RECORD OF DECISION
SITE 5 SOIL
OPERABLE UNIT 4 (OU 4)

NAVAL AIR STATION
JOINT RESERVE BASE
Willow Grove, Pennsylvania

Naval Facilities Engineering Command
Mid-Atlantic

Contract Number N62472-03-D-0057

Contract Task Order 003

SEPTEMBER 2007

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RECORD OF DECISION
NAVAL AIR STATION JOINT RESERVE BASE
OPERABLE UNIT 5
SITE 5—FIRE TRAINING AREA

PART I—DECLARATION

I. SITE NAME AND LOCATION

Naval Air Station Joint Reserve Base (NAS JRB)
Site 5—Fire Training Area
Horsham Township, Montgomery County
Pennsylvania
ID Number: PA4170000158

II. STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) presents the remedial action alternative selected for Operable Unit 4 (OU 4), soils contaminated with polycyclic aromatic hydrocarbon (PAH) compounds at Site 5, the former Fire Training Area, at the Naval Air Station Joint Reserve Base (NAS JRB), located in Horsham Township, Montgomery County, Pennsylvania.

This remedial action decision is 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 the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision document explains the factual and legal bases for selecting the remedy and is based on the Administrative Record for OU 4. Reports and other information used in the remedy selection process are part of the Administrative Record file for OU 4, which is available in the Information Repository located at the Horsham Township Library, 435 Babylon Road, Horsham, Pennsylvania.

The Commonwealth of Pennsylvania Department of Environmental Protection (PADEP) concurs with the selected remedy. A review of the public response to the OU 4 Proposed Plan is included in the Responsiveness Summary (Part III) of this decision document.

III. DESCRIPTION OF THE SELECTED REMEDY

No further action is to be taken to address soil at the Fire training Area.

IV. STATUTORY DETERMINATIONS

The selected remedy for Site 5 soil (OU 4) is protective of human health and the environment and is cost effective. Since no further action is needed or proposed for Site 5 soil, no federal or state applicable or relevant and appropriate requirements (ARARs) apply.

Authorizing Signatures

Lead Agency:

13 Sept 2007

Robert F. Lewandowski,
BRAC Environmental Coordinator
Naval Air Station Joint Reserve Base, Willow Grove
BRAC Program Management Office, Northeast

Date

Environmental Protection Agency:

9/21/07

Jim Burke,
Director, Hazardous Sites Cleanup Division
Federal Facilities Branch
U.S. EPA Region III

Date

RECORD OF DECISION
Naval Air Station Joint Reserve Base (NAS JRB)
Site 5—Former Fire Training Area
Willow Grove, Pennsylvania

PART II—DECISION SUMMARY

I. SITE NAME, LOCATION, AND DESCRIPTION

NAS JRB Willow Grove is located in Horsham Township, Montgomery County, in southeastern Pennsylvania, approximately 20 miles north of the City of Philadelphia (Figure 1). NAS JRB Willow Grove occupies approximately 1,000 acres of the 1,200 acres maintained by the Department of Defense (DoD) at the Air Station. The Willow Grove Air Reserve Station (ARS) occupies approximately 200 acres of land in the northeastern section of the Air Station and shares common facilities with NAS JRB Willow Grove. The Air Station is comprised of flat to slightly rolling terrain and is generally bounded by State Route 611 to the east, State Route 463 to the southwest, and Keith Valley Road to the north. Figure 2 shows the location of Site 5 at NAS JRB Willow Grove.

The Fire Training Area is located in the south-central portion of NAS JRB, approximately midway between Runway 10/28 and State Route 463 (Figure 3). The site is located immediately to the south of Taxiway Juliet and covers an irregularly shaped area of approximately 1.25 acres north of the Marine Reserve Training Center and the Marine Reserve Compound.

II. SITE HISTORY AND ENFORCEMENT ACTIVITY

The Fire Training Area was used from 1942 to 1975 for firefighting exercises, which included the disposal and burning of flammable liquid wastes generated by the Naval Air Station. Wastes including solvents, paint chemicals, xylenes, toluene, and various petroleum compounds were consumed at the rate of at least 4,000 gallons per year in these firefighting exercises. The area was also reportedly used for the drum storage of these flammable materials during the periods between burning exercises.

The Fire Training Area is primarily covered by grasses, with some woody and brushy vegetation present within the southern portion of the area. The burn area is located in the south-central portion of the site. Two small ponds are immediately south of the former burning area. Additional site information can be found in the Remedial Investigation Report for Site 5 – Fire Training Area (Tetra Tech NUS, February 2002).

Work undertaken pursuant to CERCLA at NAS JRB Willow Grove Site 5 includes the Preliminary Assessment (PA), also known as the Initial Assessment Study (IAS), (Naval Energy and Environmental Support Activity (NEESA), 1986); Site Inspection (SI) (EA Engineering and Science, 1990); the first and second phase Remedial Investigation (RI) (Halliburton NUS, 1993; Brown & Root Environmental, 1998); and a soil removal action (Tetra Tech NUS, 2007). The PA identified 16 sites requiring further investigation: seven at the Air Reserve Facility in 1984 and nine at the Naval Air Station in 1986 (NEESA, 1986). One additional site (Navy Site 10 – The Navy Fuel Farm) was added to the program in 1988. The final Site Inspection report (EA Engineering and Science, 1990) recommended no further action for Navy Sites 4, 6, 8 and 9, additional site screening inspection for Site 7, and Remedial Investigation/Feasibility Study (RI/FS) for Navy Sites 1, 2, 3 , 5 and the Navy fuel farm, Site 10. Phase I RI activities were completed for four (Sites 1, 2, 3 and 5) of the ten Navy sites (Halliburton NUS, 1993). The Phase I RI report characterized the physical and chemical nature of these four sites and identified data gaps requiring further study. Recommendations for further investigation included in the Phase I RI report were incorporated into subsequent discussions among the Navy and regulatory agencies for additional work and led to the Phase II RI activities that were reported in the Phase II RI report (Brown & Root Environmental, 1998).

The final Site 5 RI report (TtNUS, 2002) explains that historical leakage and/or spillage from drum storage and handling in the Fire Training Area resulted in an area of surface and subsurface soils contaminated with PAHs. After submission of the final Site 5 RI report (TtNUS, 2002), the Navy contracted for installation of an additional airport runway perimeter security fence. Since part of the new security fencing was installed in or near the area of known PAH Site 5 soil contamination, it was not known if the fence construction may have changed the distribution of PAHs in the area. Confirmation soil samples from previously sampled locations were obtained and reported in 2004 (TtNUS, 2004) after fence construction. 2004 confirmation soil sample PAH results included Benzo(a)anthracene up to 82 milligrams/kilogram (mg/kg), Benzo(a)pyrene up to 68J mg/kg (J indicates an estimated quantity from the analytical laboratory), Benzo(k)fluoranthene up to 77 mg/kg, and Dibenzo(a,h)anthracene up to 15J mg/kg, at concentrations above risk-based screening levels for the (future residential) unlimited use risk scenario, in substantial agreement with previous RI sampling and analysis results.

