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Site Management Plan
Fiscal Year 2008

Naval Air Station
Joint Reserve Base (NAS JRB)
Willow Grove, Pennsylvania

Naval Facilities Engineering Command
Mid-Atlantic

Contract No. N62467-04-D-0055
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SITE MANAGEMENT PLAN
FISCAL YEAR 2008
NAVAL AIR STATION JOINT RESERVE BASE (NAS JRB)
WILLOW GROVE, PENNSYLVANIA

COMPREHENSIVE LONG-TERM
ENVIRONMENTAL ACTION - NAVY (CLEAN) CONTRACT

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1.0 INTRODUCTION

This report presents the fiscal year 2008 updated Site Management Plan (SMP) for Naval Air Station Joint Reserve Base (NAS JRB), Willow Grove, Pennsylvania. The SMP is the management tool for planning, reviewing, and setting priorities for all remedial response activities to be performed at the facility. This SMP presents the sequence of future investigation and remediation activities, the rationale for the prioritization of investigation and remediation events, and an estimated schedule for the completion of these activities. The SMP allows for adjustments to scheduled activities to account for potential impacts created by Federal budget constraints, changes in the scope of investigation or remediation activities, or other unanticipated events. A Federal Facilities Agreement (FFA) was finalized June 27, 2005 between the Navy, the U.S. Environmental Protection Agency (EPA) and the Pennsylvania Department of Environmental Protection (PADEP). The FFA ensures that environmental impacts associated with the sites are fully investigated and proper response actions are taken. The FFA also requires preparation and annual updates to this SMP. Requirements of the FFA are incorporated into this SMP.

In 2005, NAS JRB Willow Grove, Pennsylvania was designated for closure under the authority of the Defense Base Realignment and Closure Act (BRAC) of 1990, Public Law 101-510 as amended. BRAC legislation requires that the base closure be in full compliance with the Comprehensive Environmental Response Compensation and Liability Act (CERCLA). Section 2 (Definitions) of the FFA identifies Navy Engineering Field Activity Northeast (EFANE) as the primary Navy local contact entity. Since the EFANE office was designated for closure under the 2005 round of BRAC, EFANE has been replaced by the BRAC Program Management Office Northeast, located at the former Philadelphia Navy Shipyard, as the primary local Navy contact office.

In May 2007, Special Legislation was enacted that said, "The Secretary of the Navy shall, notwithstanding any other provision of law, transfer to the Secretary of the Air Force, at no cost, all lands, easements, Air Installation Compatible Use Zones, and facilities at NASJRB Willow Grove designated for operation as a Joint Interagency Installation for use by the Pennsylvania National Guard and other Department of Defense components, government agencies, and associated users to perform national defense, homeland security, and emergency preparedness missions." Site cleanup under the FFA is expected to continue unabated by the May 2007 Special Legislation.

1.1 FACILITY DESCRIPTION

NAS JRB Willow Grove is located in Horsham Township, Montgomery County in southeastern Pennsylvania; approximately 20 miles north of the city of Philadelphia (see Figure 1-1). NAS JRB Willow Grove occupies approximately 1,000 acres of 1,200 acres the Department of Defense (DoD) maintains 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 the NAS JRB. Figure 1-1 shows the location of NAS JRB Willow Grove and ARS. 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.

The primary mission of NAS JRB Willow Grove is to provide support for operations involving aviation training activities and to train Navy reservists. NAS JRB Willow Grove supports DoD tenants such as the Marine Reserve, and the Army Reserve, and shares facilities/services with the Air Force Reserve, although the Air Force presence has been reduced since the Air Force 913th Airlift Wing unit activities were ended on 28 September 2007. The Base continues to provide facilities, services, materials, and training in direct support of all assigned tenants. These tenants include, fleet logistic support squadrons, Army Reserve and other DoD units.

1.2 ENVIRONMENTAL STATUS AND PREVIOUS INVESTIGATIONS

NAS JRB Willow Grove is being investigated through the Department of Defense's Installation Restoration Program (IRP). The identified sites are in various stages of the multi-step process toward final disposition within the IRP process the Navy is pursuing jointly with state and Federal regulatory agencies. Table 1-1 provides a list of NAS JRB Willow Grove sites and status in the Navy's IRP.

In 1986, the Department of Navy initiated an Initial Assessment Study (IAS) conducted by the Naval Energy and Environmental Support Activity (NEESA). The purpose of the IAS was to assess sites posing potential threats to human health or the environment resulting from hazardous materials handling at the facility. Historical records and aerial photographs were reviewed, interviews with site personnel were conducted, and field inspections were performed. Based on this information, nine potentially contaminated sites were identified. Each of these sites was evaluated for potential health or environmental impacts by evaluating the characteristics of potential contaminants and the migration pathways and potential receptors for these contaminants. The study concluded that five sites (Sites 1, 2, 3, 4, and 5) should be subject to a confirmation study.

The 1988 confirmation study included Site Inspection (SI) studies at 10 sites (the 9 sites identified in the IAS and the Navy Fuel Farm). These investigations included electromagnetic (EM) terrain conductivity surveys and soil vapor surveys, both performed in 1988 (EA Engineering, 1990). The surveys were conducted to provide data for the placement of test borings and monitoring wells proposed for Site 3. EM surveys were conducted at Sites 2, 3, 4 and 7. Soil vapor surveys were conducted at Sites 3, 5, 7, 8 and 9 and the Navy Fuel Farm.

In 1989, additional field activities included the installation of monitoring wells at eight different sites and measurement of water levels from the wells to determine groundwater flow direction. Three rounds of groundwater sampling were conducted. Test borings in areas of soil vapor or EM anomalies were performed, and samples were obtained. Surface soil samples were also collected at two sites. To evaluate potential surface water impacts, aqueous and sediment samples were obtained along the surface water migration pathway at one off-site and 11 on-site locations (EA Engineering, 1990).

In 1990, results were presented in the Site Inspection Studies Report (EA Engineering, 1990) and the Plan of Action for Extended Site Inspections and Remedial Investigations (EA Engineering, 1991).

Recommendations were no further action at Sites 4, 6, 8, and 9 and the performance of a Remedial Investigation (RI) at Sites 1, 2, 3, and 5 and the Fuel Farm (Site 10). In addition, an Extended Site Inspection (ESI) was recommended for Site 7 because the SI data was inconclusive. The installation formed a technical review committee.

The ESI field work was conducted at Site 7 in 1991. The field work involved installation of an additional monitoring well, sampling test borings in the area of soil vapor readings from the 1988 SI, and collection of surface soil samples to determine if the source of contamination was from upgradient, off-site sources. Results indicated no apparent threat to human health or the environment, and no further action was recommended (EA Engineering, 1992).

In 1992, two 210,000-gallon Underground Storage Tanks (USTs) were removed from Site 10. Site 10 petroleum product groundwater contamination clean up was performed in a series of pilot and full-scale active remediation systems in later years (EA, June 2001). During the construction of sewer lines and culverts near the aircraft parking apron, construction crews reported volatile odors. Samples analyzed for total petroleum hydrocarbons (TPH) and benzene, toluene, ethylbenzene, and xylene (BTEX) revealed the presence of these contaminants. This site was added as Site Screening Area (SSA) 11 and was also known as suspected "Site" 11 (Brown & Root Environmental, 1996).

In 1993, the RI for Sites 1, 2, 3, and 5 concluded that additional sampling was needed at all four sites to delineate the extent of contamination and/or the sources at the sites (Halliburton NUS, 1993).

In 1995, a Phase II RI work plan was issued for Sites 1, 2, 3 and 5 (Brown & Root Environmental, October 1996). In addition, the installation established a Restoration Advisory Board (RAB), which meets regularly.

In 1996, the Final Pilot Study Report for Product Recovery at Site 10 was completed (EA, November 1996).

In 1997, the RI fieldwork was conducted at Sites 1, 2, 3, and 5. The Site 10 Fuel Farm was not included in the scope of work of the RI. As part of RI activities, B&R Environmental installed monitoring wells, completed test borings and hand auger sampling locations, excavated test pits, and collected surface, subsurface, groundwater, surface water, and sediment samples. In addition, a draft SMP (Brown & Root Environmental, December 1996) and a Community Relation Plan (Brown & Root Environmental, December 1997) were developed.

In 1998, a draft Phase II RI report for Sites 1, 2, 3, and 5 (Brown & Root Environmental, April 1998) was submitted to regulators for review.

In 1999, the Navy decided de-link the reporting process for IR Sites 1, 2, 3, and 5 and submit four separate Phase II RI documents. An interim remedial action (IRA) for polychlorinated biphenyl (PCB) contaminated soil at Site 1 was completed (FWENC, November 1999). Approximately 1,100 tons of soil was removed.

In 2000, a Base-wide water-level study was completed (Tetra Tech, July 2002). This project allowed the Navy to obtain valuable geophysical data and analytical data for Site 1 groundwater, as requested by EPA. Additional fieldwork was completed at Site 5.

In 2001, the Navy discontinued active operation of the light non-aqueous phase liquids (LNAPL) recovery system at Site 10 (EA, June 2001). Quarterly bailing or recovery of product continued through 2002.

In 2002, the final RI report for Site 1 was submitted to the regulators and the RAB (Tetra Tech, July 2002). A draft (Navy internal) Site 2 RI (Tetra Tech February 2002) report was completed in 2002. The final RI report for Site 5 (Tetra Tech, February 2002) documented halogenated VOC contaminants in groundwater and a range of organic compounds (mainly polynuclear aromatic hydrocarbons (PAHs) in

limited site surface soils. The Navy completed the draft Site 5 groundwater (OU 2) FS report (Tetra Tech, February 2002) and submitted it to regulators and the RAB.

In 2003, off-Base sources of the groundwater contamination at Site 1 were explored. PADEP supplied a compilation of investigations that identified groundwater contaminants and a potential significant source of solvents in groundwater upgradient of Site 1. The Navy contractor Resource Management Concepts (RMC) removed drums and debris and sampled soil at the EPIC drum and debris site (SSA 12) between Site 2 and Site 5 (RMC, 2003). The preliminary draft Site 2 RI report was on hold as the Navy evaluated results of this drum and debris removal at SSA 12. After reviewing the draft FS for Site 5 groundwater, RAB members requested that the Navy consider additional remedial alternatives, such as in-situ biological and chemical treatment processes, for the groundwater at Site 5. Also in 2003, the Navy completed fieldwork at IR Site 10, the Navy Fuel Farm. In January 2003, the Navy discontinued quarterly bailing for recovery of product at Site 10.

In 2004 the Navy completed a draft Proposed Remedial Action Plan (PRAP) for Site 1 soil. The PRAP, recommending no further action, was presented in a public meeting in October 2004. The Navy planned additional groundwater monitoring well installation and groundwater sampling at the upgradient Air Station property line from Site 1 to confirm the major source of groundwater contamination is off Base. Information from the drum removal and soil sampling report (RMC, July 2003) at SSA 12 was sent to the Navy's contractor Tetra Tech for tabulation, evaluation, and incorporation into a final report of cleanup. However, due to unacceptably high analytical detection limits, comparisons to typical health-based concentrations (e.g., EPA medium specific concentrations (MSCs) or PA ACT 2 cleanup levels) did not lead to a clear resolution of the status of the SSA 12 drum removal area between Site 2 and Site 5. Therefore, the draft Site 2 RI report remained on hold as the Navy waited to evaluate results of the drum and debris removal from this area. In response to requests from the RAB to include additional remedial alternatives for Site 5 groundwater, the 2002 draft Site 5 groundwater FS was revised and reissued as revised draft in 2004 (Tetra Tech, September 2004). The Navy submitted the Site 5 RI Addendum 1, PAH Confirmation and Analysis Report (Tetra Tech, October 2004) to confirm status of petroleum compounds in Site 5 soil. Based on the Navy's Final Report, Request for No Further Action, Installation Restoration (IR) Program Site 10 Ground Water (EA, September 2004), that recommended no further action for Site 10, the Navy and PADEP agreed that no further action at this time (under the current Air Station use scenario) for Site 10 was appropriate (PADEP, April 2004).

