	NA
Subsurface Soil - Exposure Routes									
Incidental Ingestion	8.51E-04	NA	NA	NA	NA	1.01E-02	5.98E-04	NA	NA
Dermal Contact	1.29E-04	NA	NA	NA	NA	3.90E-04	8.91E-05	NA	NA
Fugitive Dust Inhalation	NT	NA	NA	NA	NA	NT	NT	NA	NA
Subtotal of Subsurface Soil	0.001	NA	NA	NA	NA	0.01	0.001	NA	NA
Sediment - Exposure Routes									
Incidental Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	1.58E-02
Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	2.70E-04
Subtotal of Sediment	NA	NA	NA	NA	NA	NA	NA	NA	0.02
Surface Water (Total Inorganics) - Exposure Routes									
Incidental Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	7.82E-04
Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	2.66E-05
Subtotal of Surface Water (Total)	NA	NA	NA	NA	NA	NA	NA	NA	0.001
Surface Water (Dissolved Inorganics) - Exposure Routes									
Incidental Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	7.97E-04
Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	2.71E-05
Subtotal of Surface Water (Dis.)	NA	NA	NA	NA	NA	NA	NA	NA	0.001
INCREMENTAL CANCER RISK									
Surface Soil - Exposure Routes									
Incidental Ingestion	7.35E-06	7.14E-07	3.42E-07	9.86E-08	1.15E-06	2.08E-05	4.94E-06	2.58E-05	NA
Dermal Contact	2.48E-06	1.25E-07	1.53E-07	6.65E-08	3.45E-07	1.82E-06	1.66E-06	3.46E-06	NA
Fugitive Dust Inhalation	3.36E-08	1.10E-09	8.32E-10	9.83E-10	3.10E-09	1.31E-09	1.44E-07	2.59E-07	NA
Subtotal of Surface Soil	9.83E-06	8.40E-07	4.98E-07	1.64E-07	1.60E-06	2.30E-05	6.74E-06	2.84E-05	NA
Subsurface Soil - Exposure Routes									
Incidental Ingestion	2.22E-07	NA	NA	NA	NA	6.28E-07	1.49E-07	7.77E-07	NA
Dermal Contact	5.99E-08	NA	NA	NA	NA	4.39E-08	4.01E-08	8.40E-08	NA
Fugitive Dust Inhalation	2.02E-11	NA	NA	NA	NA	6.65E-11	6.67E-11	1.55E-10	NA
Subtotal of Subsurface Soil	2.82E-07	NA	NA	NA	NA	6.72E-07	1.89E-07	8.61E-07	NA
Sediment - Exposure Routes									
Incidental Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	1.22E-07
Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	2.94E-09
Subtotal of Sediment	NA	NA	NA	NA	NA	NA	NA	NA	1.26E-07
Surface Water (Total Inorganics) - Exposure Routes									
Incidental Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NT
Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	NT
Subtotal of Surface Water (Total)	NA	NA	NA	NA	NA	NA	NA	NA	NT
Surface Water (Dissolved Inorganics) - Exposure Routes									
Incidental Ingestion	NA	NA	NA	NA	NA	NA	NA	NA	NT
Dermal Contact	NA	NA	NA	NA	NA	NA	NA	NA	NT
Subtotal of Surface Water (Dis.)	NA	NA	NA	NA	NA	NA	NA	NA	NT

* = Lifetime Casual User Risks are the summed Cancer Risks for Casual User Child (Age 1-6), Casual User Pre-Adolescent/Adolescent (Age 7-16), and Casual User Adult (14 year exposure)
** = 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.
NT = COPCs for these exposure routes had no quantitative toxicity values, therefore, no toxicity was estimated for these exposure pathways
Hazard Indices (i.e., summation of the hazard quotients) are used only for comparison purposes and do not reflect actual additive noncarcinogenic effects

APPENDIX B.