The Phase II RI determined that migration of PAHs was limited, as evidenced by low concentrations of PAHs, below the level considered a risk to human health or the environment, detected in two sediment sample locations receiving drainage from the site. No PAH impact on site groundwater was detected in groundwater samples taken. However, concentrations of chlorinated compounds were found in groundwater beneath Site 5 in excess of MCLs. Groundwater beneath the site (OU 2) is being managed separately from soil issues.

In January 2006, soil was excavated and removed to a depth of approximately two feet in the "burn ring" area (Figure 3). The "burn ring" was a section cut from the end of an approximately 20 feet diameter cylindrical tank, and partially buried below the surface of the surrounding soil. The burn ring (tank section) and soil were removed for disposal off site. A total of 286 tons of soil was excavated in the first phase of the soil removal and transported to a permitted facility for disposal. The results of confirmatory soil sampling revealed that several PAH compounds exceeded the 10^{-5} cancer risk level PRG range (see Table 1) for a lifelong resident, and the total residual risk (7.39×10^{-4}) exceeded the acceptable carcinogenic risk range (1×10^{-6} to 1×10^{-4}) for the lifelong resident scenario as required by the NCP at 40 C.F.R. § 300.430(e)(2)(i)(A)(2). Maximum concentrations of PAHs exceeding PRGs after the first phase of soil removal included Benzo(a)anthracene up to 61.0 mg/kg, Benzo(a)pyrene up to 26 mg/kg, Benzo(k)fluoranthene up to 9.0 mg/kg and Dibenzo(a,h)anthracene up to 5.7 mg/kg.

To address the unacceptable total residual risk, the Navy performed an additional excavation at the site in August 2006 as the second phase of the removal action. A total of 227 tons of soil were excavated and transported to a facility permitted for disposal. Maximum concentrations of PAHs after the second phase of soil removal included Benzo(a)anthracene at 3.4 mg/kg, Benzo(a)pyrene at 3.4 mg/kg, Benzo(k)fluoranthene at 1.6 mg/kg and Dibenzo(a,h)anthracene at 0.68 mg/kg. The residual risk for individual components remaining after the removal action was 4.27×10^{-6} for total dioxins and 8.22×10^{-5} for the primary PAHs of concern. The total residual risk remaining after the soil removal was 8.65×10^{-5} which is within the acceptable carcinogenic risk range (1×10^{-6} to 1×10^{-4}) for the lifelong resident scenario. Subsequently, the excavation site was backfilled with clean soil and restored with seed and mulch.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

Based on the soil removal action completed in 2006 and the corresponding Site 5 soil closeout report by the Navy contractor RMC Environmental, Inc. (which is included in the Remedial Investigation Report Addendum Six for Site 5 Soil (OU 4) (TtNUS, 2007)), the Navy prepared the Site 5 Soil Proposed Remedial Action Plan (PRAP) for No Further Action (NFA) in June 2007 (TtNUS, 2007). On June 15, 2007, a newspaper notification inviting public comment on the Proposed Plan appeared in *The Intelligencer* newspaper. The newspaper public notice identified the time and location of the public meeting to learn about the Navy's Proposed Plan and the preferred alternative. A public meeting was held on Wednesday, July 11, 2007 at 6:00 PM in the Community Meeting Room at the Horsham Township Public Library, 435 Babylon Road, Willow Grove, Pennsylvania to present the Site 5 soil PRAP. Copies of the Site 5 Soil PRAP were distributed to interested attendees, and it was also made available for public review at the public meeting and in the Administrative Record (AR) file for NAS JRB located at the Horsham Township Public Library. In accordance with CERCLA Sections 113(k) and 117(a), a public comment period for the PRAP

was held from June 15, 2007, through July 30, 2007. More details about the community involvement in this ROD are described in the Responsiveness Summary, which is Part III of this ROD.

IV. SCOPE AND ROLE OF SITE 5 SOIL (OU 4)

At Site 5, although the problem of PAH contamination in the shallow soil (OU 4) and the chlorinated contaminants in groundwater (OU 2) resulted from the same historical fire fighting exercises, it is more convenient to deal with the issues separately. As a result, the Navy and EPA, with agreement from PADEP, organized the response into two operable units:

- Operable Unit 2: Site 5 – Fire Training Area Groundwater
- Operable Unit 4: Fire Training Area Soils

Site 5 soil (OU 4) is the subject of this ROD. The PAH soil removal action performed in 2006, followed by the Site 5 soil PRAP, that was accepted by the public and regulatory agencies in August 2007, are the bases for this Site 5 Soil No Further Action (NFA) ROD. Based on the results of actions taken, Site 5 soil does not require further remedial action. OU 2, contamination of groundwater beneath Site 1, will be addressed in accordance with CERCLA and applicable federal and state guidelines.

Other sites at NAS JRB Willow Grove identified as part of the National Priorities List (NPL) site include:

- Site 1—Privet Road Compound (OU 1—Site 1 soil; OU 3—Site 1 groundwater)
- Site 2—Antenna Field Landfill (OU 5—Site 2 soil; OU 9—Site 2 groundwater)
- Site 3—Ninth Street Landfill (OU 6—Site 3 soil; OU 10—Site 3 groundwater)

Site 1 groundwater, Site 2 all media, Site 3 all media and Site 5 groundwater are in the RI/FS or decision-making phase of the CERCLA process. For Site 1 soil, a ROD for NFA was fully executed in September 2006.

Two other sites at the Air Station have been assigned operable unit designations by EPA (OU 8—Navy Fuel Farm and OU 7—Air Force Site 1 Ponding Basin). For OU 8, PADEP is the lead regulatory agency because the contamination source is petroleum, which is excluded from the CERCLA cleanup process. The Air Force is the lead agency for OU 7.

V. SUMMARY OF SITE CHARACTERISTICS

A. Hydrology

The ground surface in the vicinity of the Fire Training Area slopes toward the south at a grade of approximately two percent. Runoff during normal precipitation events should be minimized by the relatively gentle slope and the abundant vegetation, which serve to decrease runoff velocity and increase infiltration. Based on the local topography, any runoff from the site area may be expected to flow off Base through a small intermittent drainage that crosses the Base boundary approximately 2,000 feet south of the Fire Training Area. This drainage, which also carries runoff from the Antenna Field Landfill, flows into Pennypack Creek approximately 3,000 feet from the Base property line.