To ensure compliance with the timetable for Base Closure stipulated by BRAC 2005, the Navy engaged its contractors ECOR and Tetra Tech to begin a series of IR program RI/FS tasks at Site 3. Reinstatement of the RI at Site 3 began in 2005, beginning with the installation of two new monitoring

wells in one borehole to investigate potential sources located upgradient of Site 3, near the Army Reserve vehicle maintenance facility. Field work completed in 2005 included sampling and analysis of all Site 3 monitoring wells, additional sampling and analysis of soil near the Army Reserve Hangar upgradient of Site 3, and preparation of a new human health risk assessment (HHRA) to determine the eventual disposition of Site 3. The Navy submitted the Action Memorandum for Site 5 - Fire Training Area Soil Removal in August 2005 (Tetra Tech, August 2005) to deal with the relatively limited area of soil contaminated primarily with PAHs. Site 5 - Fire Training Area Soil Removal was performed by the Navy's contractor, RMC, in 2006.

In the period of 2005/2006, the Navy, EPA and PADEP had discussions regarding the "No Further Action Sites" (Sites 4, 6, 7, 8 and 9). EPA issued a letter of concurrence with the PADEP notice of agreement with the Navy for no further action (NFA) under the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) at Sites 8 (Building 118 Abandoned Fuel Tank) and 9 (Steam Plant Building Tank Overfill) (EPA, October 2006). The letter of concurrence from EPA is dated October 4, 2006.

Following NAS JRB Willow Grove's designation as a BRAC 2005 facility slated for closure, the No Further Action Record of Decision (ROD) for Site 1 Soil was prepared, underwent several levels of review and was signed by the Navy and EPA with concurrence from PADEP in 2006 (Tetra Tech, September 2006). Plans for installation of three new monitoring wells upgradient of Site 1 at the Base property line, completed by the Navy, were reviewed and approved by PADEP and EPA. The three new monitoring wells were installed and were sampled in 2006 by ECOR Solutions, Inc. (ECOR). In the draft Site 1 RI Addendum 5 for Groundwater (Tetra Tech, September 2006), the Navy concluded that results from the three new upgradient monitoring wells confirmed that the major contributor to solvent contamination in groundwater beneath Site 1 is an off-Base source (Tetra Tech, September 2006).

In 2006, based on discussions among EPA, PADEP and the Navy regarding the lack of any evidence of a relationship between Site 2 - Antenna Field Landfill and SSA 12, drum and debris removal area, these two areas were de-linked for investigation and reporting purposes. The Navy directed Tetra Tech to prepare a draft RI report for Site 2 for regulatory agency review.

The revised draft FS for Site 5 groundwater (submitted in September 2004) generated comments and questions from the EPA received in January 2005. The Navy responded with a series of RI work plans and reports of findings to address EPA concerns. Site 5 RI Addendum 2, Soil Investigation for Volatile Organic Compound (VOC) Soil to Groundwater Impact (Tetra Tech, March 2006) was submitted to independently verify the Navy's RI sample results for VOCs in soil obtained in 1997. Site 5 RI Addendum

3, Technical Memorandum of Risk Assessment Evaluation for Site 5 Groundwater (Tetra Tech, February 2007) and Site 5 RI Addendum 4, Technical Memorandum of Risk Assessment Evaluation for Site 5 Soil (Tetra Tech, July 2006), applied current EPA HHRA guidance, toxicity factors and other current assumptions used for calculating estimated risk, and presented evaluations of variance from the HHRA performed in 1997. Site 5 RI Addendum 5, Remedial Investigation Addendum Report for Site 5 - Fire Training Area Groundwater (OU 2) (Tetra Tech, September 2006) presented results and conclusions from RI activities performed by the Navy in response to EPA comments on hydrogeological and geochemical issues in the revised draft FS for Site 5 groundwater (Tetra Tech, September 2004).

As a result of comments from EPA, the revised draft Site 1 RI Addendum 5 for Groundwater was submitted to regulators for review in July 2007. In 2008, the Site 1 RI Addendum 5 was finalized (Tetra Tech, January 2008). The final Focused Feasibility Study for Site 1 Groundwater was submitted (Tetra Tech, January 2008). The FFS report developed the remedial alternatives for Site 1 groundwater and provided a detailed analysis and comparison of these alternatives. The Navy completed the final Proposed Remedial Action Plan (PRAP) for Site 1 groundwater (Tetra Tech, April 2008). This PRAP recommended an interim remedial action at Site 1 Groundwater, including implementation of institutional controls and periodic groundwater monitoring in conjunction with a review of site conditions and risks every five years. The PRAP was presented in a public meeting in April 2008. The Record of Decision (ROD) for Site 1 groundwater (OU 3) will be prepared in 2008 to be signed by the Navy and EPA with concurrence from PADEP.

In May of 2007, after a preliminary draft (Navy internal) Site 2 RI report was reviewed, the Navy also instructed Tetra Tech to update the ecological risk assessment approach to comply with current EPA and Navy guidelines, including food-chain modeling. In December 2007, an internal draft Site 2 RI report was submitted to Navy for review. The Site 2 RI report is being revised according to the further comments from the Navy.

Based on the inconclusive nature of the soil report (RMC, 2003) for the SSA 12, drum and debris removal area, the Navy contracted Tetra Tech to obtain confirmation samples from this area. After discussions with EPA and PADEP at a Team Meeting, the Navy prepared a draft Work Plan for SSA 12 Confirmation Sampling that was submitted for regulatory agency review in May 2007. In December 2007, the field soil sampling investigation was conducted according to the approved work plan for SSA 12. Electromagnetic induction (EM) geophysical surveys were performed in March 2008. The evaluation and disposition of SSA 12 is proceeding independently of IR Site 2.

Based on an internal Navy draft of the Site 3 RI report prepared in 2007, the Navy noticed an apparent data gap in soil quality sampling in the area of reported historical landfill operations. Based on this apparent data gap, the Navy prepared a work plan for test pits and soil sampling in April 2007. Site 3 test pits and soil sampling were carried out according to the approved work plan in April/May 2007. The Remedial Investigation/Feasibility Study (RI/FS) process is on hold as the Navy and EPA attempt to delineate the extent of landfill cells discovered at Site 3 in 2007. In order to update the RI groundwater data, Tetra Tech NUS performed Interim Groundwater Monitoring (IGWM) at Site 3 according to the approved Sampling and Analysis Plan for Site 3 IGWM in March 2008. The draft report of Site 3 IGWM findings is expected to be published in July, 2008. In April 2008, the draft Sampling and Analysis Plan (SAP) for the landfill delineation study at Site 3 was submitted to the regulators for review (Tetra Tech, April 2008).In order to delineate the extent of the buried waste and soil contamination discovered during the Site 3 Test Pit Investigation and to further characterize the soil contamination. The planned Landfill Delineation Investigation will include electromagnetic induction (EM) geophysical surveys (performed in May 2008), additional test pits and soil samples, as well as surface soil samples for ecological screening.

EPA review and comment on the FS-inspired Site 5 groundwater-related reports was complete in 2007. The draft final Site 5 groundwater FS was due for distribution in June 2008 and the final Site 5 groundwater FS is expected in August 2008. In December 2007, a draft Pilot Study SAP for Site 5 Groundwater (OU 2) was submitted for regulatory agency review. Preliminary soil sampling and monitoring well installation for the Site 5 groundwater pilot study commenced in May 2008. Field demonstration testing for bioaugmentation is being conducted by the Navy to evaluate the effectiveness of several different electron donors with the site aquifer materials, including soils and groundwater.

The draft Site 5 RI Addendum 6 for Soil (OU 4) was submitted for regulatory agency review in May 2007. The Site 5 RI Addendum 6 was finalized and submitted in July 2007. The final PRAP for Site 5 Soil (OU 4) (Tetra Tech, June 2007), proposing no further action for Site 5 soil, was presented for public comment at a public meeting held for that purpose on July 11, 2007. The Record of Decision (ROD) for Site 5 Soil (OU 4) (Tetra Tech, September 2007), was produced, incorporating all comments from regulatory agency reviewers, as well as including comments from the public in the Responsiveness Summary Section. The Site 5 Soil (OU 4) ROD was signed by the Navy and EPA in September 2007.

EPA's Biological Technical Assistance Group (BTAG) visited Sites 4 (North End Landfill) and 7 (Abandoned Rifle Range No. 2) on March 28, 2007. EPA and the BTAG did not recommend further action or investigation.

Based on discussion at the NAS JRB Willow Grove partnering meeting held at EPA Region 3 in June 2007 between the Navy, EPA and PADEP, the Navy agreed to prepare individual site screening process consensus agreements for No Action at Sites 4, 6 and 7.

An Internal draft Record of Consensus agreement for Site 4 was prepared In July 2007. It remains on hold awaiting outcome of the site screening investigation. In 2008, the Navy contracted Tetra Tech to conduct site screening investigation at Site 4. Brush clearing and land survey field investigation work was carried out in March 2008 to find the location of historical soil boring NELB-1 that reportedly was located in the approximately fifty square feet "tar-like waste" area. In order to determine the general nature, and approximate lateral extent and thickness of the tar-like waste and any associated contaminated soil, a soil boring and sampling investigation at the Site 4 "tar-like waste" area was conducted in May 2008. A test pit investigation for the Site 4 tar-like waste is scheduled for June 2008 to excavate the "tar-like waste" material, and containerize the waste and associated soil for off-Base disposal. The excavation will be backfilled with clean soil.

Based on the results of the Site Screening Process performed in accordance with the FFA, the Record of Consensus Agreement No Action Decision for Site 6 was signed by the Navy BRAC Environmental Coordinator and the EPA RPM on December 12, 2007. PADEP agreement with the decision was documented in a letter from PADEP that was included as an attachment to the Record of Consensus Agreement document. Copies of the fully-executed Site 6 Record of Consensus Agreement document were distributed in January 2008.

The draft Record of Consensus Agreement No Action Decision for Site 7 was completed in May 2008 for signature by Navy, EPA and PADEP at the Partnering meeting scheduled for August 20, 2008.

1.3 REPORT ORGANIZATION

The remainder of this report contains five sections. Section 2.0 presents a summary of the procedures to be followed as part of the CERCLA process. Section 3.0 presents a description of each of the sites included in this SMP (Sites 1 through 9, the Navy Fuel Farm (Site 10), SSA 11, and SSA 12). Section 4.0 discusses the ranking system used to prioritize the sites, provides the current status of each site, presents the generic schedule durations for planned CERCLA activities, and includes assumptions provided in the FFA used to develop the schedule and this SMP. A list of references used in this SMP follows Section 4.0.

2.0 CERCLA PROCESS ACTIVITIES

Guidelines established by the EPA for the CERCLA process will continue to be followed for the sites at NAS JRB Willow Grove. The CERCLA process provides guidelines for investigation activities prior to the RI, including preliminary assessments (PAs) (completed at NAS JRB Willow Grove; IAS, 1986) and site inspections (SIs) (completed at NAS JRB Willow Grove Sites 1 through 10; EA Engineering, 1990, and SSA's 11 and 12 (U.S. Department of Defense, 1996). Because PA and SI activities for the sites addressed under this SMP have been completed, discussions of the CERCLA process activities for PAs and SIs are not included in this section. This section discusses the CERCLA processes required to complete investigative and remediation activities at the facility.

After the site inspection and risk screening process is conducted, if a site is deemed to present a potential risk to human health and/or the environment, the site is subject to the full remedial investigation/feasibility study (RI/FS) process. Depending on the severity of site conditions, a removal action or interim remedial action may be appropriate to mitigate immediate threats to human health or the environment. Potentially applicable CERCLA processes for the NAS JRB Willow Grove sites are described in the following sections.

2.1 PA/SI PROCESS

The Preliminary Assessment (PA) and Site Inspection (SI) are used to evaluate the potential for a release of hazardous substances from a site.

The PA is a preliminary assessment usually consisting of review of available data and information on a site, interviews, and a non-sampling site visit to observe areas of potential waste disposal and migration pathways. If the PA results in a recommendation for further investigation, a Site Inspection is performed.

The SI is a site investigation with the goal of eliminating from further consideration those sites that pose no significant threat, or determine the need for additional action or investigation at the site. The SI is conducted prior to the RI.