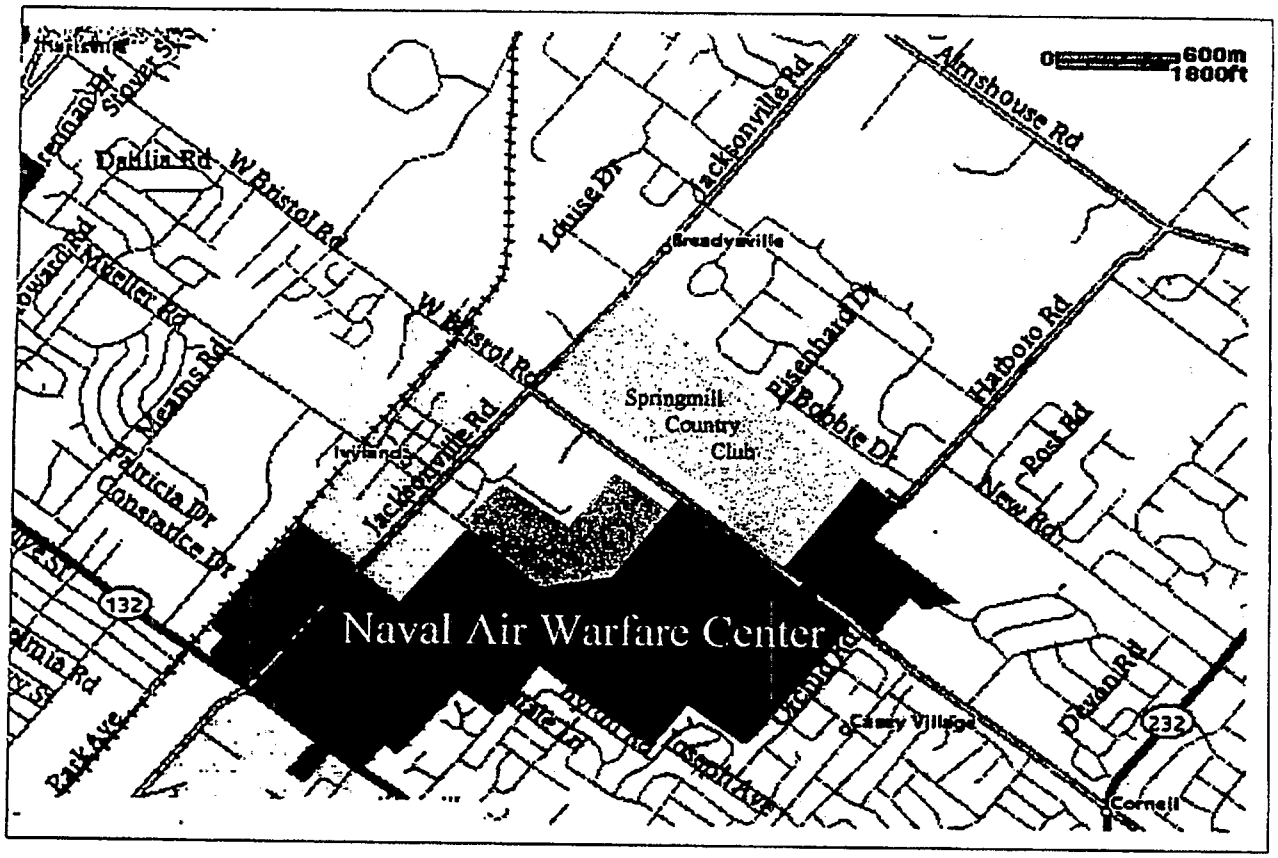

Figure 1. The Former NAWC, Warminster, PA