B. Geology

The geologic interpretation of the Fire Training Area is based on the subsurface data (boring logs and geophysical logs) obtained during site investigations. These data indicate that the local geology beneath this site is generally consistent with the regional geology discussed in the Remedial Investigation Report for Site 5 - Fire Training Area (TtNUS, 2002).

Soil and well borings taken during the RI consistently encountered a variably thick overburden section underlain by weathered siltstone and sandstone. The overburden consisted of silty clay and clay, with minor amounts of silty sand. The thickness of the overburden (or the depth to the top of the weathered bedrock) ranged from 9 to 18 feet at various locations across the site.

The maximum depth of the monitoring well boreholes at Site 5 is 261 feet. The bedrock to this depth typically consisted of alternating sequences of siltstone and sandstone. Thin but laterally consistent beds of mudstone and claystone were encountered within the lower portions of the section penetrated. In general, the bedrock beneath this site was characterized by its predominantly coarse-grained lithology. A 3-point correlation of geophysical logs from the Site 5 boreholes produced a bedrock strike of North 76^0 East and a bedrock dip of 7^0 Northwest.

A fine-grained claystone that occurs at a subsurface depth of about 100 feet beneath the source area at monitoring well cluster 05MW01 is fairly correlatable throughout the site (both on the drilling lithology logs and the geophysical logs), and served as the key marker bed for the subsurface correlations. The lateral continuity of this bed is consistent with the observation (noted by TtNUS at several sites within the region) that, in general, the finer-grained rocks within the Triassic Basin are more laterally continuous and traceable than the coarser-grained rocks.

C. Hydrogeology

The sandstones, shales, and conglomerates of the Triassic Basin are relatively good water-bearing formations. They generally yield abundant supplies to wells (Hall, 1934). The groundwater ranges from soft to hard, and the average hardness is greater than that of most other formations in southeastern Pennsylvania.

The major source of groundwater in the vicinity of NAS JRB Willow Grove is the fractured bedrock of the Stockton Formation (Earth Data Incorporated, 1985). These rocks form a multi-aquifer system of relatively discrete water-bearing zones separated by less permeable zones. Transmissivity and groundwater movement within water-bearing zones are greater parallel to bedding than across bedding. Groundwater can generally be found between 5 and 25 feet below ground surface (bgs).

The Fire Training Area is situated atop a southwest-northeast-trending ridge that is the highest topographic feature within the region. This ridge serves as a divide for the regional surface water bodies (watershed divide); surface water to the north of the divide flows toward the Little Neshaminy Creek, and surface water to the south of the divide flows toward the Pennypack Creek. A USGS interpretation of a regional groundwater study indicates that the regional groundwater divide trends southwest-to-northeast in the vicinity of Site 5 and passes directly beneath the Fire Training Area.

D. Nature and Extent of Contamination

Remedial investigation results of Site 5 soil samples, which were taken before the soil removal, indicated concentrations of PAHs included Benzo(a)anthracene up to 82 mg/kg, Benzo(a)pyrene up to 68J mg/kg, Benzo(k)fluoranthene up to 77 mg/kg and Dibenzo(a,h)anthracene up to 15J mg/kg, at concentrations above risk-based screening levels for future residential unlimited use (TtNUS, 2004).

In January 2006, soil was excavated and removed from the burn ring area (Figure 3) in two phases until confirmation samples indicated residual risk sufficiently low to allow unrestricted future use. Table 1 provides a summary of the preliminary remediation goals (PRG's) range agreed to by EPA, PADEP and the Navy. Confirmation soil sampling indicated maximum concentrations of PAHs after the second phase of soil removal included Benzo(a)anthracene at 3.4 mg/kg, Benzo(a)pyrene at 3.4 mg/kg, Benzo(k)fluoranthene at 1.6 mg/kg, and Dibenzo(a,h)anthracene at 0.68 mg/kg. Residual individual risk components remaining include total dioxins (4.27×10^{-6}) and the primary PAHs of concern (totaled 8.22×10^{-5}). The total residual risk remaining after the soil removal (8.65×10^{-5}) was within the acceptable carcinogenic risk range (1×10^{-6} to 1×10^{-4}) for the lifelong resident scenario.

VI. SUMMARY OF SITE RISKS

A. Baseline Human Health Risk Assessment

A screening-level human health risk assessment was performed as part of the Site 5 Remedial Investigation (Site 5 RI Addendum 4, Technical Memorandum of Risk Assessment Evaluation for Site 5 – Fire Training Area Soil (OU 4) Tetra Tech NUS, July 2006). Surface soil concentrations were compared to EPA Region 3 residential Risk-Based Concentrations (RBCs) to be protective of all receptors exposed to surface soil. Subsurface soil concentrations were also compared to surface soil RBCs since, generally, surface soil is expected to be interchangeable with subsurface soils during excavation or future construction activities. Using the RBC screening approach, a chemical was eliminated from consideration as a chemical of potential concern (COPC) at the site if the maximum detected concentration was less than the RBC screening value determined at a cancer risk level of 1×10^{-6} or a non-cancer Hazard Quotient (HQ) of 0.1, or if site concentrations were not greater than background (inorganics only). The screening-level human health risk assessment indicated potential risks in surface and subsurface soils above acceptable levels. A summary of COPCs is presented in Tables 2a and 2b.

The potential receptors evaluated in the risk assessment included current occupational workers, current adolescent and adult trespassers, future excavation workers, future recreational children, and future residents. The risk evaluation assumed that potential human receptors would be exposed to COPCs at Site 5 via incidental ingestion, dermal contact, and inhalation of fugitive dusts from soil.

The quantitative risk assessment evaluated each potential receptor under a reasonable maximum exposure (RME) scenario and a less conservative central tendency exposure (CTE) scenario. RME incorporates input parameters into the exposure scenarios that are representative of the highest exposure that is reasonably expected to occur at a site and the CTE incorporates input parameters that are representative of an average or median exposure that is reasonably expected to occur at a site.

Excess lifetime cancer risks were determined for each receptor by multiplying a daily dose by the chemical-specific cancer slope factor. Cancer slope factors have been developed by EPA from epidemiological or animal studies to reflect a conservative "upper bound" of the risk posed by potentially carcinogenic compounds. Pursuant to 40 CFR Section 300.430 (e)(2)(i)(A)(2), EPA's maximum acceptable carcinogen risk range for site-related exposure is 1E-06 to 1E-04, which equates to a one in one million or one in ten thousand (respectively) increased risk over and above the background cancer rate that a receptor will develop cancer in his or her lifetime as a result of exposure to chemicals present in the environmental media at this site.