2.2 RI/FS PROCESS

Figure 2-1 presents a schematic of the RI/FS process. The RI is a field investigation, more extensive than a SI, with the goal of determining the nature and extent of contamination at the site. The baseline risk assessment, performed as part of the RI, is an analysis of potential adverse health and/or ecological

effects arising from site conditions in the absence of any mitigating actions. The FS presents options for cleanup by screening alternatives for remediation and conducting an analysis of the alternatives. Factors for evaluation include overall protection of health and the environment, short- and long-term effectiveness, and cost. The PRAP presents the proposed alternative for remediation of the site selected from the FS. The ROD, when signed by the Navy and EPA, presents the remedy selected after consideration of the public comments. The remedial design (RD) is the development of the actual design of the selected remedy including the preparation of technical specifications and drawings. The remedial action (RA) is the construction, implementation, and operation of the selected remedy.

2.3 REMOVAL ACTIONS

Removal actions are implemented to clean up or remove hazardous substances from the environment or mitigate, minimize, or prevent damage to human health or the environment from a release or threat of release by limiting exposure to those substances. Removal actions may be either time-critical or non-time-critical. Time-critical removal actions are taken when there is an imminent threat to human health and/or the environment. An example of such a threat would be corroded drums that are leaking hazardous substances that would threaten ecological or human receptors. Non-time-critical removals are actions that may be delayed for six or more months without immediate risk to human health or the environment. Although removal actions often begin prior to the completion of RI/FS activities to reduce the spread of contaminants, they may occur at any point during the RI/FS process.

If a non-time-critical removal action is implemented, an Engineering Evaluation/Cost Analysis (EE/CA) is prepared rather than an FS. The EE/CA is prepared for the substances to be removed rather than all potentially contaminated media. Media not addressed in the EE/CA will still be considered in the RI/FS process. Figure 2-2 presents the general process for non-time-critical removals.

Removal actions generally are smaller in scope than a typical site RI/FS; therefore, the time required to perform a removal action, including preparation of an EE/CA, removal design, and implementation, is usually significantly less than the time needed to complete an RI/FS. Under a non-time critical removal action, there is still evaluation of options and an opportunity for public comment, and the selected removal action is documented in an Action Memorandum.

If the risk assessment from the RI/FS process indicates that no further remedial action is required for the entire site after a removal action is completed, the removal action may negate the need for a remedial action. In that case, a no-further-action ROD would be prepared for signature by the concerned parties.

2.4 INTERIM REMEDIAL ACTIONS

Interim remedial actions are designed to mitigate potential risks posed by site contaminants to human health and/or the environment until a final remedial action is implemented. Interim remedial activities usually occur prior to initiation of a full FS. Interim remedial actions, if implemented early in the CERCLA process, often reduce long-term remedial action (RA) costs by limiting the extent of contamination at a site. For example, installation of a groundwater pump and treat system to control plume migration would be considered an interim remedial action, if initiated prior to selection of the final remedy. Interim remedial actions are limited in scope and should address only areas or media for which a remedy will be developed during the RI/FS process.

Figure 2-3 shows the interim remedial action process. Because these actions are usually taken prior to initiation of the full FS, a focused feasibility study (FFS) is prepared addressing only the media and contaminants subject to the interim remedial action. Results of the FFS are incorporated into a PRAP for the interim remedy that is subject to public comment. Similar to the full RI/FS process, after the public comment period, an interim ROD is prepared and signed, the interim remedial design is developed, and the interim action implemented. If the risk assessment from the RI/FS process indicates that no further remedial action is required for the entire site after an interim remedial action is completed, the interim action may become the final remedial action for the site.

2.5 TREATABILITY STUDIES

Before a ROD is signed, and possibly even before final FS development, laboratory-based or pilot treatability studies may be required. These studies evaluate the effectiveness of a potential remedial technology's performance. The goal of performing treatability studies is to support the remedial design process. Treatability studies are typically performed when insufficient data are available from the RI to support full-scale design and implementation of the preferred alternative or where there is a need to determine the effectiveness of a particular technology prior to full-scale implementation.

2.6 ROD AND POST ROD ACTIVITIES

The Record of Decision is used to support and document the remedy selected for an NPL Site. It describes why the selected remedial actions were chosen and other candidate actions were not, how much the remedial actions are expected to cost, and how the public responded to the Proposed Alternative (combination of technologies proposed for site remediation).

3.0 SITE DESCRIPTIONS AND INVESTIGATIONS

3.1 SITE DESCRIPTIONS

This section presents a history of disposal practices and current status of each of the 12 sites and site screening areas addressed in this SMP. This information is based on data from previous investigations and progress made to date in the Navy's IR program. Site locations are identified on Figure 3-1.

3.1.1 Site 1 - Privet Road Compound

The Privet Road Compound is located west of Privet Road, across from the steam plant (Building No. 6). The entire site area is approximately 2 acres and consists of a bowling alley, parking lot, and a 1/2-acre (formerly) fenced area. Trash handling operations at the Privet Road Compound began in 1967 when the Ninth Street Landfill (Site 3) was closed. To replace the landfill, regular trash pickup and off-site disposal were initiated. The Privet Road Compound site was used to process wastes from 1967 to 1975. A fence was erected around the compound area in 1972 to control waste disposal and handling within the compound. The suspected waste handling area, however, is believed to extend throughout Site 1, including the area where the Bowling Alley and parking lot are now located.

The Privet Road Compound was constructed as a transfer station to handle materials not accepted by the trash pickup service. During operations at the compound, wastes were temporarily stored on site to await off-site disposal or burned and/or buried on site. Burning and burial ceased by 1975; however, stored waste material was not completely removed from the site until 1977 (NEESA, 1986).

Wastes reportedly disposed at the site included paint wastes, paint stripper and solvents, Freon, general refuse, asbestos, battery acid, sewage sludge containing heavy metals, oils and lubricants, and mercury-containing dental amalgam. Transformers (containing polychlorinated biphenyls (PCBs)) were also stored at the site. PCB-containing liquids spilled when stored transformers overturned during an incident at the compound (NEESA, 1986).

B&R Environmental (formerly Halliburton NUS Corporation) conducted RI field activities at Site 1 in 1991. The RI concluded that additional sampling was needed to further delineate the extent of contamination and/or potential sources at the site. The RI recommended a Phase II RI and a feasibility study (FS) (Halliburton NUS, 1993).

In 1997, the Phase II RI fieldwork was conducted and in 1998, a draft Phase II RI report was submitted to regulators for review (Brown & Root, 1998).

In 1999, the Navy decided to de-link the reporting process for the IR sites (1, 2, 3, and 5) and submit four separate Phase II RI documents. Also in June 1999, a removal action for PCB-contaminated soil at Site 1 was completed. A total of approximately 1,100 tons of soil was removed for disposal off-site.

In 2000, Basewide water-level studies were completed in cooperation with local municipal authorities and the United States Geological Survey (USGS). Access to the two deep Navy production well boreholes (NW-1 and NW-2) was necessary for geophysical, groundwater quality, and production rate studies performed by the USGS. These two wells are the sole supply of potable and emergency (fire fighting) water for the entire Willow Grove Air Station facility. This project allowed the Navy to obtain the Navy supply well water quality analytical data requested by EPA to help analyze Site 1 groundwater conditions.

In 2002, the RI report was finalized and submitted to the regulators and the RAB (Tetra Tech, July 2002).

In 2004, a draft Addendum RI Report was submitted. The draft Addendum RI Report determined that the chlorinated solvents found in the local groundwater do not originate substantially from the Privet Road Compound area, but appear to be from an off-Base location southeast of Site 1 across Pennsylvania Route 611 in the vicinity of the former Kellet Aircraft manufacturing facility. Also in 2004, the Navy Public Works Officer had the fence removed from around the compound area and reseeded the soil with grass to improve the appearance of the area.

In September 2004, the Navy submitted the final Proposed Remedial Action Plan (PRAP) for Site 1 soil (Tetra Tech, September 2004). A public meeting was held to present the Navy's plan for no further action for Site 1 soil, based on the PCB-contaminated soil removal. A public comment period was set for September 27, through October 27, 2004 to encourage public participation in the decision process for the Privet Road Compound.

Based on concerns from EPA, the Navy performed two additional studies to support the no further action recommendation in the Site 1 soil PRAP. The Site 1 RI Addendum 1, Residual Risk Evaluation Letter Report for Soil (Tetra Tech, June 2005) reviewed the residual risk remaining after the Site 1 soil removal was completed, and the Site 1 RI Addendum 4, Soil Investigation for Volatile Organic Compound Soil to Groundwater Impact (Tetra Tech, March 2006) confirmed earlier RI results regarding the absence of

VOCs in soil. Both of these reports confirmed earlier RI results and the conclusions found in the PRAP, leading to the NFA recommendation.

The Site 1 Soil (OU 1) ROD (Tetra Tech, September 2006), specifying no further action for Site 1 soil, was accepted by PADEP (PADEP, September 2006) and signed by the Navy and EPA in September 2006.

The Navy installed three new monitoring wells upgradient of Site 1 at the Base property line based on a work plan prepared by the Navy that was reviewed and approved by PADEP and EPA. Three new monitoring wells were installed and were sampled in 2006 by ECOR. Results from the three new upgradient monitoring wells confirmed that the major contributor to solvent contamination in groundwater beneath Site 1 is an off-Base source (Site 1 RI Addendum 5 for Groundwater report, Tetra Tech, (Draft) September 2006). However, based on information presented in the Site 1 RI Addendum 5 for Groundwater report, EPA requested that the document be reissued to include more of the background information from previous study reports that had been only referenced. In July 2007, the revised draft Site 1 RI Addendum 5 for Groundwater was submitted to regulators for review. In January 2008, the Navy submitted the final Site 1 RI Addendum 5 for Groundwater report (Tetra Tech, January 2008). This RI addendum report demonstrated that VOCs are migrating onto the Base from an upgradient, off-Base source area.

In September 2007, Tetra Tech prepared a draft Focused Feasibility Study (FFS) report for Site 1 Groundwater report and submitted it to regulators for review. In February 2008, the Navy submitted the final Focused Feasibility Study for Site 1 Groundwater (Tetra Tech, January 2008). The FFS report developed the remedial alternatives for Site 1 groundwater and provided a detailed analysis and comparison of these alternatives which would be used by the Navy and EPA in agreement with PADEP to select a preferred remedy to deal with contaminated groundwater.

In January 2008, the PRAP for Site 1 groundwater (OU 3) was submitted to regulators for review (Tetra Tech, January 2008). In April 2008, the Navy submitted the final PRAP for Site 1 groundwater (Tetra Tech, April 2008). This PRAP recommended that limited action, including implementation of institutional controls and periodic groundwater monitoring in conjunction with a review of site conditions and risks every five years, would be taken as an interim measure to address risks associated with the groundwater located beneath Site 1 while EPA investigates the off-site source of the groundwater contamination. A public meeting was held to present the Navy's plan for the interim action for the groundwater of Site 1. A public comment period was set for April 16, through May 30, to encourage public participation in the decision process for the Privet Road Compound. Several comments were received from the public during the

public meeting, but no additional comments were received during the public comment period. The Record of Decision (ROD) for Site 1 groundwater (OU 3) will be prepared, incorporating all comments from regulatory agency reviewers, as well as including comments from the public in the Responsiveness Summary Section.

3.1.2 Site 2 - Antenna Field Landfill

The Antenna Field Landfill is located in the southern portion of the Naval Air Station, southwest of Runway 10/28 (Figure 3-1). The landfill has been estimated to be approximately 9 acres in size.

The landfill was used between 1948 and 1960 as the principal disposal area for solid waste generated by the facility. Waste disposal activities included the excavation of trenches where wastes were subsequently burned and/or buried. In addition to general wastes, bulk items such as furniture, tires, and shingles were disposed. Paint wastes and sewage sludge were also reportedly disposed (NEESA, 1986).

In the mid 1990's, an antenna array consisting of five antennae was constructed at the site to replace an older antenna array.

B&R Environmental conducted RI field activities at Site 2 in 1991. The RI concluded that additional sampling was needed to further delineate the extent of contamination and/or the sources at the site. The RI recommended a Phase II RI and a FS (Halliburton NUS, 1993).