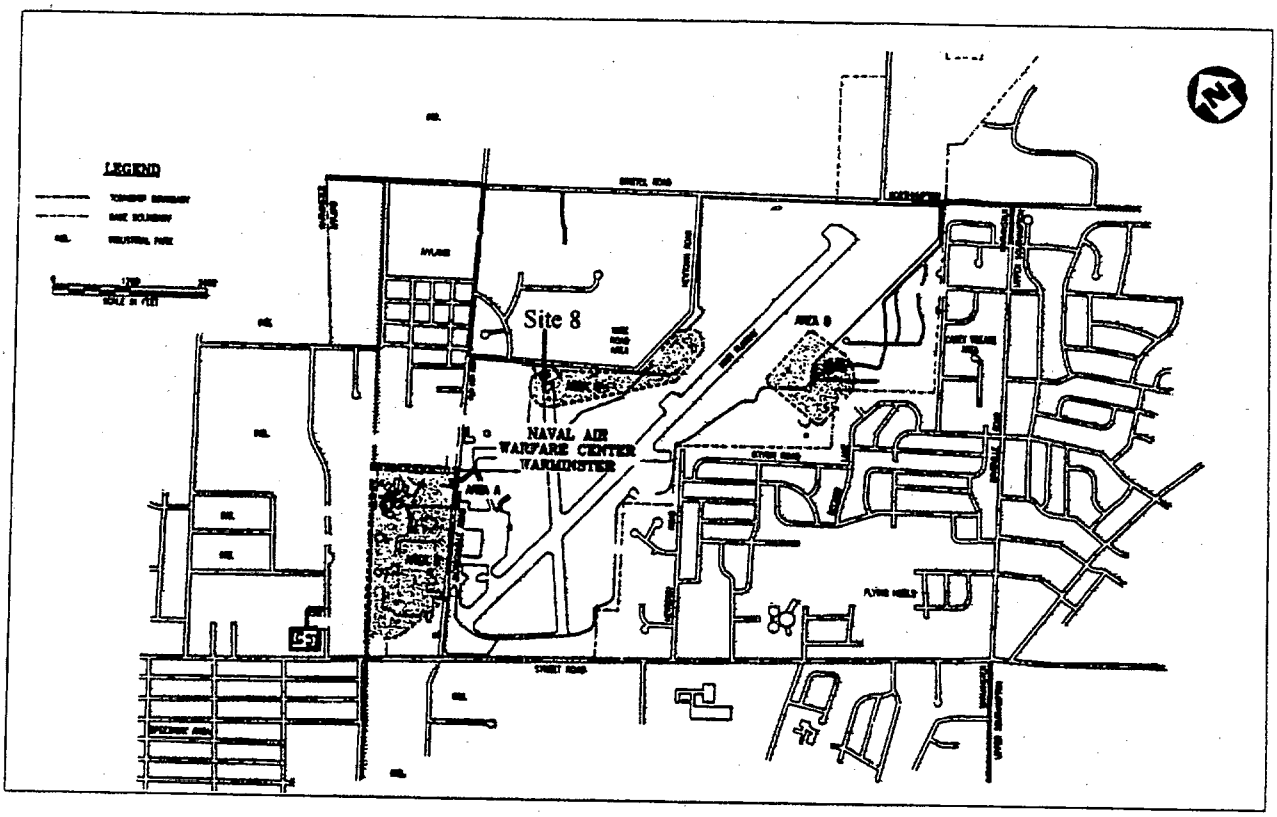

Figure 2. Site 8 Location Map

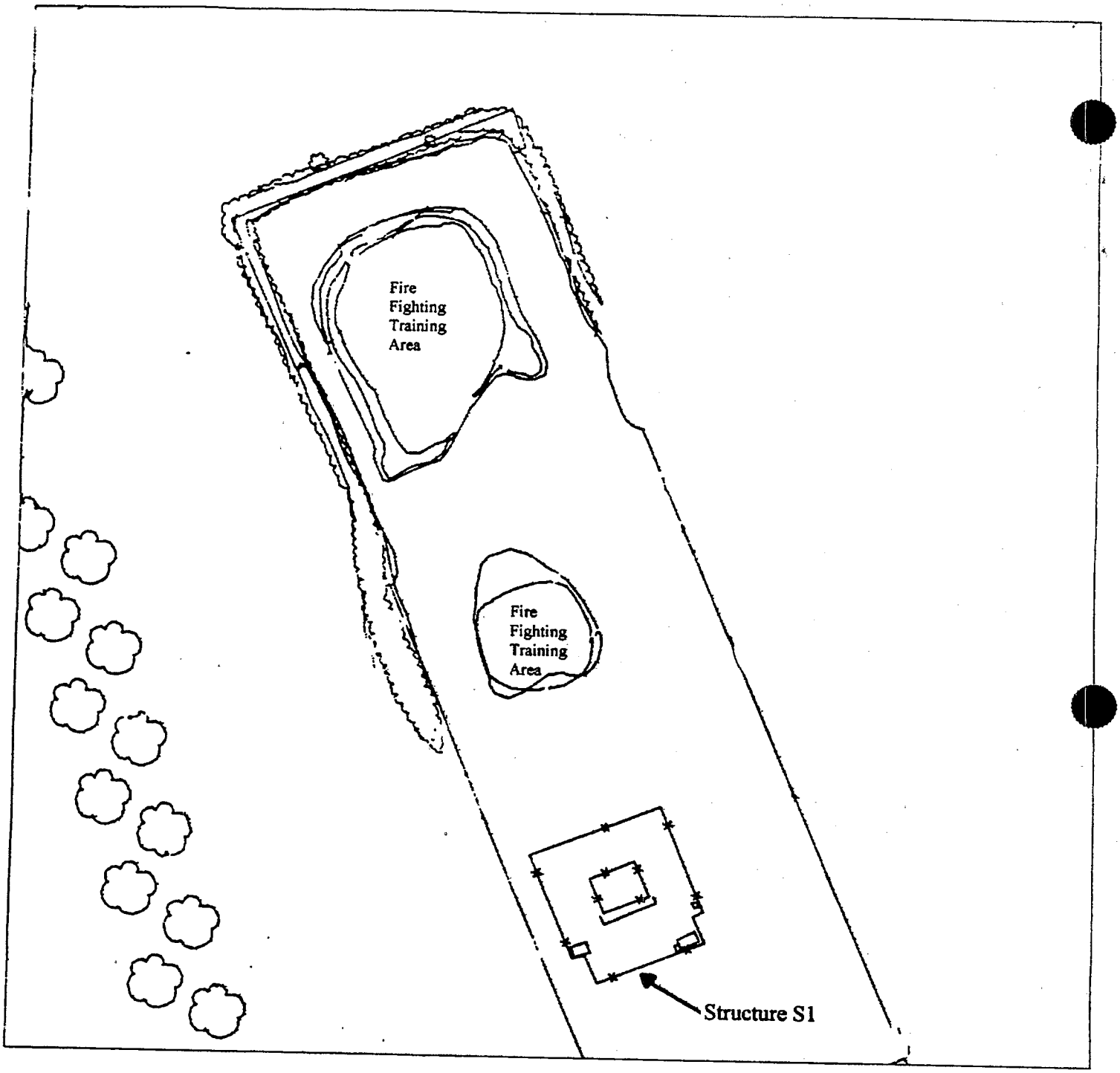