Non-carcinogenic risks are presented in the form of HQs, which are determined by dividing the daily dose of a chemical by the published reference doses (RfDs). RfDs have been developed by EPA and represent a level to which an individual may be exposed that is not expected to result in any deleterious effect. An HQ of less than or equal to 1.0 indicates that a receptor's dose of a single contaminant is less than or equal to the RfD and that adverse non-carcinogenic effects from that chemical are unlikely. The HQs for each COPC that the receptor is assumed to be exposed to via a specific pathway are summed to yield the Hazard Index (HI) for that pathway. A total HI is then calculated for each receptor by summing the pathway-specific HIs.

The results of the risk assessment prior to the removal action showed that the estimated RME incremental lifetime carcinogenic risks (ILCRs) for the occupational worker (1×10^{-4}) and adult resident (1×10^{-4}) were equal to the upper bound of the acceptable risk range ILCRs for the child resident (3×10^{-4}) and lifelong resident (4×10^{-4}) exceeded the acceptable risk range under the RME scenario. Carcinogenic PAHs [primarily benzo(a)pyrene] were the major contributors to the ILCR for all receptors under the RME scenario.

ILCRs for the occupational worker (1×10^{-5}), child resident (3×10^{-5}), adult resident (1×10^{-5}), and lifelong resident (4×10^{-5}) under the CTE scenario were within the acceptable risk range of 1×10^{-4} to 1×10^{-6}.

HIs for the occupational worker (0.2) and adult resident (0.3) under the RME scenario were less than 1.0, indicating that adverse non-carcinogenic effects were not anticipated for these receptors under the defined exposure conditions. The HI for the child resident (2.0) exceeded 1.0, although the HQs for the individual target organs were all less than or equal to 1.0.

HIs for the occupational worker (0.1), child resident (1.0), and adult residents (0.1) under the CTE scenario were less than or equal to 1.0, indicating that adverse non-carcinogenic effects were not anticipated for these receptors under the defined exposure conditions.

A range of PRGs for protection of human health were developed by EPA Region III and the Navy using EPA Region III RBCs and based on site-specific risk for lifetime resident exposure scenarios (Table 1).

As summarized earlier in this ROD, in 2006 the Navy performed a two-phased soil removal action for PAH-contaminated soil followed by subsequent confirmatory sampling to ensure all soils containing PAHs in excess of PRGs were removed. The human health risk assessment was recalculated using the confirmatory sampling results from the removal action to demonstrate that the human health cancer risk had been reduced to acceptable levels.

After accounting for the PAH-contaminated soil removal and residual dioxin risk after resampling, the revised calculated RME cancer risk for the future lifelong resident (8.65×10^{-5}) was within the acceptable risk range. Table 3 lists the estimated RME carcinogenic risks for the lifelong (child/adult) resident after PAH-contaminated soils were removed. The revised human health risk assessment found that the site soils no longer pose a threat to current or the most sensitive anticipated future human receptors.

B. Ecological Risk Assessment

A screening-level ecological risk assessment (ERA) was performed before the 2006 soil removal to characterize the potential risks from site-related contaminants to ecological receptors that inhabit the installation. All analytes detected in surface soil samples collected during the 1991 Phase I and 1997 Phase II sampling activities were assessed in this investigation. Calcium, magnesium, potassium, and sodium were excluded in the screening process since they are essential nutrients that are toxic only at extremely high concentrations.

Initial screening levels for contaminants that may adversely affect soil organisms primarily consisted of EPA Region 3 Biological Technical Assistance Group (BTAG) screening levels, Oak Ridge National Laboratory surface soil screening levels, and Dutch "B" levels that represent ecological toxicity endpoints.

Aluminum, antimony, arsenic, cadmium, chromium, iron, lead, manganese, thallium, vanadium, and zinc were retained as inorganic COPCs in soil since their maximum concentrations exceeded screening levels. Several PAHs and acetone were retained as organic COPCs in soils since their maximum concentrations also exceeded screening levels.

Step 3 involved the consideration of factors such as background data (mainly for inorganics), toxicological evaluation of COPCs, frequency of detection, and comparisons of COPCs to alternate guidelines.

Almost all of the COPCs were eliminated as COCs in the risk evaluation phase of the assessment for one or more reasons, including low frequency of detection, maximum concentrations comparable to or below background (primarily inorganics), or alternative guidelines and spatial analysis of detection. Only COPCs that were determined to be present at high enough concentrations in soils, and with sufficiently high frequencies of detection to pose potential risks to terrestrial receptors were selected as COCs. Table 4 shows the results of the selection of ecological COCs in surface soil.

Based on the following set of criteria, no further action to protect the environment or potential ecological receptors is deemed necessary:

- Terrestrial habitat is very limited. The site is surrounded by several acres of hard-packed gravel parking area, asphalt roadways, and the taxiway associated with the adjacent 8,000 foot military runway.

- Only limited receptors are potentially present. Virtually no mammals have been recorded living in the area. The presence of high fences and wide expanses of pavement and hard-pack discourage any of the larger mammals from passing through the area.

- In addition, the limited contamination found in Site 5 soil (mainly PAHs and dioxins) was largely removed in the 2006 soil removal action, resulting in clean-up to human health unrestricted future use standards.

VII. DOCUMENTATION OF SIGNIFICANT CHANGES

No significant changes from the Proposed Plan appear in this ROD.

RECORD OF DECISION
Naval Air Station Joint Reserve Base (NAS JRB)
Site 5 – Former Fire Training Area
Willow Grove, Pennsylvania

PART III - RESPONSIVENESS SUMMARY

The purpose of this Responsiveness Summary is to review public response to the Proposed Plan for Site 5 soil. It also documents the consideration of comments during the decision-making process and provides answers to any comments raised during the public comment period.

The Responsiveness Summary for Site 5 soil is divided into the following sections:

- **Overview** - This section briefly describes the remedial alternative recommended in the Proposed Plan and any impacts on the Proposed Plan due to public comment.

- **Background on Community Involvement** - This section describes community relations activities conducted with respect to the area of concern.

- **Summary of Major Questions and Comments** - This section summarizes oral and written comments received during the public meeting and the public comment period and provides responses thereto.

I. OVERVIEW

This Responsiveness Summary addresses public response to the No Further Action Proposed Plan. The Proposed Plan and other supporting information are maintained for public review in the Administrative Record file for Site 5, which is maintained at the Horsham Township Public Library, 435 Babylon Road, Horsham, Pennsylvania. No changes to the Proposed Plan were made as a result of public comment during the public comment period.