In 1997, the Phase II RI fieldwork was conducted and in 1998, a draft Phase II combined Sites 1, 2, 3,and 5 RI report was submitted to regulators for review (Brown & Root, 1998). In 1999, the Navy decided to de-link the reporting process for IR Sites 1, 2, 3, and 5, and submit four separate Phase II RI documents.

A draft (Navy internal) Site 2 RI report was completed in 2002 (Tetra Tech, 2002). During this time period, the Navy discovered debris and discarded empty drums between Site 2 and Site 5 (SSA 12). The Navy contracted with RMC Environmental (RMC) to remove the drums, obtain samples of the drum/contents (residues only) and soils that potentially could have been impacted. When field conditions were appropriate, RMC removed drums and sampled beneath the drums at SSA 12 (RMC, 2003). Information from the RMC Report was sent to the Navy's contractor Tetra Tech for tabulation, evaluation, and possible incorporation into a Final RI Report for Site 2. Tetra Tech combined the results and conclusions of the drum removal and confirmatory sampling into the revised draft Site 2 RI report (Navy internal review - 10/06/04). However, due to unacceptably high analytical detection limits, comparisons to typical health-based concentrations (e.g., EPA medium specific concentrations (MSCs)

or PA ACT 2 cleanup levels) did not lead to a clear resolution of the status of SSA 12. The draft Site 2 RI report remained on hold as the Navy waited to evaluate results of the drum and debris removal from SSA 12. In September 2006, the Navy directed Tetra Tech to prepare a work plan to resample soils at SSA 12. At that time, the Navy also directed Tetra Tech to proceed with preparation of the draft RI report for Site 2 that will not include information about SSA 12.

In May of 2007, after a preliminary draft (Navy internal) Site 2 RI report was reviewed, the Navy instructed Tetra Tech to update the ecological risk assessment approach to comply with current EPA and Navy guidelines, including food-chain modeling. In December 2007, an internal draft Site 2 RI report was submitted to Navy for review. The Site 2 RI report is being revised according to further comments from Navy.

3.1.3 Site 3 - Ninth Street Landfill

The Ninth Street Landfill site is located at the western boundary of the facility, immediately north of Ninth Street. Disposal operations at the 9-acre site were initiated as a replacement for the Antenna Field Landfill in 1960. Wastes were disposed by burning and burial in excavated trenches. Wastes were similar to those at Site 2, including general wastes, bulk items, paint waste, asbestos, and sewage sludge (NEESA, 1986). Transformers containing PCBs were also stored and serviced in a salvage yard established on the landfill after the landfill's closure in 1967 (EA Engineering, 1990).

B&R Environmental conducted RI field activities at Site 3 in 1991. The RI concluded that additional sampling was needed to further delineate the extent of contamination and/or the sources at the site. The RI recommended a Phase II RI and a FS (Halliburton NUS, 1993).

In 1997, the Phase II RI fieldwork was conducted and in 1998, a draft Phase II RI report was submitted to regulators for review (Brown & Root, 1998). In 1999, the Navy decided to de-link the reporting process for the IR sites (1, 2, 3, and 5) and submit four separate Phase II RI documents. In response to comments, the Navy has performed minor investigations at Site 3 since the draft Phase II RI report was submitted to regulators for review in 1998. USGS performed geophysical logging of two irrigation wells owned by the golf course (the adjacent, downgradient off-site property) in March 1998. Sediments from the retention basin located north of Site 3 (part of the NAS JRB Willow Grove storm water control system) were sampled and analyzed for contamination in 2002 (Woodward and Curran 20543901, May 2002).

During the period from 1999 through 2004 progress at Site 3 was a lower priority than other IRP sites at NAS JRB Willow Grove. No individual Site 3 RI was prepared for submission or separate review, and Site 3 did not progress further past Phase II RI investigations due to funding and priority issues as well as a lack of cooperation from the nearby golf course. Requests for access to Golf Course monitoring wells for RI efforts were met with limited acceptance (for instance geophysical logging of some of the golf course wells was permitted). In 2007, the Navy requested access to sample the flowing monitoring well and obtain two surface water samples on Lot 1, the managers of the Golf Course informed the Navy that they would allow those additional RI efforts on Golf Course property.

With the passage of BRAC 2005, priority and funding issues changed for Site 3. To ensure compliance with the timetable for Base Closure stipulated by BRAC 2005, the Navy engaged its contractors ECOR and Tetra Tech to begin a series of IR program RI/FS tasks at Site 3. By agreement among the Navy, EPA and PADEP, two new monitoring wells were installed to investigate potential groundwater contamination sources upgradient of Site 3 near the Army Reserve vehicle maintenance facility. Fieldwork completed in 2005/2006 included resampling and analysis of all Site 3 monitoring wells (including the new upgradient wells) and additional sampling and analysis of soil near the Army Reserve Hangar. The Navy and EPA agreed on a methodology for preparation of a new HHRA to help determine the eventual disposition of Site 3.

The preliminary (Navy internal) draft Site 3 RI report, reviewed by the Navy in January 2007, concluded that Site 3 soils do not pose a threat to public health or the environment. However, the Navy considered that the soil analytical data generated during the RI up to that time may not have been representative of actual site conditions. In order to confirm that the conclusion of the preliminary draft RI report regarding site soils was correct, the Navy prepared a work plan for additional test pits and soil sampling in April 2007. Site 3 test pits and soil sampling were carried out according to the approved work plan in April/May 2007. Significant quantities of buried waste material at several Site 3 locations were encountered during a subsurface soil test pit and soil sampling investigation, and soil samples associated with some of the buried waste contained elevated levels of semivolatile organic compounds (SVOCs), pesticides, polychlorinated biphenyls (PCBs), dioxin, and metals. In January 2008, a draft Test Pit and Soil Sampling Letter Report for Site 3 Landfill was submitted to regulators for review (Tetra Tech, January 2008). The Navy responded to EPA comments on the draft Letter Report in May 2008. This Test Pit and Soil Sampling Letter Report will be finalized and submitted to the regulators.

In order to delineate the extent of the buried waste and soil contamination discovered during the Test Pit Investigation and to further characterize the soil contamination, a landfill delineation investigation will be conducted including electromagnetic induction (EM) geophysical surveys, additional test pits and soil

samples, as well as surface soil samples for ecological screening. The results of landfill delineation investigation will be used in the remedial decision process. In April 2008, the draft Sampling and Analysis Plan (SAP) for the landfill delineation study at Site 3 was submitted to the regulators for review (Tetra Tech, April 2008).

To update the RI groundwater data while the Navy and EPA attempt to delineate the extent of landfill cells discovered at Site 3 in 2007, a draft SAP for Site 3 interim groundwater monitoring (IGWM) was submitted to regulators for review in December 2007. In March 2008, Tetra Tech performed the Semi-annual Event 1 of IGWM at Site 3 according to the approved SAP for Site 3 Interim Groundwater Monitoring (Tetra Tech, March 2008) in May 2008. The draft Site 3 IGWM letter report is being prepared.

3.1.4 Site 4 - North End Landfill

Limited information exists on the operations at the North End Landfill; however, the landfill reportedly was used from approximately 1967 to 1969 to accept overflow wastes from the Privet Road Compound. The site is approximately 3.5 acres in size and is located between the northern end of Runway 15/33 and the Perimeter Road. Disposed waste materials are believed to be items not collected during routine trash pickup such as bulk items, sewage sludge, and oils and lubricants. During the site's operation, it is reported that wastes were covered; however, observations from the IAS showed waste materials, including oil, at the surface (NEESA, 1986).

Based on the SI (EA, MAY 1990), combined with the results of the site screening process, the Navy recommended NFA for this Site. PADEP concurred with the Navy recommendation for NFA at this site (PADEP, October 31, 2005). The Navy prepared a summary discussion of review and presented a status update at the scheduled December 19, 2006 Navy Willow Grove IRP Partnering Team Meeting. All available past investigation results, correspondence and notes were summarized and recommendations for future actions were presented for discussion among the team. EPA's BTAG visited Site 4 on March 28, 2007 to review conditions. BTAG did not recommend further investigation or action at this site.

The IAS (NEESA, 1986) and the SI (EA Engineering, 1990) described a pool of "tar-like waste" covered about 50 square feet and was underlain by very soft tarry earth at Site 4 - North End Landfill. The Navy contracted Tetra Tech to conduct site screening investigation at Site 4 to further identify the nature of this "tar-like waste". Site screening investigation field work was carried out, and the location of historical soil boring NELB-1 that reportedly was obtained from the "tar-like waste" area was located in March 2008. The Status of Investigation Site Screening Area 4 was submitted to Navy in April 2008. To obtain

information about the nature and extent of contamination, a soil sampling investigation at Site 4 "tar-like waste" area was conducted in May 2008. A test pit investigation for the Site 4 "tar-like waste" will be conducted. One test pit is planned, with containerization of the "tar-like waste" for off-Base disposal. The test pit excavation will be backfilled with clean soil.

Based on discussion at the NAS JRB Willow Grove partnering meeting held at EPA Region 3 in June 2007 between the Navy, EPA and PADEP, the Navy agreed to prepare an individual site screening process consensus agreements for No Action at Site 4. An Internal draft Record of Consensus Agreement was prepared In July 2007. It remains on hold awaiting the outcome of site screening investigation at site 4. When complete agreement is reached, the consensus agreement will be signed by the Navy BRAC Environmental Coordinator, EPA RPM and PADEP Case Manager.

3.1.5 Site 5 - Fire Training Area

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 3-1). The site is located immediately south of Taxiway Juliet and covers an irregularly shaped area of approximately 1.25 acres. The training area was used from 1942 to 1975 for large-scale 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 up to 4,000 or more 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, consisting of the "burning ring" that has actually been found to have been a section of a partially buried steel tank, wide open at the top with an intact bottom below surrounding grade, was located in the south-central portion of the site (Tetra Tech, 2002).

B&R Environmental conducted RI field activities at Site 5 in 1991. The RI concluded that additional sampling was needed to further delineate the extent of contamination and/or the sources at the site. The Phase I RI report recommended a Phase II RI and a FS (Halliburton NUS, 1993).

In 1997 Phase II RI fieldwork was conducted and in 1998, a draft Phase II RI report was submitted to regulators for review (Brown & Root, 1998). In 1999, the Navy decided to de-link the reporting process for IR sites (1, 2, 3, and 5) and submit four separate Phase II RI documents.

In 2000 additional field work was completed at Site 5 to verify that site groundwater contamination was not moving off-Base toward the Horsham Township Municipal water supply well number 26 (HTMW 26). Sentinel monitoring wells installed on Navy property to monitor water quality between Site 5 and HTMW 26 are now sampled annually by the Base to verify contamination is not migrating closer toward the municipal water supply well.

The final RI report for Site 5, completed in February 2002, documented halogenated VOC contaminants in groundwater and a range of organic compounds (mainly polynuclear aromatic hydrocarbons [PAHs]) in limited site surface soils (Tetra Tech, February 2002). The final RI Report for Site 5 combined the results from the draft Phase II RI Report and previous findings for Site 5, with the results of activities performed from April 1998 through October 2000 (Tetra Tech, 2002).

In 2002, Tetra Tech prepared the draft FS report for Site 5 groundwater and submitted it to regulators and the RAB (Tetra Tech, February 2002). Based on RAB member comments, the Navy decided to reconsider emerging (biological and chemical treatment in-situ) technologies and resubmit a revised draft Site 5 groundwater FS for regulatory and public review. In response to requests from the RAB to include additional remedial alternatives for Site 5 groundwater, the 2002 draft Site 5 groundwater FS was revised and reissued as revised draft in 2004 (Tetra Tech, September 2004).

After submission of the RI Report (Tetra Tech, 2002), the Navy contracted for installation of an additional airport runway perimeter security fence. Part of the new security fencing was installed in or near the area of known PAH soil contamination. Because of this potential change to Site 5 surface soil conditions in the area of the identified PAH "hot spots," surface and shallow subsurface soil samples were collected in June 2004 for a side-by-side comparison with the 1997 data. The Navy submitted the Site 5 RI Addendum 1, PAH Confirmation Sampling and Analysis Report (Tetra Tech, October 2004) to confirm status of petroleum compounds in Site 5 soil.