Figure 3. Site 8

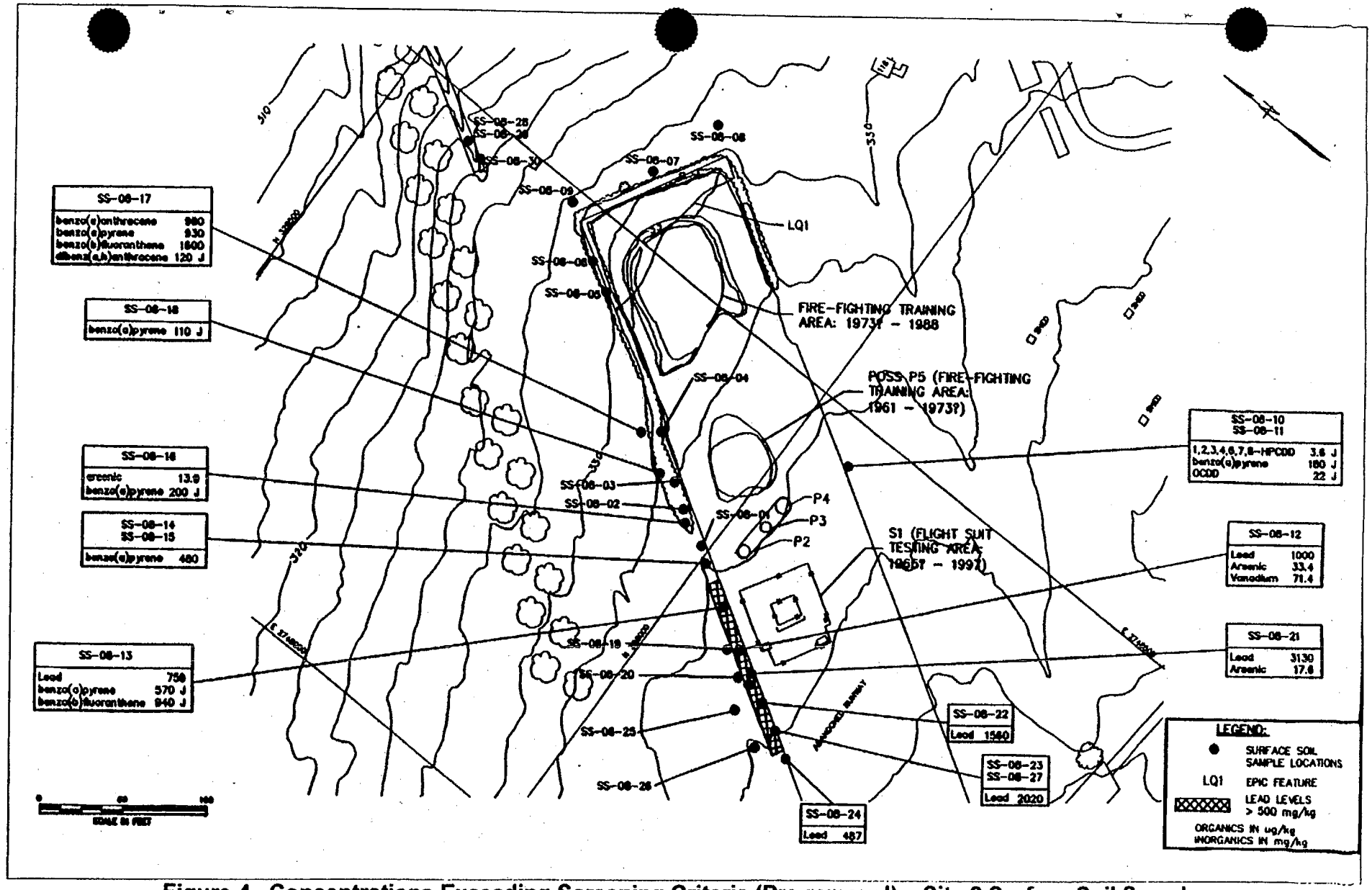

Figure 4. Concentrations Exceeding Screening Criteria (Pre-removal) – Site 8 Surface Soil Samples