II. BACKGROUND ON COMMUNITY INVOLVEMENT

This section provides a brief history of community participation in the investigation and interim remedial planning activities conducted for Site 5. Throughout the investigation period, USEPA and PADEP reviewed work plans and reports and provided comments and recommendations, which were incorporated into appropriate documents. A Technical Review Committee (TRC), consisting of representatives from the Navy, USEPA, the PADEP, and other agencies and local groups surrounding NAS JRB Willow Grove, was formed. The TRC later was transformed into the Restoration Advisory Board (RAB) to include community

members, as well as the original officials from the TRC. The RAB has been holding periodic meetings to maintain open lines of communication with the community and to inform all parties of current activities.

On June 15 2007, a newspaper notification inviting public comment on the Proposed Plan appeared in *The Intelligencer* newspaper. The newspaper public notice identified the time and location of the public meeting to learn about the Navy's preferred alternative. At the public meeting, the Navy specified a public comment period as well as the address to which written comments could be sent. Public comments were accepted from June 15, 2007 to July 30, 2007. At the public meeting, the Navy explained that a copy of the Proposed Plan, along with the entire AR file, was available for public review at the Navy's Information Repository. The Information Repository had been housed at the Horsham Township Municipal Building on Horsham Road prior to moving to the Horsham Township Public Library on Babylon Road in 2004.

A public meeting was held on Wednesday, July 11, 2007 at 6:00 PM in the Community Meeting Room at the Horsham Township Public Library, 435 Babylon Road, Willow Grove, Pennsylvania to present the Site 5 soil Proposed Plan. At this meeting, representatives from the Navy, USEPA and PADEP were available to answer questions concerning Site 5 Soil and the preferred alternative. The attendance list for the July 11, 2007 public meeting is included in Appendix A.

III. SUMMARY OF MAJOR QUESTIONS AND COMMENTS

A. Written Comments

During the public comment period from June 15, 2007 to July 30, 2007, no written comments were received from the public pertaining to Site 5.

B. Public Meeting Comments

Questions or comments concerning Site 5 Soil received from the public at the July 11, 2007 public meeting are presented with the government response in Appendix B.

IV. LIST OF REFERENCES

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TABLES

TABLE 1
PRELIMINARY REMEDIATION GOALS RANGE
SITE 5 - FIRE TRAINING AREA
NAS JRB WILLOW GROVE, PENNSYLVANIA

Chemical	REMEDIATION GOALS		
	LIFELONG RESIDENT		
	10^{-6}	10^{-5}	10^{-4}
2,3,7,8-TCDD Equivalents	0.000004	0.00004	0.0004
Benzo(a)anthracene	0.62	6.2	62
Benzo(a)pyrene	0.062	0.62	6.2
Benzo(b)fluoranthene	0.62	6.2	62
Benzo(k)fluoranthene	6.2	62	620
Dibenzo(a,h)anthracene	0.062	0.62	6.2
Indeno(1,2,3-cd)pyrene	0.62	6.2	62

Notes:
1. All concentrations are in mg/kg.
2. The 1 X 10-5 human health risk level represents the mid point in the preliminary remediation goals range. Actual remedial action soil removal endpoints were determined to ensure that the sum of individual risks in soil remaining after removal would be within the acceptable cancer risk range.

Table 2a

Summary of Chemicals of Potential Concern for Surface Soil

Site 5 - NAS JRB Willow Grove

Substance	Freq. of Detection	Range of Positive Detection			RBC	EPC	Units
		Min.		Max.			
2,3,7,8-TCDD Equivalents	2/2	27.9	-	143	4.30E-06	1.4E-04	mg/kg
Benzo(a)anthracene	28/29	22	-	82000	0.22	51.3	mg/kg
Benzo(a)pyrene	28/29	37 J	-	68000 J	0.022	14.1	mg/kg
Benzo(b)fluoranthene	28/29	60	-	77000 J	0.22	17.4	mg/kg
Benzo(k)fluoranthene	27/29	20	-	36000	2.2	8.74	mg/kg
Dibenzo(a,h)anthracene	27/29	5.4 J	-	15000 J	0.022	2.53	mg/kg
Dibenzofuran	13/14	71 J	-	34000 J	78	26.7	mg/kg
Indeno(1,2,3-cd)pyrene	28/29	22	-	48000	0.22	8.46	mg/kg
Naphthalene	17/29	5.5	-	22000 J	1564	9.56	mg/kg
Chromium	14/14	9.8	-	56.5	235	24.6	mg/kg
Iron	14/14	6230	-	21600	54750	15983	mg/kg
Lead	14/14	10.1	-	412	400*	95.9	mg/kg
Vanadium	14/14	12.9	-	36.3	78	26.5	mg/kg

J = Estimated value

Lead value is from OSWER directive

RBC = EPA Region III residential risk-based concentration

Table 2b

Summary of Chemicals of Potential Concern for Subsurface Soil

Site 5 - NAS JRB Willow Grove

Substance	Freq. of Detection	Range of Positive Detection			RBC	EPC	Units
		Min.		Max.			
Benzo(a)anthracene	5/16	55 J	-	13000	0.22	9.45	mg/kg
Benzo(a)pyrene	5/16	45 J	-	11000	0.022	8.05	mg/kg
Benzo(b)fluoranthene	5/16	64 J	-	12000	0.22	8.92	mg/kg
Dibenzo(a,h)anthracene	3/16	250 J	-	1400 J	0.022	0.639	mg/kg
Indeno(1,2,3-cd)pyrene	4/16	170 J	-	5700 J	0.22	4.27	mg/kg
Chromium	10/10	6.1	-	23.7	235	18	mg/kg
Iron	10/10	9320	-	27900	54750	21508	mg/kg
Manganese	10/10	134	-	1550	1564	786	mg/kg
Vanadium	10/10	12.4	-	36.8	78	28	mg/kg

J = Estimated value

RBC = EPA Region III residential risk-based concentration

Table 3
Residual Risk Analysis Including Dioxin Data
NAS JRB Willow Grove - Site 5 - After Soil Removal

	10-5 Cancer Risk Level	PRG for resident mg/kg	Maximum Confirmatory mg/kg	Residual Carcinogenic Risk
2,3,7,8-TCDD Equivalents	1.E-05	4.00E-05	1.71E-05	4.27E-06
Benzo(a)anthracene	1.E-05	6.2	3.4	5.48E-06
Benzo(a)pyrene	1.E-05	0.62	3.4	5.48E-05
Benzo(b)fluoranthene	1.E-05	6.2	4.5	7.26E-06
Benzo(k)fluoranthene	1.E-05	62	1.6	2.58E-07
Dibenzo(a,h)anthracene	1.E-05	0.62	0.68	1.10E-05
Indeno(1,2,3-cd)pyrene	1.E-05	6.2	2.1	3.39E-06
			Total	**8.65E-05**