Based on the Action Memorandum for Site 5 - Fire Training Area Soil Removal (Tetra Tech, August 2005), a soil removal action for PAH-contaminated soil at Site 5 began in December 2005. Initial excavation confirmation samples indicated PAHs remained at some spots at concentrations above cleanup levels. A second round of excavation and confirmation samples (including sampling and analysis for dioxins as requested by EPA) was followed by soil backfill in October 2006. The Navy's Site 5 RI Addendum 6 for Soil (Tetra Tech, June 2007), including the Navy's residual risk calculation approved by EPA, the RMC final closeout report and an analysis of the potential impact from dioxins, as requested by EPA, was submitted in July 2007.

The revised draft FS for Site 5 groundwater (submitted in September 2004) generated a list of comments and questions from the EPA received in January 2005. The Navy responded with a series of RI work plans and reports of findings to address EPA concerns about past RI field sample collection practices, past HHRA practices, and the site conceptual model. In February 2007, EPA issued a letter of concurrence with the Navy Response to Comments (RTC) document laying out the Navy response to each of the EPA comments on the Site 5 groundwater FS. The Navy will submit the draft final Site 5 groundwater FS in 2008.

Site 5 RI Addendum 2, Soil Investigation for Volatile Organic Compound (VOC) Soil to Groundwater Impact (Tetra Tech, March 2006) was submitted to validate the Navy's RI samples for VOCs in soil obtained in 1997. 1997 RI sample and analysis results were very comparable to the results obtained from the same sample locations using the (new - 2006) EPA-preferred method of sample collection and preservation.

Site 5 RI Addendum 3, Technical Memorandum of Risk Assessment Evaluation for Site 5 Groundwater (Tetra Tech, February 2007), and Site 5 RI Addendum 4, Technical Memorandum of Risk Assessment Evaluation for Site 5 Soil (Tetra Tech, July 2006), applied current EPA HHRA guidance, toxicity factors and other current assumptions used for calculating estimated risk, and presented evaluation of variances from the HHRA performed in 1997. The HHRA Tech Memo for Site 5 soil concluded that the risk drivers and potential chemicals of concern (COCs) remained the same and highlighted any differences from the 1997 HHRA.

Site 5 RI Addendum 5, Remedial Investigation Addendum Report for Site 5 - Fire Training Area Groundwater (OU 2) (Tetra Tech September 2006) presented results and conclusions from RI activities performed by the Navy in response to EPA comments on the revised draft FS for Site 5 groundwater (Tetra Tech, September 2004). The Navy installed five new boreholes and eight new monitoring wells, performed geophysical logging, packer studies, and analysis of groundwater samples to respond to EPA hydrochemistry, hydrogeology and health risk concerns noted in these comments.

The final PRAP for Site 5 Soil (OU 4) (Tetra Tech, June 2006), proposing no further action for soil at Site 5, was presented for public comment at a public meeting held for that purpose on July 11, 2007. Several comments were received from the public during the public meeting, but no additional comments were received during the balance of the public comment period that ran from June 15, 2007 through July 30, 2007. The ROD for Site 5 Soil (OU 4) (Tetra Tech, September 2006), was produced, incorporating all comments from regulatory agency reviewers, as well as including comments from the public in the

Responsiveness Summary Section. The Site 5 Soil (OU 4) ROD was signed by the Navy and forwarded to EPA for signature on September 13, 2007. EPA signed the OU 4 ROD on September 21, 2007.

In December 2007, a draft Pilot Study SAP for Site 5 Groundwater (OU 2) was submitted to regulators for review. Preliminary soil sampling and monitoring well installation for the Site 5 groundwater pilot study commenced in May 2008. Field demonstration testing for bioaugmentation is being conducted by the Navy to evaluate the effectiveness of several different electron donors with the site aquifer materials.

3.1.6 Site 6 - Abandoned Rifle Range No. 1

Abandoned Rifle Range No. 1 is located adjacent to Horsham Road near the southwestern corner of the Marine Reserve Compound. The Marine Reserve Training Center building and parking area that was constructed in the mid 1990s now covers virtually all of what is estimated as Site 6.

The range was built in 1942 and consisted of a firing mat and an earthen rampart. The rampart was approximately 1 acre in size. It is not known when the range was closed; however, the second range was not built until 1965, so it is assumed that this site was active until that time. After the site was closed, the rampart was regraded. There are no records indicating if the lead from the fired rounds was removed; therefore, it is assumed that the lead was mixed with the earth from the rampart during the regrading (NEESA, 1986).

EA Engineering performed ESI fieldwork at Site 6 in 1991. Results indicated no apparent threat to health or the environment, and no further action was recommended (EA Engineering, 1992).

PADEP concurred with the Navy recommendation for NFA at this site (PADEP, October 31, 2005). The Navy prepared a summary review and presented a status update at the scheduled December 19, 2006 Navy Willow Grove IRP Partnering Team Meeting. All available past investigation results, correspondence and notes were summarized and recommendations for future actions were presented for discussion among the team.

Based on the results of the Site Screening Process performed in accordance with the FFA, the Record of Consensus Agreement No Action Decision for Site 6 was signed by the Navy BRAC Environmental Coordinator and the EPA RPM on December 12, 2007. PADEP agreement with the decision was documented in a letter from PADEP that was included as an attachment to the Record of Consensus Agreement document. Copies of the fully-executed Site 6 Record of Consensus Agreement document were distributed in January 2008.

3.1.7 Site 7 - Abandoned Rifle Range. No. 2

The site is located in the northwestern corner of the facility, west of the north end of Runway 15/33. Construction and operation of the range were similar to Site 6 and consisted of a 1-acre earthen rampart to collect fired rounds of ammunition. The range operated from 1965 until 1977, when the current range located in Building 176 at the Army Reserve Compound was constructed. The rampart, along with the spent ammunition, was regraded in 1977. This area was subsequently used as a landfill for inert materials including clean fill, broken concrete, asphalt, and cinderblocks. In addition, dry wastewater treatment sludge and emulsified oil and grease from on-site oil/water separators were reported to have been buried at the site (NEESA, 1986).

Based on the ESI (EA, January 1992) combined with the results of the site screening process, the Navy recommended NFA for this Site. PADEP concurred with the Navy recommendation for NFA at this site (PADEP, October 31, 2005). The Navy prepared a summary review and presented a status update at the scheduled December 19, 2006 Navy Willow Grove IRP Partnering Team Meeting. All available past investigation results, correspondence and notes were summarized and recommendations for future actions were presented for discussion among the team. EPA's BTAG visited Site 7 on March 28, 2007 to review conditions. BTAG did not recommend further investigation or action at this site.

In January 2008, the Navy prepared a technical memorandum presenting a human health risk screening evaluation (HHRSE) of soil and groundwater at Site 7. The HHRSE compared existing data to USEPA Region III Risk Based Concentration (RBC) values to conservatively estimate the potential for adverse carcinogenic and non-carcinogenic health effects for exposures to soil and groundwater. Concentrations of all chemicals detected in soil were less than their respective RBCs for residential exposures to soil with the exception of arsenic. Concentrations of arsenic exceeded the RBC at most sampling locations but concentrations of arsenic were within background levels for soil. Manganese was the only chemical detected in groundwater at concentrations exceeding the full RBCs for tap water. Manganese slightly exceeded its full RBC in one sample.

Based on discussion at the NAS JRB Willow Grove partnering meeting held at EPA Region 3 in June 2007 between the Navy, EPA and PADEP, the Navy agreed to prepare a site screening process consensus agreement for No Action at Sites 7. The draft Record of Consensus Agreement No Action Decision for Site 7 was completed in May 2008 for signature by Navy, EPA and PADEP at the Partnering meeting scheduled for August 20, 2008.

3.1.8 Site 8 - Building 118-Abandoned Fuel Tank

The site consists of a former underground 500-gallon heating fuel tank located approximately 50 feet north of Building 118. The tank was placed in service in 1959 and was abandoned in place in 1980 when it was replaced with a 290-gallon above ground tank. The tank contained only No. 2 heating fuel and serviced Building 118. In 1980, oil was observed seeping into the basement of Building 118. This occurred on an intermittent basis and the oil was removed after each occurrence. The tank was investigated as a result of the seepage; the tank was empty and soils in the excavation around the tank did not indicate the presence of released materials; however, the fill and riser pipes were removed and the tank was buried in place (NEESA, 1986).

PADEP issued a notice of agreement (PADEP, October 31, 2005) with the Navy recommendation for NFA at Site 8 (Building 118 Abandoned Fuel Tank) under Pennsylvania storage tank regulations (Act No. 32; P.L. 169 and PA Code Title 25, Chapter 245). EPA sent a letter agreeing that the site had non-CERCLA issues and can be closed out from a CERCLA perspective (EPA, October 4, 2006).

3.1.9 Site 9 - Steam Plant Building 6 Tank Overfill

When the main steam plant (Building 6) was converted from coal to oil in 1969-70, spill containment for fuel oil was not constructed. In 1978, a fuel oil supplier delivered No. 2 fuel oil to a filled tank while leaving the delivery truck unattended. The fuel backed up through the vent pipe, and approximately 3,000 to 5,000 gallons of fuel oil were released. The spill was located in the area between Building 6 and Building 114. This area is now bermed to contain spills resulting from fuel delivery.

The NAS JRB Willow Grove fire department responded to the spill event and flushed the fuel with water. Runoff was directed to drainage swales downstream of the steam plant. The spill was directed toward the Air Reserve Facility's detention basin on the northern side of the facility. The basin was equipped with oil spill containment devices. The total affected area was less than 1 acre (NEESA, 1986).

PADEP issued a notice of agreement (PADEP, October 31, 2005) with the Navy recommendation for NFA at Site 9 (Steam Plant Building 6 Tank Overfill) under Pennsylvania storage tank regulations (Act No. 32; P.L. 169 and PA Code Title 25, Chapter 245). EPA sent a letter agreeing that the site had non-CERCLA issues and can be closed out from a CERCLA perspective (EPA, October 4, 2006).

3.1.10 Site 10 - Navy Fuel Farm

Site 10 is located south of the Air Reserve facility along the north side of Privet Road. The site formerly had two partially buried, 210,000-gallon fuel tanks (Tank No. 115 and Tank No. 116) containing aviation fuel. Two smaller underground storage tanks (USTs) were located in the southeastern corner of the site. One tank contained diesel fuel and the other was used for storage of waste oil. The waste oil tank was formerly used for fuel storage. In 1986, Tank No. 115 was overfilled and fuel was released to the ground. The same year during excavation for utility work on the southern side of the site, non-aqueous phase liquid (NAPL) was observed floating on top of the water in the trench. The NAPL was observed in the area of a dry well located near the northeastern corner of Building 81, which is located south of the 210,000gallon tanks. The dry well was used to discharge effluent water siphoned from the bottom of the fuel tanks (EA Engineering, 1990). In March 1989, aviation fuel was detected emanating from two patches of dead grass on the west side of Tank No. 115. In 1991 the two main fuel tanks and the waste oil and diesel fuel USTs were removed. Inspection of the waste oil tank during removal revealed that the tank was not intact as holes up to 1 inch in diameter were reported.

In 1995, groundwater remediation pilot systems were being investigated to address the petroleum (aviation fuel) contamination at Site 10 (Navy Fuel Farm) under the Pennsylvania Department of Environmental Protection (PADEP) UST program. The Final Study Report for Product Recovery Pilot System was completed in 1996 (EA, 1996).

In 1998, a light non-aqueous phase liquid (LNAPL) recovery system designed to remediate the fuel spill was installed.

In 2001, the Navy discontinued active operation of the LNAPL recovery system for the jet fuel spill. Quarterly floating product recovery by bailing, or capture by absorption onto recovery "socks" placed in the well continued until January 2003.

PADEP approved the final Work Plan for various fieldwork efforts at Site 10 dated March 2003 (EA, 2003). Field work included installation and sampling of monitoring wells and soil borings to evaluate current site conditions.

A final RI for Site 10 soil was submitted in December 2003 to support no further investigation at this time (EA, 2003).

In September 2004, the Navy submitted the Request for No Further Action for IR Program Site 10 Groundwater (EA, September 2004). PADEP agreed with the Navy that no further remedial action or investigation at this time is appropriate for Site 10 soils or groundwater. However, PADEP noted in their letter (PADEP, April 2004) that groundwater and soil at Site 10 do not meet criteria for unrestricted use and that it may be appropriate to seek full closure under Act 2 if land use changes.