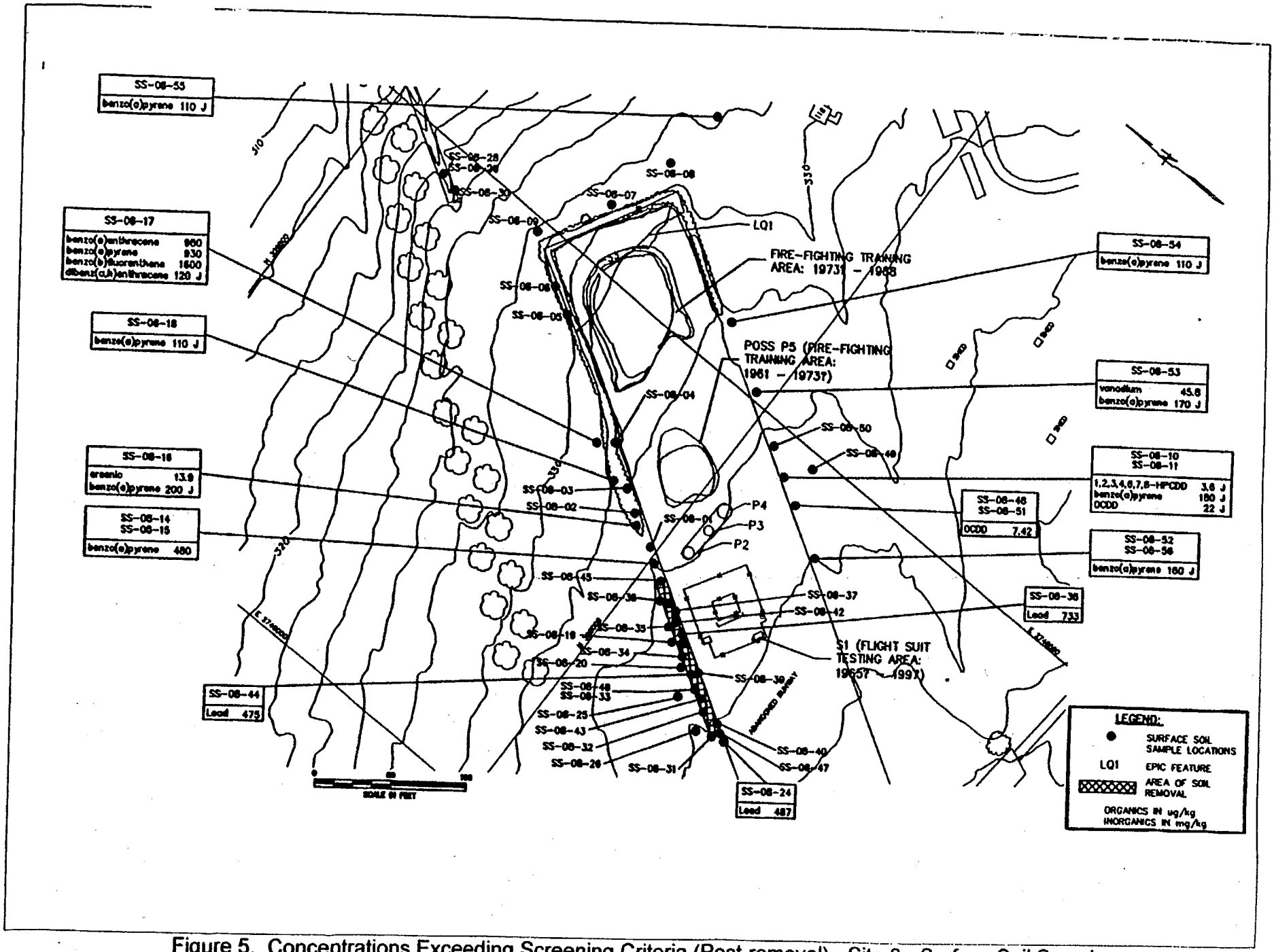

Figure 5. Concentrations Exceeding Screening Criteria (Post-removal) - Site 8 - Surface Soil Samples