TABLE 4
SELECTION OF ECOLOGICAL RISK ASSESSMENT
CHEMICALS OF POTENTIAL CONCERN
SITE 5 - FIRE TRAINING AREA SOIL (OU 4)
NAS JRB WILLOW GROVE

Contaminant	Maximum Concentration	95% UCL	Mean Concentration	Initial Screening Level	BTAG Screening Level	ORNL[a,b]	Dutch B[c]	CCME[d]	Mean/Max. Background	Retained as Final COC?
Metals (mg/kg)										
Aluminum	12400.00	10600	9840	1.0	1.0	600[a]	NA	NA	11300/15000	No
Antimony	9.20	9.89	4.82	5	0.48	5[b]	NA	NA	ND	No
Arsenic	10.5	6.04	4.87	10	328	60[a]/10[b]	30	19	6.6/10.6	No
Cadmium	4.70	1.73	1.17	3	2.5	20[a]/4[b]	5.0	3.8	ND	No
Chromium	56.50	23.8	18.6	10	0.0075	0.4[a]/1.0[b]	250	64	15.3/20.8	No
Iron	21600.00	16700	14400	12	12	200[a]	NA	NA	14800/17600	No
Lead	412.00	217	90	50	0.01	500[a]	150	70	30.6/64.7	Yes
Manganese	873.00	582	494	330	330	100[a]/500[b]	NA	NA	642/1190	No
Thallium	0.39	0.26	0.202	0.001	0.001	1.0[b]	NA	NA	0.226/0.34	No
Vanadium	36.3	27.7	24.3	20	0.5	20[a]/2[b]	NA	NA	24.9/28.2	No
Zinc	137.00	87.6	59.6	50	10	100[a]/50[b]	200	NA	90.1/597	No
SVOCs (ug/kg)										
2-methylnaphthalene	16000.0	1270	1170	NA	NA	NA	NA	NA	ND	Yes
Acenaphthene	36000.0	4370	2560	100	100	20,000[b]	NA	NA	178/64	Yes
Acenaphthylene	2300.0	643	356	NA	NA	NA	NA	NA	177/62	No
Anthracene	54000.0	11800	4290	2050	100	NA	10,000	NA	154/160	Yes
Benzo(a)anthracene	48000.0	45400	711	2050	100	NA	NA	NA	306/940	Yes
Benzo(a)pyrene	36000.0	26700	5760	2050	100	NA	1,000	750	394/1100	Yes
Benzo(b)fluoranthene	35000.0	39100	7260	2050	100	NA	NA	NA	507/1500	Yes
Benzo(g,h,i)perylene	13000.0	5910	2290	2050	100	NA	NA	NA	225/490	Yes
Benzo(k)fluoranthene	29000.0	22800	4630	2050	100	NA	NA	NA	370/920	Yes
Carbazole	19000.0	3200	1780	NA	NA	NA	NA	NA	213/310	No
Chrysene	45000.0	37500	7290	2050	100	NA	NA	NA	420/1200	Yes
Dibenz(a,h)anthracene	4800.0	1710	843	2050	100	NA	NA	NA	161/160	Yes
Dibenzofuran	34000.0	3120	2380	NA	NA	NA	NA	NA	172/120	No
Fluoranthene	140000.0	151000	17600	2050	100	NA	10,000	NA	902/2600	Yes
Fluorene	56000.0	5560	3890	2050	100	30,000[a]	400,000	NA	184/160	Yes

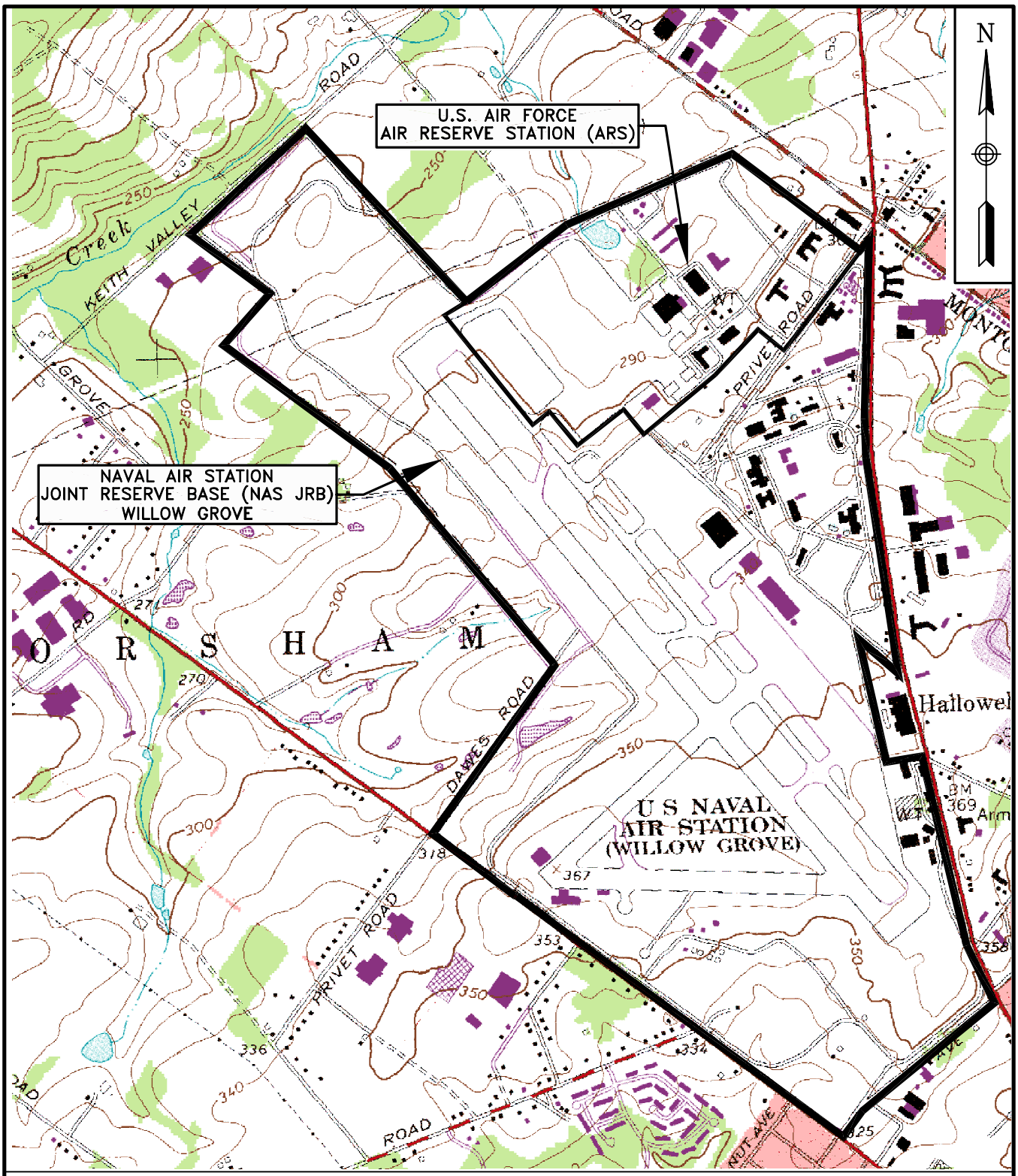
TABLE 4
SELECTION OF ECOLOGICAL RISK ASSESSMENT
CHEMICALS OF POTENTIAL CONCERN
SITE 5 - FIRE TRAINING AREA SOIL (OU 4)
NAS JRB WILLOW GROVE