3.1.11 Site Screening Area 11 - Aircraft Parking Apron (SSA 11)

In 1992, during construction of footers for an Air Force building, organic odors were detected by the construction crew. This area is located at the north end of the main runway, between the Navy and Air Force parking aprons. It is suspected that fuel was spilled in this area in the past. Although soil samples were analyzed and the suspected contaminated soil was excavated, confirmation sampling was not conducted in 1992. Also, the analytical method was not stipulated and the laboratory reporting units were questionable (the samples consisted of soil; however, the reporting units indicated aqueous samples). Therefore, PADEP requested that confirmation soil samples be collected and evaluated to determine if attainment for Act 2 liability protection for closure could be demonstrated for the former excavated area (SSA 11). In addition, PADEP requested that groundwater be sampled downgradient of the site to determine if the petroleum-contaminated soil had affected the groundwater in the area.

PADEP approved the final Work Plan for various fieldwork efforts at suspected "site" 11 (SSA 11) dated March 2003 (EA, 2003). Field work included installation and sampling of monitoring wells and soil borings to evaluate current site conditions to determine if any of the previously reported petroleum contamination remained.

In March 2004 the Navy submitted the final report of PADEP Act 2 soil sampling and analysis (EA, March, 2004) at suspected Navy "site" 11 (SSA 11 - Aircraft Parking Apron). PADEP agreed with the Navy conclusion that this "site" did not meet the criteria necessary to be considered under any program for potential remediation. This "site" has never formally entered either the IR or UST program. It was agreed by PADEP and the Navy that no further action of any kind is required for SSA 11, the suspected "site" 11, former aircraft parking apron (PADEP, April 5, 2004). The Navy received a letter from EPA dated February 12, 2007 indicating concurrence that no further remedial actions are needed for SSA 11.

3.1.12 Site Screening Area 12- Drum and Debris Removal Area (SSA 12)

The Navy contractor RMC removed drums and debris and sampled soil at the EPIC drum and debris site, SSA 12, (the site screening area between Site 2 and Site 5) in 2003. Information from the drum removal

and soil sampling report (RMC, July 2003) at SSA 12 was sent to the Navy's contractor Tetra Tech for tabulation, evaluation, and incorporation into a final report of cleanup. However, due to unacceptably high analytical detection limits, comparisons to typical health-based concentrations (e.g., EPA MSCs or PA ACT 2 cleanup levels) did not lead to a clear resolution of the status of the SSA 12 drum removal area.

Based on the inconclusive nature of the soil report for the SSA 12, the Navy contracted Tetra Tech to obtain confirmation samples from this area. The draft Work Plan for Soil Investigation at Site Screening Area 12 (Tetra Tech, May 2007) was submitted for regulatory agency review and comment in May 2007. In November 2007, the Navy submitted the final Work Plan for Soil Investigation at SSA 12 (Tetra Tech, November 2007). A confirmation soil sampling investigation was conducted in December 2007 and electromagnetic induction (EM) geophysical surveys were performed in March 2008.

Site screening at SSA 12 will continue in 'FY 08 in accordance with the NAS JRB Willow Grove FFA.

4.0 SITE RANKING AND SMP SCHEDULES

4.1 SITE RANKING

A site ranking methodology was developed by the DoD to rank Defense Environmental Restoration Program (DERP) sites based on the degree of risk posed to human health and the environment. Results of the ranking were used to prioritize sites and focus investigation and remediation efforts. Sites were categorized into High, Medium and Low relative risk groups to assure that investigations of sites currently impacting human or ecological receptors, or with the potential for significant migration from the site, are conducted before sites posing less significant threats. However, following the inclusion of NAS JRB Willow Grove on the BRAC 2005 for closure, relative risk site ranking will no longer be used to prioritize sites for cleanup. Cleanup priorities will be determined according to property disposal schedules.

The following list presents the status for site investigation and/or remediation activities:

- Site 1 (Decision Process)
- Site 2 (Investigation/Decision Process)
- Site 3 (Investigation/Decision Process)
- Site 4 (Screening Process)
- Site 5 (Feasibility Study/Pilot Study/Decision Process)
- Site 6 (Consensus Agreement for No Action)
- Site 7 (Screening Process)
- Site 8 (No Further Action Agreement)
- Site 9 (No Further Action Agreement)
- Site 10 (Remediation is complete. No further action unless major land use change occurs)
- SSA 11 - Aircraft parking apron area (No further investigation)
- SSA 12 - Drum and debris removal area (Screening Process)

Historical summaries for major investigative and project activities for each site are provided in Section 3.0. Projected schedules for the sites are presented in this section. These schedules are based on currently available information and are intended to be adjusted periodically during the decision making process or after new data become available. Appendix A presents master schedules showing milestones, up to and including “response complete” (RC) or "remedy in place" (RIP) (also known as "project end date" in the FFA). Primary documents and review cycles planned for each site and SSA are shown in the Appendix A schedules.

4.2 SCHEDULING ASSUMPTIONS

4.2.1 Document Preparation and Review Assumptions

Durations for work plan and draft report preparation activities are based on available site information, site complexity, and the anticipated amount of new data to be generated by future field investigations. The time required for document review varies based on the length and complexity of the document. For purposes of this SMP, documents have been categorized as either primary or secondary. Primary documents are the major deliverables associated with each phase of the remedial process as discussed in Section 2.0. Secondary documents fulfill portions of phased requirements and are assumed to be relatively straightforward in complexity and shorter in length than primary documents. Table 4-1 presents the primary documents for the various remedial process phases and their associated secondary documents. Table 4-2 presents the schedule for completion of review and response to comments for primary and secondary documents.

Time required to complete draft deliverables has been based on historical data for preparation and submittal of similar documents. Estimated schedules will be included in site-specific work plans. These schedules will be adjusted to account for impacts from new data or availability of funding.

Estimated document preparation times for preliminary draft documents are presented in Table 4-3. These durations are the time required to complete various preliminary draft deliverables after completion of field activities. The review and comment process for draft and final documents is discussed in Section 10 (Consultation) of the FFA.

4.2.2 Field Investigation and Sample Analysis Validation Assumptions

The schedule for field investigations includes mobilization/demobilization of all equipment and personnel, including procurement and oversight of subcontractors where required, and conduct all field activities. The schedule also allows for proper handling and disposal of investigation-derived wastes (IDW). The duration of these events is dependent on the number and types of samples collected, role of subcontractors (e.g., drilling and monitoring well installation, surveying, etc.), and accessibility of the site to complete the field activities.

It has been assumed for scheduling purposes that samples will be analyzed and reported using standard 28-day laboratory turnaround time. Data validation activities are scheduled for completion within 21 days of receipt of laboratory data.

4.3 SITE MANAGEMENT PLAN ASSUMPTIONS

The timely flow of work and report/milestone development durations outlined in this SMP assume that the necessary funding, when requested by the Navy in a timely manner, will be approved by Congress (see Section XXVII - FUNDING of the FFA). This SMP provides the document preparation durations for the NAS JRB Willow Grove sites. Schedules for RI/FS and RD/RA activities shown in Appendix A are compressed to the greatest extent possible by overlapping tasks and reducing redundancy in data collection efforts wherever possible. The degree of dependency between the various tasks and documents determines the extent of overlap. Key dependencies between tasks and related assumptions are:

- Remedial Investigation: Preparation of the preliminary draft RI report is assumed to start once all analytical data are received. Some RI tasks can begin before data are validated.

- Feasibility Study: Preparation of the preliminary draft FS may start as early as 2 months after the start of the RI report, provided there is general consensus between the Navy and the regulators and sufficient funding is available.

- Proposed Plan: Preparation of the preliminary draft Proposed Plan is assumed to start following receipt of EPA and state comments on the draft FS. Selection of the proposed remedial action(s) is dependent on regulatory approval of the recommended alternative(s) presented in the FS.

- Record of Decision: Preparation of the draft ROD is assumed to start after completion of the public comment period on the Proposed Plan. Community acceptance of the Proposed Plan must be considered in the selection of the interim or final remedial action(s).

- Remedial Design: The remedial alternative(s) must be selected prior to initiation of the remedial design; therefore, RD activities will commence following finalization of the ROD.

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TABLES

TABLE 1-1
NAS JRB WILLOW GROVE
INSTALLATION RESTORATION PROGRAM
SITE SUMMARY

SITE	NAME	OPERABLE UNIT (OU)	STATUS
1	Privet Road Compound	Soil - OU 1 Groundwater - OU 3	NFA ROD Signed September 2006 Final PRAP April 2008
2	Antenna Field landfill	Soil - OU 5 Groundwater- OU 9	Draft (OU 5 and OU 9) RI Report Pending
3	Ninth Street Landfill	Soil - OU 6 Groundwater- OU 10	Draft (OU 6 and OU 10) RI Report Pending
4	North End Landfill	----	Screening Process Consensus Document for No Action is on hold
5	Fire training Area	Soil - OU 4 Groundwater - OU 2	NFA ROD September 2007 Draft FS Comments
6	Abandoned Rifle Range No. 1	----	Consensus Agreement for No Action December 2007
7	Abandoned Rifle Range No. 2	----	Preparation of Consensus Document for No Action underway
8	Site 8 - Building 118 Abandoned Fuel Tank	---	NFA Agreement October 2006
9	Steam Plant Building 6 Tank Overfill	----	NFA Agreement October 2006
10	Navy Fuel Farm	----	NFA at this time
SSA 11	Aircraft Parking Apron	---	Eliminated From Consideration Februarary 2007
SSA 12	Drum and Debris Removal Area	---	Screening Process

TABLE 4-1

PRIMARY AND SECONDARY DOCUMENTS

NAS JRB WILLOW GROVE

Primary Documents	Secondary Documents
Site Screening Process (PA, SI) Work Plans	Health and Safety Plans
Site Screening Process Reports	Non-Time Critical Removal Action Plans
RI/FS and FFS Work Plans	Pilot/Treatability Study Work Plans
Remedial Investigation Reports	Pilot/Treatability Study Reports
FS and FFS Reports	N/A
Proposed Plans	Engineering Evaluation/Cost Analysis Reports
Record of Decision	N/A
Remedial Action Work Plans • Remedial Action Sampling Plan • Remedial Action Construction Quality Assurance Plan • Remedial Action Environmental Monitoring Plan • Remedial Design for Land Use Controls (RD for LUCs) (formerly referred to as Land Use Control Implementation Plan (LUCIP))	Preliminary Conceptual Design or Equivalent
Final Remedial Designs	Well Closure Methods and Procedures
Remedial Action Completion Reports	Prefinal Remedial Designs
Operation and Maintenance Plans	Periodic Review Assessment Reports
Site Management Plan	Removal Action Memoranda
Community Relations Plan	N/A
Long-Term Remedial Action Monitoring Plan	N/A

PA = Preliminary Assessment
SI = Site Inspection
RI/FS = Remedial Investigation/Feasibility Study
FFS = Focused Feasibility Study
N/A = Not Applicable

TABLE 4-2
DOCUMENT REVIEW AND REVISION SCHEDULE
NAS JRB WILLOW GROVE

Document	Review Duration	Response Duration [2]
Draft Primary or Secondary Document	60 Days [1]	60 Days
Draft Final Primary Document	N/A	N/A
Final Primary Document	N/A	N/A

N/A = Not Applicable
[1] Agency (PADEP, EPA) Review
[2] Incorporation of comments on Draft Report and submittal of Draft Final Report shall occur within 60 days after close of the comment period on the Draft Report