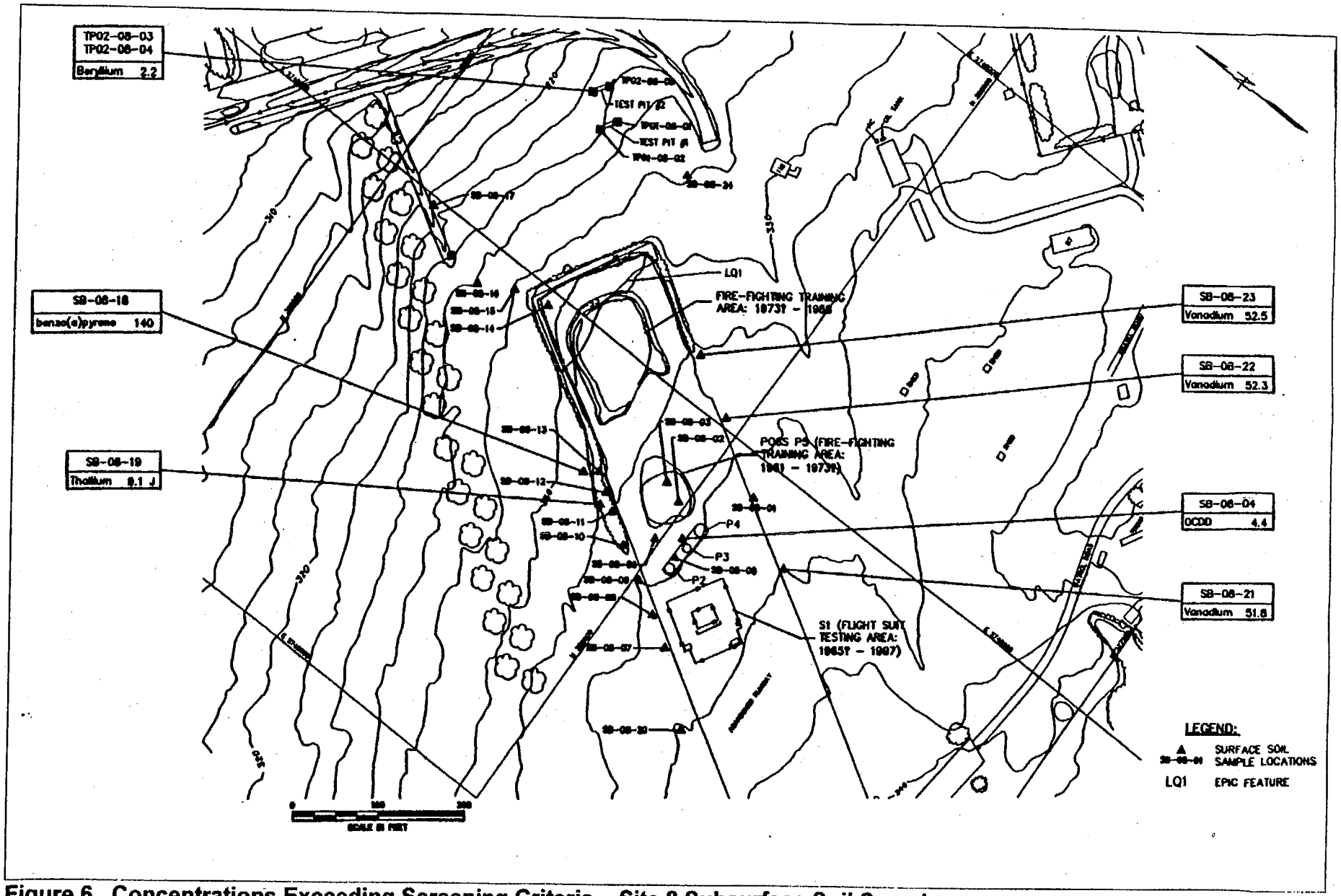

Figure 6. Concentrations Exceeding Screening Criteria – Site 8 Subsurface Soil Samples

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