Contaminant	Maximum Concentration	95% UCL	Mean Concentration	Initial Screening Level	BTAG Screening Level	ORNL[a,b]	Dutch B[c]	CCME[d]	Mean/Max. Background	Retained as Final COC?
Indeno(1,2,3-cd)pyrene	18000.0	9700	3180	2050	100	NA	NA	NA	251/640	Yes
Naphthalene	22000.0	1610	1540	2050	100	NA	5,000	600	ND	Yes
Phenanthrene	200000.0	106000	18100	2050	100	NA	5,000	NA	667/1700	Yes
Pyrene	120000.0	135000	15800	2050	100	NA	10,000	NA	723/2100	Yes
Total PAHs	928,000	5,410,000	107,000	4,000	NA	NA	20,000	NA	4,450/14,100	Yes
VOCs (ug/kg)										
Acetone	17.0	16.8	7.7	NA	NA	NA	NA	NA	ND	No

a. Oak Ridge National Laboratory (ORNL) screening levels; a = lowest value for earthworms and soil micro-organisms (Efroymson et al, 1997a)
b. ORNL screening levels; b = soil phytotoxicity (Efroymson et al, 1997b).
c. Dutch "B" soil value: moderate soil contamination that requires further study (Beyer, 1990).
d. Canadian Council of Ministers of the Environment Soil Quality Guidelines (CCME, 1997).
NA = not available or not applicable.
ND = not detected.

FIGURES

2192 WillowGrove\1233\2192CM01.DWG 07/18/07 MKB



BASE MAP IS A PORTION OF THE AMBLER, PA U.S.G.S. 7.5 MINUTE QUADRANGLE MAP, DATED 1963, PHOTOREVISED IN 1983.

QUADRANGLE LOCATION

0 1500 3000

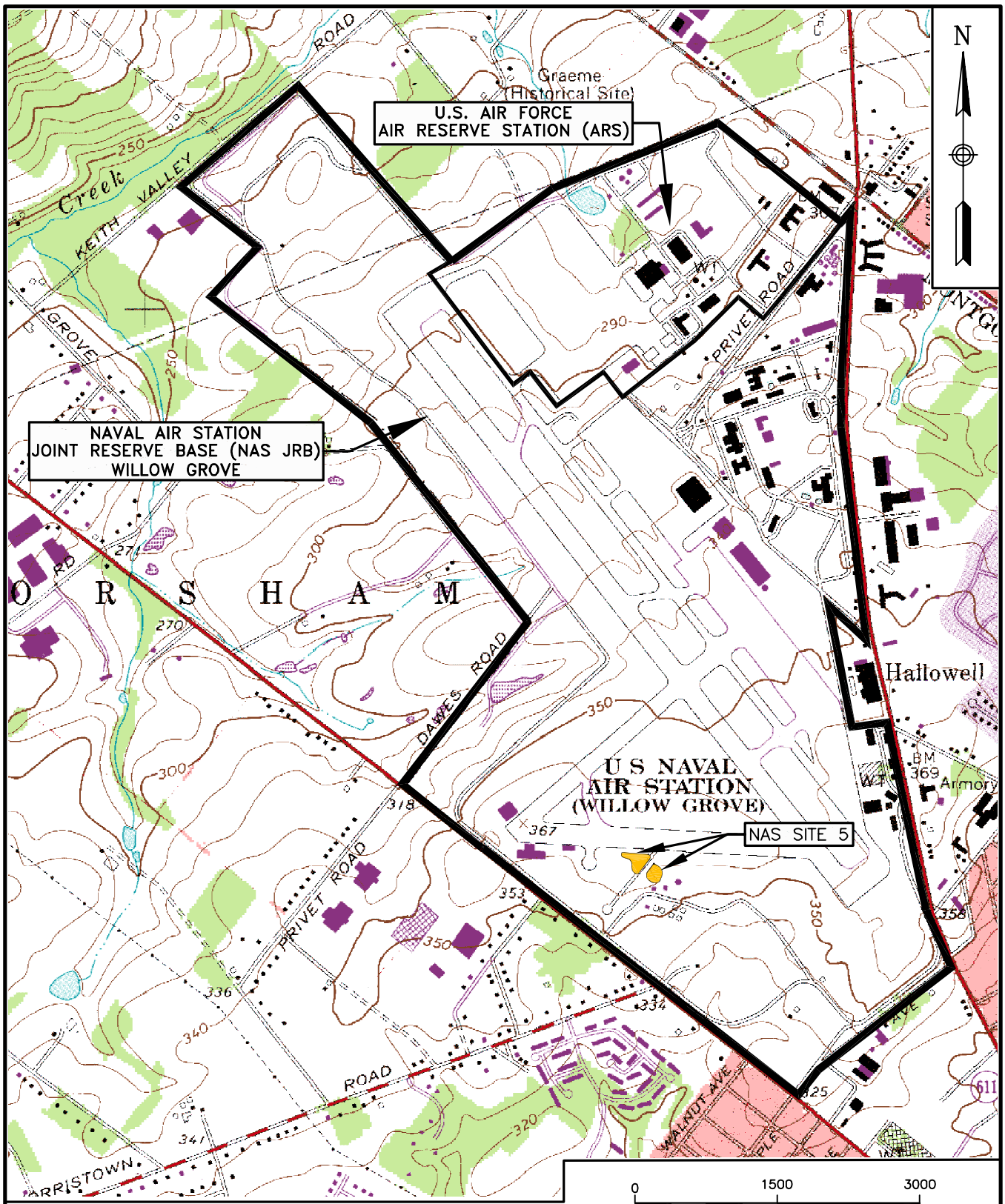
SCALE IN FEET

TETRA TECH NUS, INC.