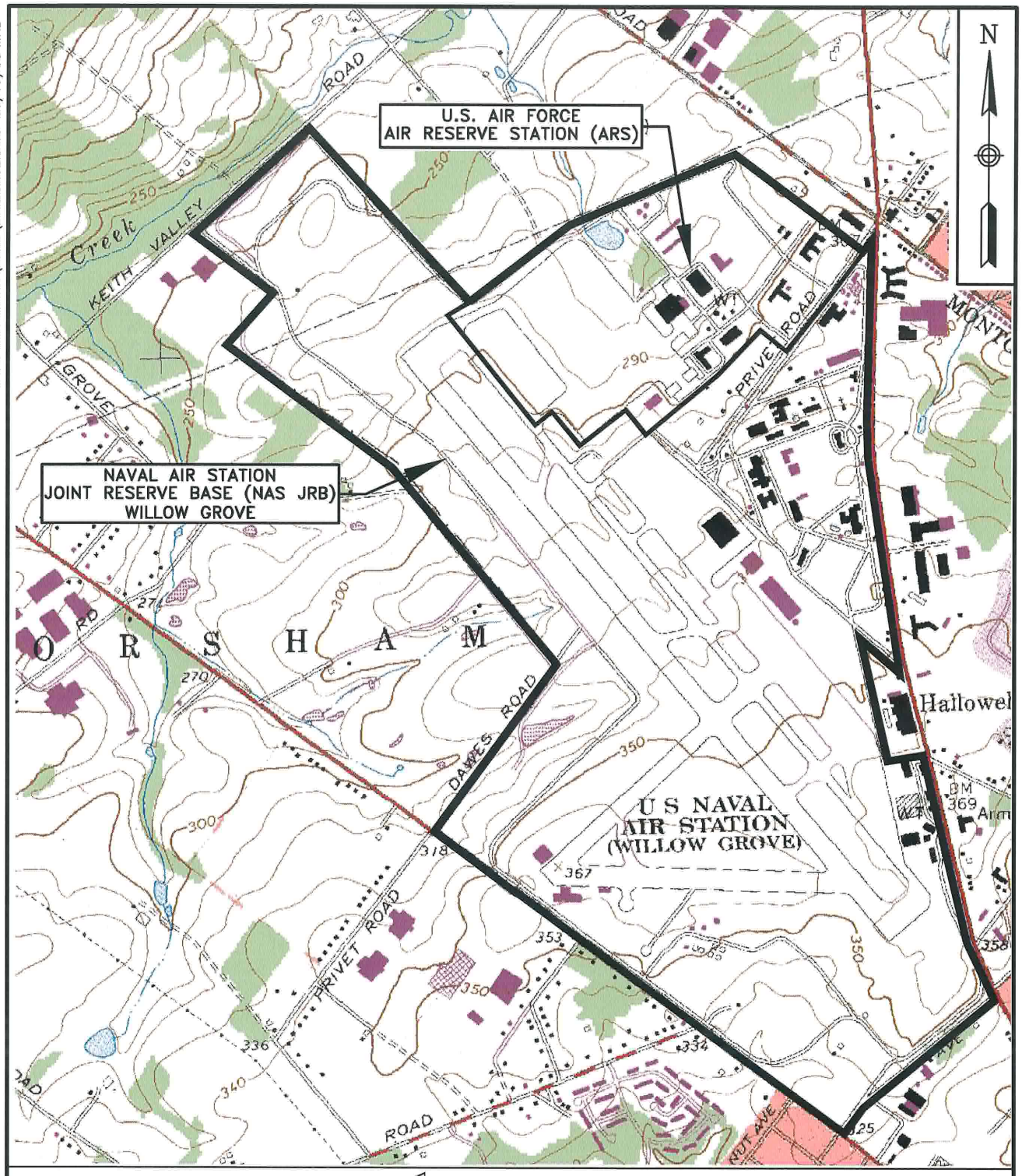
TABLE 4-3
DOCUMENT PREPARATION
DURATIONS
NAS JRB WILLOW GROVE

Document	Duration (Months) [1]
Site Inspection Report	2
Remedial Investigation Report	4
Feasibility Study	4
Proposed Plan	2
Record of Decision	2
Draft Remedial Design/Work Plan	5
Prefinal Remedial Design/Work Plan	2
Final Design/Work Plan	2
Engineering Evaluation/Cost Analysis, Focused Feasibility Study	1
Removal Action Memorandum	1
30% Removal Action Design	1
90% Removal Action Design	2
Final Removal Action Design	1
Treatability Study Work Plan	2
Treatability Study Report	1

[1] Durations represent estimated time required to complete preliminary draft documents after completion of field activities.

FIGURES

2192 WillowGrove\3202\2192CM02.DWG 06/16/08 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 TECHNUS, INC.

FACILITY LOCATION MAP
NAS JRB WILLOW GROVE
WILLOW GROVE, PENNSYLVANIA

SCALE	AS NOTED
FILE	2192CM02.DWG
REV	0
DATE	06/16/08
FIGURE NUMBER	FIGURE 1–1

FIGURE 2-1

RI/FS PROCESS

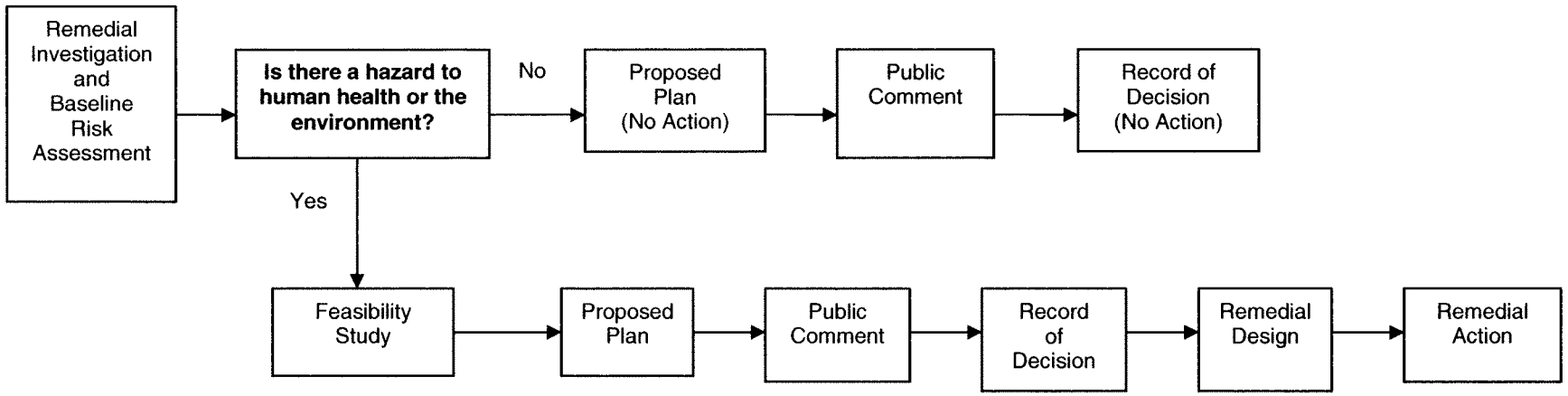


FIGURE 2-2

NON-TIME-CRITICAL REMOVAL ACTION PROCESS

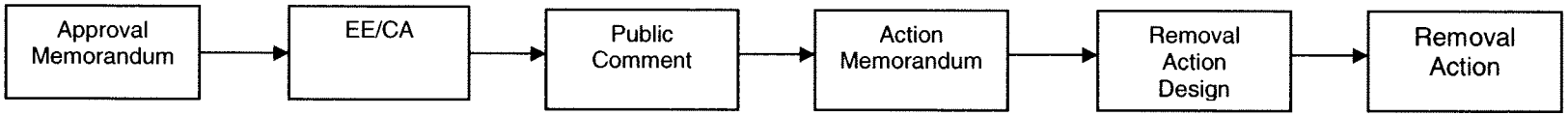
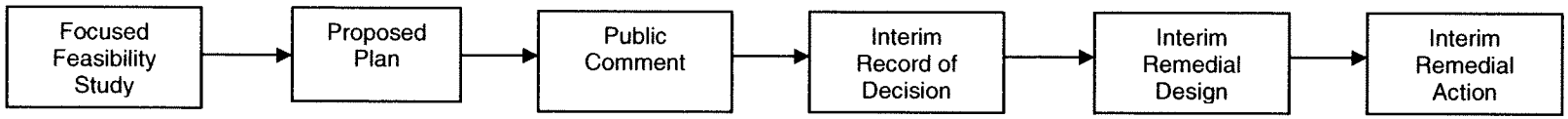


FIGURE 2-3

INTERIM REMEDIAL ACTION PROCESS



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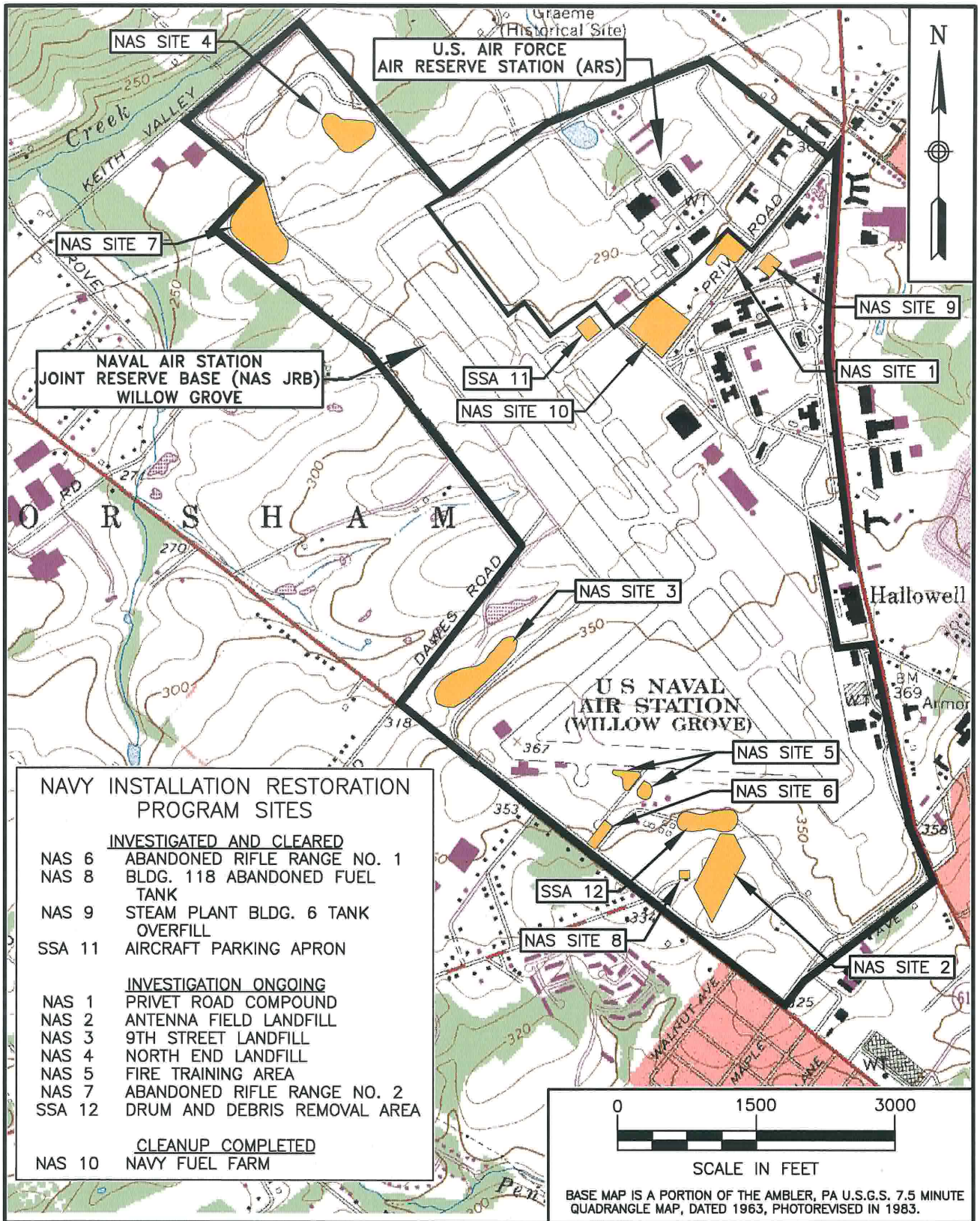

BASE MAP IS A PORTION OF THE AMBLER, PA U.S.G.S. 7.5 MINUTE QUADRANGLE MAP, DATED 1963, PHOTOREVISED IN 1983.

NAVY INSTALLATION RESTORATION PROGRAM SITES

INVESTIGATED AND CLEARED

NAS 6	ABANDONED RIFLE RANGE NO. 1
NAS 8	BLDG. 118 ABANDONED FUEL TANK
NAS 9	STEAM PLANT BLDG. 6 TANK OVERFILL
SSA 11	AIRCRAFT PARKING APRON

INVESTIGATION ONGOING

NAS 1	PRIVET ROAD COMPOUND
NAS 2	ANTENNA FIELD LANDFILL
NAS 3	9TH STREET LANDFILL
NAS 4	NORTH END LANDFILL
NAS 5	FIRE TRAINING AREA
NAS 7	ABANDONED RIFLE RANGE NO. 2
SSA 12	DRUM AND DEBRIS REMOVAL AREA

CLEANUP COMPLETED

NAS 10	NAVY FUEL FARM

TETRA TECH NUS, INC.

SITE LOCATION MAP
NAS JRB WILLOW GROVE
WILLOW GROVE, PENNSYLVANIA

SCALE	AS NOTED
FILE	112G00845CM01
REV	0
DATE	06/16/08
FIGURE NUMBER	FIGURE 3–1

APPENDIX A

MASTER SCHEDULES FOR ACTIVE REMEDIAL RESPONSE ACTIVITIES

(SEE LATEST SCHEDULES FROM QUARTERLY TEAM/PARTNERING MEETING)

DOCUMENT/MILESTONE SCHEDULE
SITE 1 - PRIVET ROAD COMPOUND
NAS JRB WILLOW GROVE, PENNSYLVANIA

	DOCUMENT/MILESTONE TITLE	DOCUMENT/MILESTONE DUE DATE	COMMENTS DUE DATE	GENERAL COMMENTS
SITE 1 Privet Road Compound Groundwater OU 3	Site 1 GW Draft RI Addendum 5	**09/21/06**	**03/13/07**	
	Site 1 GW Revised Draft RI Addendum 5	**07/16/07**	**12/12/07**	
	Site 1 GW Final RI Addendum 5	**01/31/08**	NA	
	Site 1 GW Draft FFS	**09/27/07**	**12/12/07**	
	Site 1 GW Final FFS	**02/01/08**	NA	
	Site 1 GW Draft PRAP	**01/25/08**	**03/26/08**	
	Site 1 GW Final PRAP for Public Comment	**04/17/08**	NA	
	Site 1 GW Draft ROD	**07/02/08**	**07/30/08**	
	Site 1 GW Draft Final ROD	**08/22/08**	NA	
	Site 1 GW Final ROD Signatures	09/30/08	NA	
	Site 1 GW Draft RD for LUCs	08/27/08	10/27/08	
	Site 1 GW Draft Final RD for LUCs	12/27/08	01/27/09	
	Site 1 GW Final RD for LUCs	01/30/09	NA	
	Project End Date (Remedy In Place)	01/30/09	NA	RIP

DATE	= Actual date document submitted.
NA	= Not applicable; comments are not typically required/received on the final version of a document.
Red Text	= Action overdue

DOCUMENT/MILESTONE SCHEDULE
SITE 2 - ANTENNA FIELD LANDFILL
NAS JRB WILLOW GROVE, PENNSYLVANIA

	DOCUMENT/MILESTONE TITLE	DOCUMENT/MILESTONE DUE DATE	COMMENTS DUE DATE	GENERAL COMMENTS
SITE 2 Antenna Field Landfill Groundwater OU 9 and Soil OU 5	Site 2 Draft RI Report	**08/29/08**	10/28/08	
	Site 2 Draft Final RI Report	11/28/08	NA	
	Site 2 Final RI Report	12/29/08	NA	
	Site 2 Draft NFA PRAP	12/12/08	01/12/09	
	Site 2 Final NFA PRAP for Public Comment	02/03/09	NA	3/21/09 is close of public comment period.
	Site 2 Draft NFA ROD	04/06/09	05/08/09	
	Site 2 Final NFA ROD	06/02/09	NA	
	Project End Date (Remedy In Place)	06/02/09	NA	RIP

DATE = Actual date document submitted.
NA = Not applicable; comments are not typically required/received on the final version of a document.
Red Text = Action overdue

DOCUMENT/MILESTONE SCHEDULE
SITE 3 - NINTH STREET LANDFILL
NAS JRB WILLOW GROVE, PENNSYLVANIA

	DOCUMENT/MILESTONE TITLE	DOCUMENT/MILESTONE DUE DATE	COMMENTS DUE DATE	GENERAL COMMENTS
SITE 3 Ninth Street Landfill Groundwater OU 10 and Soil OU 6	Site 3 Draft Test Pit and Soil Sampling Work Plan	**04/13/07**	NA	
	Site 3 Final Test Pit and Soil Sampling Work Plan	**04/27/07**	NA	
	Begin Test Pit and Soil Sampling Field Activities	**04/30/07**	NA	
	Draft Test Pit and Soil Sampling Report	**01/16/08**	**04/30/08**	Proposed RTC to EPA May 15, 2008
	Final Test Pit and Soil Sampling Report	09/19/08	NA	
	Draft IGWM QAPP	**12/07/07**	**02/01/08**	
	Final IGWM QAPP	**03/07/08**	NA	
	Site 3 IGWM Investigation Field Work	**03/10/08**	NA	
	Draft Report – Site 3 IGWM	**08/28/08**	NA	
	Draft Landfill Delineation SAP	**04/24/08**	**06/27/08**	
	Final Landfill Delineation SAP	09/05/08	NA	
	Site 3 Landfill Delineation Field Work	09/15/08	NA	
	Final Report – Site 3 Landfill Delineation Report	03/02/09	NA	
	Site 3 Draft RI Report	02/16/09	04/15/09	
	Site 3 Draft Final RI Report	05/15/09	NA	
	Site 3 Final RI Report	06/16/09	NA	
	Site 3 Draft FS	06/16/09	08/14/09	
	Site 3 Draft Final FS	08/31/09	NA	
	Site 3 Final FS	09/30/09	NA	
Soil OU 6	Site 3 Draft PRAP OU 6	09/01/09	10/01/09	
	Site 3 Final PRAP OU 6 for Public Comment	10/26/09	NA	12/10/09 is close of public comment period
	Site 3 Draft ROD 0U6	12/22/09	01/22/10	
	Site 3 Final ROD OU 6	02/22/10	NA	
	Site 3 Draft RD for LUCs OU 6	04/02/10	05/03/10	
	Site 3 Final RD for LUCs OU 6	06/02/10	NA	
	Project End Date OU 6 (Remedy In Place)	07/02/10	NA	RIP
Groundwater OU 10	Site 3 Draft PRAP OU 10	09/01/09	10/01/09	
	Site 3 Final PRAP OU 10 for Public Comment	10/26/09	NA	12/10/09 is close of public comment period
	Site 3 Draft ROD OU 10	12/22/09	01/22/10	
	Site 3 Final ROD OU 10	02/22/10	NA	
	Site 3 Draft RD for LUCs OU 10	04/02/10	05/03/10	
	Site 3 Final RD for LUCs OU10	06/02/10	NA	
	Project End Date OU 10 (Remedy In Place)	07/02/10	NA	RIP
	Peform EM Geophysical Survey	**04/07/08**		
	Submit EM Geophysical Survey Report	**07/11/08**		

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NA	= Not applicable; comments are not typically required/received on the final version of a document.
Red Text	= Action overdue

DOCUMENT/MILESTONE SCHEDULE
SITE 4 - NORTH END LANDFILL
NAS JRB WILLOW GROVE, PENNSYLVANIA

	DOCUMENT/MILESTONE TITLE	DOCUMENT/MILESTONE DUE DATE	COMMENTS DUE DATE	GENERAL COMMENTS
SITE 4 North End Landfill	NFA Concurrence PADEP	**10/31/05**	NA	
	Navy to Present Summary and Status	**12/19/06**	NA	
	BTAG Review	**03/28/07**	NA	
	Site Screening Field Work	**03/17/08**		
	Report of Site Screening	**04/01/08**		
	Site 4 Tarry Waste Sampling	09/08/08		
	Report Tarry Waste Sampling	11/17/08	NA	
	Navy to prepare draft record of consensus agreement for regulatory agency signatures	12/01/08	NA	
	Final Consensus Agreement	01/14/09		

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TBD	= To Be Determined
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DOCUMENT/MILESTONE SCHEDULE
SITE 5 - FIRE TRAINING AREA
NAS JRB WILLOW GROVE, PENNSYLVANIA

	DOCUMENT/MILESTONE TITLE	DOCUMENT/MILESTONE DUE DATE	COMMENTS DUE DATE	GENERAL COMMENTS
Groundwater OU 2	Site 5 Draft FS	**09/01/04**	NA	
	Site 5 Draft Final FS	**07/24/08**	09/19/08	
	Site 5 Final FS	10/15/08	NA	
	Submit Draft Pilot Study QAPP	**12/11/07**	**06/27/08**	
	Submit Final Pilot Study QAPP	09/05/08	NA	
	Perform Field Activities (Investigation and Proof of Technology)	**5/26/08** to 3/10/10	NA	
	Interim Letter Report of Investigation Findings	TBD		
	Commence Treatment Operations	10/27/08		
	Complete Treatment Operations	10/10/09		
	First Post-Treatment Groundwater Monitoring	04/10/10		
	Internal Draft (Navy only) Report of Results	07/10/10		
	Draft (for Regulatory Agencies) Report of Results	08/10/10	10/10/10	
	Final Report of Results	11/10/10	NA	
	Site 5 Draft PRAP OU 2	06/15/09	07/15/09	
	Site 5 Final PRAP OU 2 for Public Comment	07/23/09	NA	9/06/09 is close of public comment period
	Public Meeting	08/08/09	NA	Plan to combine with RAB Meeting
	Site 5 Draft ROD OU 2	10/09/09	12/10/09	
	Site 5 Final ROD OU 2	01/07/10	NA	
	Site 5 Draft RD and Work Plan OU 2	TBD		Will be prepared as necessary pending pilot study results.
	Site 5 PreFinal RD and Work Plan OU 2	TBD		
	Site 5 Final RD and Work Plan OU 2	TBD		
	Construction Start	TBD		
	Construction complete (Remedy In Place)	TBD		RIP
	Project End Date OU 2	TBD		
Soil OU 4	Site 5 Soil Final RI Addendum 6	**07/02/07**	NA	
	Site 5 Soil Draft NFA PRAP	**04/23/07**	**05/30/07**	
	Site 5 Soil Final NFA PRAP for Public Comment	**06/15/07**	NA	
	Public Meeting	**07/11/07**	NA	
	Site 5 Soil Draft NFA ROD	**07/27/07**	NA	
	Site 5 Soil Draft Final NFA ROD	**08/16/07**	NA	
	Site 5 Soil Final NFA ROD	**09/22/07**	NA	
	Project End Date OU 4 (Remedy In Place)	**09/22/07**	NA	RIP

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DOCUMENT/MILESTONE SCHEDULE
SITE 7 - ABANDONED RIFLE RANGE No. 2
NAS JRB WILLOW GROVE, PENNSYLVANIA

	DOCUMENT/MILESTONE TITLE	DOCUMENT/MILESTONE DUE DATE	COMMENTS DUE DATE	GENERAL COMMENTS
SITE 7 Abandoned Rifle Range Number 2	NFA Concurrence PADEP	**10/31/05**	NA	
	Navy to Present Summary and Status	**12/19/06**	NA	
	BTAG Review	**03/28/07**	NA	
	Navy to prepare final record of consensus agreement for regulatory agency signatures	**05/20/08**	NA	
	Final Concurrence Letter	**08/20/08**		

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DOCUMENT/MILESTONE SCHEDULE
SITE MANAGEMENT PLAN
NAS JRB WILLOW GROVE, PENNSYLVANIA

	DOCUMENT/MILESTONE TITLE	DOCUMENT/MILESTONE DUE DATE	COMMENTS DUE DATE	GENERAL COMMENTS
SMP - 'FY 2008	INTERNAL DRAFT SMP (FY 2008)	**06/08/08**	---	
	DRAFT UPDATE TO SMP (FY 2008)	**06/17/08**	**08/20/08**	
	FINAL UPDATE TO SMP (FY 2008)	09/05/08	NA	

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