FACILITY LOCATION MAP
NAS JRB WILLOW GROVE
WILLOW GROVE, PENNSYLVANIA

SCALE	AS NOTED
FILE	2192CM01.DWG
REV	0
DATE	07/18/07
FIGURE NUMBER	FIGURE 1

2192 WillowGrove\1233\2192CM02.DWG 06/29/07 MKB



BASE MAP IS A PORTION OF THE AMBLER, PA U.S.G.S. 7.5 MINUTE QUADRANGLE MAP, DATED 1963, PHOTOREVISED IN 1983.

TETRA TECH NUS, INC.

SITE 5 LOCATION MAP
NAS JRB WILLOW GROVE
WILLOW GROVE, PENNSYLVANIA

SCALE	AS NOTED
FILE	2192CM02.DWG
REV	0
DATE	07/18/07
FIGURE NUMBER	FIGURE 2

2192 WillowGrove\1214\2192CM02.DWG 05/16/07 MKB

MAIN RUNWAY (10/28)

TAXIWAY JULIET

APPROXIMATE SITE 5
FIRE TRAINING AREA
LOCATION

NEW FENCE LINE

APPROXIMATE LOCATION OF
FORMER BURNING RING

PARKING

MARINE RESERVE
TRAINING CENTER

MARINE RESERVE
COMPOUND

05SS26
05SS28
05SS22
05SS36
05SS34
05SS17
05SS35
05SS19
05SS18
05SS38
05SS20
05SS24
05SS39
05SS25
05SS21
05SS33
05SS37
05SS40
05SS45
05SS29
05SS14
05SS31
05SS23
05SS43
05SS44
05SS32
05SS30
05SS41
05SS42

N

0 120 240
SCALE IN FEET

LEGEND

- SURFACE SOIL SAMPLE LOCATION, 2004
- PREVIOUS SURFACE SOIL SAMPLE LOCATION, 1997

TETRA TECH NUS, INC.

SITE FEATURES
SITE 5 – FIRE TRAINING AREA
NAS JRB WILLOW GROVE
WILLOW GROVE, PENNSYLVANIA

FILE	SCALE
2192CM02.DWG	AS NOTED
FIGURE NUMBER	REV / DATE
FIGURE 3	0 07/18/07

APPENDIX A

LIST OF ATTENDEES

PUBLIC MEETING HELD ON OCTOBER 6, 2004

NAVAL AIR STATION JOINT RESERVE BASE WILLOW GROVE
PUBLIC MEETING TO PRESENT THE PROPOSED REMEDIATION PLAN FOR SITE 5 SOIL
JULY 11, 2007

NAME	ADDRESS	PHONE NUMBER	ANY ORGANIZATIONAL AFFILIATION
Curt Frye	Phila Naval Base, Philadelphia, PA	215-897-4914	Navy, Midlant
Bob Lewandowski	Phila Naval Base, Philadelphia, PA	215-897-4908	Navy, BRAC PMO
Marge Johnston	NAS JRB Willow Grove	215-443-6939	Navy, Willow Grove
Jessica Kasmari	PADEP, Norristown, PA	484-250-5724	PADEP
Don Whalen	TtNUS, King of Prussia, PA	610-491-9688	Tetra Tech
Russ Turner	TtNUS, King of Prussia, PA	610-491-9688	Tetra Tech
Hal Dusen	Air Reserve	XXXX	Air Force
Mary E. “Liz” Gemmill	Hatboro, PA	XXXX	RAB Community Co-Chair
Lisa Cunningham	USEPA 1650 Arch Street Philadelphia, PA	215-814-3363	US EPA
Bruce Beach	USEPA 1650 Arch Street Philadelphia, PA	215-814-3364	US EPA
Gary Brown	King of Prussia, PA	XXXX	RT Environmental Services
Jack Tarman	Hatboro, PA	XXXX	Develcom
Ted Roth	Horsham, PA	XXXX	RAB Member
Steve Detwiler	Not Provided	XXXX	Not Provided
CDR Jones	NAS JRB Willow Grove	215-443-6051	Acting for NAS JRB Willow Grove XO

APPENDIX B

RESPONSE TO QUESTIONS AND COMMENTS

PUBLIC MEETING HELD ON JULY 11, 2007

RESPONSIVENESS SUMMARY

RECORD OF DECISION
Naval Air Station Joint Reserve Base (NAS JRB)
Site 5 – Former Fire Training Area
Willow Grove, Pennsylvania
(July 11, 2007 Public Meeting)

Reply to Comments on the Site 5 Proposed Plan

1. Mr. Roth asked where in the Proposed Plan does it say what the recommendation is?

Response: Mr. Frye and Commander Jones referred him to page 7, Column 2 of the Proposed Plan handed out earlier.

2. Mr. Roth mentioned that he had been reading all about terrestrial habitat and asked if the Navy was looking for concurrence to say okay, go do nothing?

Response: Mr. Frye replied that the Navy invites comments either way, positive or negative.

3. Mr. Roth mentioned that one of the slides said for "unrestricted use". He commented that it was somewhat different from what had been discussed. He stated that he thought in recommending no further action, NAS JRB Willow Grove should point out that the projected use is the USAF, and that it doesn't have to clean it up as if it's going to be used as a water reservoir.

Response: Mr. Frye replied that NAS JRB Willow Grove can't say for sure what the future use will be. The direction for this site for years, even pre-BRAC, was to meet the Base's desire to clean this site up so there would be no restrictions on the site. Regardless of the planned use, NAS JRB Willow Grove was planning to clean up the site to this level.

4. Mr. Detwiler asked if this (presentation) was only regarding Site 5, and whether Sites 1, 2, and 3 are separate meetings, separate issues.

Response: Mr. Frye and Lisa Cunningham clarified the issue, stating this presentation has been for Site 5 soil, also known as Operable Unit number four.

5. Mr. Detwiler asked who did the cleanup and where did the stuff (contaminated soil) go? Was it all nonhazardous?

Response: Mr. Frye replied that the Navy contracted with a firm called RMC, and the excavated soil was delivered to a company called Clean Earth, which is in West Philadelphia. Clean Earth is a thermal treatment facility, but the soil was nonhazardous.

6. Mr. Brown asked if the Navy is saying that the conclusion is that the soil there is no longer impacting groundwater in the future.

Response: Mr. Frye replied that is correct.

7. Mr. Brown confirmed his understanding that it (compounds in soil) has been addressed by the prior removal and there's nothing there that's going to continue to impact groundwater.

Response: Mr. Frye replied that is correct.