Health and Safety Plan
for
Phase II Remedial Investigation

NAS Willow Grove, Pennsylvania

Northern Division
Naval Facilities Engineering Command
Contract No. N62472-90-D-1298
Contract Task Order 227

April 1996

BROWN & ROOT ENVIRONMENTAL

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HEALTH AND SAFETY PLAN
PHASE II REMEDIAL INVESTIGATION
NAVAL AIR STATION JOINT RESERVE BASE
WILLOW GROVE, PENNSYLVANIA

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

Submitted to:
Northern Division
Environmental Branch, Code 14
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TABLE OF CONTENTS

TABLE OF CONTENTS (continued)

APPENDICES

TABLES

FIGURES

EXHIBITS

1.0 INTRODUCTION AND PERSONNEL ASSIGNMENTS

1.1 INTRODUCTION

This health and safety plan (HASP) is intended to provide safety procedures for Brown & Root Environmental (B & R Environmental) employees and B & R Environmental subcontractor personnel engaged in Phase II remedial investigation activities at the Naval Air Station Joint Reserve Base (NASJRB) in Willow Grove, Pennsylvania. This plan was developed using available information from previous investigations, including the final remedial investigation (RI) Phase I report dated February 1993, regarding known/suspected chemical contaminants and physical hazards that may be encountered during planned activities. If additional information becomes available prior to or throughout the course of field activities, this document will be modified accordingly. Modifications will be reviewed and approved by the B & R Environmental Comprehensive Long-Term Environmental Action - Navy (CLEAN) health and safety manager (HSM), Matthew M. Soltis, CSP, CIH, and will be immediately communicated to appropriate personnel. The HASP is intended to be in compliance with 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response."

1.2 SITE INFORMATION AND PERSONNEL ASSIGNMENTS

This section establishes the authority and responsibility for site safety and health and lists key site personnel (Figure 1-1). Any changes in key personnel must receive prior approval by the B&R Environmental Project Manager and the B&R Environmental Health and Safety Manager.

1.2.1 Project Manager

- Verify that health and safety provision as defined in this HASP are implemented at the project site.
- Advise the FOL and HSO of their safety, health and environmental responsibilities and hold them accountable for their assigned site activities.
- Approval all changes of key site personnel.
- Design and manage site operations to minimize environmental, safety, and human health impacts and provide work places free of recognized safety hazards.
- Monitor and evaluate site performance in safety, health, and environmental protection.
- Monitor and evaluate site performance in safety, health, and environmental protection.
- Consult with the B&R Environmental Health and Safety Manager as required to resolve health and safety issues arising at the project site.

1.2.2 Health and Safety Manager

- Designate professional staff to support site safety, health, and environmental protection activities.
- Verify that personnel receive the necessary training for conducting and effective site health and safety program.
- Approve all changes of key site health and safety personnel.
- Verify through field audits that site activities comply with applicable laws and regulations governing safety, health , and environmental protection.
- Provide consultation to the Project Manager and HSO for the resolution of site health and safety issues.

1.2.3 Field Operations Leader

- Overall responsibility for verifying that RIs are conducted in accordance with the provisions contained in this HASP
- Advise Project Manager on health and safety issues which affect project activities as the site..
- Verifies that personal protective equipment (PPE), monitoring equipment, sanitation facilities, etc., are adequate to support an effective health and safety program at the site.
- Inform RI personnel of potential heath and safety hazards associated with their assignment tasks and that safe work practices and procedures are instituted, including the proper wearing of PPE.
- Enforce heath and safety provisions at the project site as applicable.
- Coordinate site security activities.
- Verify that all work performed onsite is conducted in accordance with the HASP.
- Direct site emergency response activities and responsible for implementing the HASP Emergency Response Plan (ERP).

1.2.4 Site and Health and Safety Officer

The primary site duty and responsibility is to implement and direct the health and safety program at the site in accordance with the provisions contained in this HASP. These program include:

- Decontamination Plan
- Site Control Plan
- PPE Program
- Monitoring Program
- Sanitation Program
- Spill Containment Program

- Verify that all site personnel have successfully completed the OSHA 40-hour Hazardous Site Worker Course and, as applicable, the OSHA eight-hour Site Worker Refresher Course.

- Verify that site personnel assigned to supervisory positions have successfully completed the OSHA eight-hour Hazardous Site Supervisors Course.

- Verify that all site personnel are medically certified to perform work at hazardous waste sites and that work restrictions are noted for each individual as applicable

- Verify that RIs are conducted in a safe manner by conducting daily inspections of all site activities

- Authority to stop any operation that threatens the health or safety of site personnel or the surrounding populace or has the potential for a significant adverse impact to the environment.

- Present onsite during all site work activities.

- Maintain a field logbook summarizing daily health and safety activities. The logbook shall include, as minimum, the following information: instrument field calibration data, environmental monitoring results, decontamination procedures, weather condition, names of personnel present at the site (including visitors), PPE utilized at site activities and any unusual events. Logbooks shall be turned over to the FOL at the conclusion of project field activities for inclusion in the project files.

Site Name:	NASJRB, Willow Grove	Client Contact:	Jim Edmond
Address:	Willow Grove, Pennsylvania	Phone Number:	(215) 443-6939

Effective Date: March 1996(Revised February 1997)
Purpose of Site Visit: Phase II Remedial Investigation
Proposed Dates of Work: March 1996 through June 1996 (Revised March 1997 through June 1998)

Project Team:

B & R Environmental Personnel:	Discipline/Tasks Assigned:
Russell Turner	Project Manager
Vincent Shickora	Field Operations Leader (FOL)/HSO (as necessary)
Vincent Shickora	Site Health and Safety Officer (HSO)/Geologist
Kevin Kilmartin	Geologist

Non-B & R Environmental
Personnel/Affiliation:

Plan Preparation:

Prepared by: Michelle F. Gillie, CIH, Philadelphia District HSM

Reviewed and approved by: Matthew M. Soltis, CSP, CIH, B & R Environmental CLEAN HSM

Reviewed:
B & R Environmental Project Manager: Russell Turner

Follow-Up Report:
Responsible Person: Vincent Shickora

(Must fill out Follow-Up Report)

2.0 DESCRIPTION AND BACKGROUND OF NASJRB WILLOW GROVE SITES

Section 2.0 describes the history and past investigation activities for each area addressed in this HASP. Figure 2-1 shows the location of NASJRB Willow Grove in Horsham Township, Montgomery County in Southeastern Pennsylvania. Figure 2-2 shows the locations of the five RI sites at NASJRB Willow Grove. More detailed descriptions of each site and past investigation work are presented in the CLEAN Program Health and Safety Plan for NASJRB Willow Grove (B&R Environmental, 1991). The Phase II RI will be focused on five sites at NASJRB Willow Grove (NASJRB Sites 1,2, 3, 5, and 11). These are described below.

2.1 NASJRB SITE 1 - PRIVET ROAD COMPOUND

2.1.1 Description and History

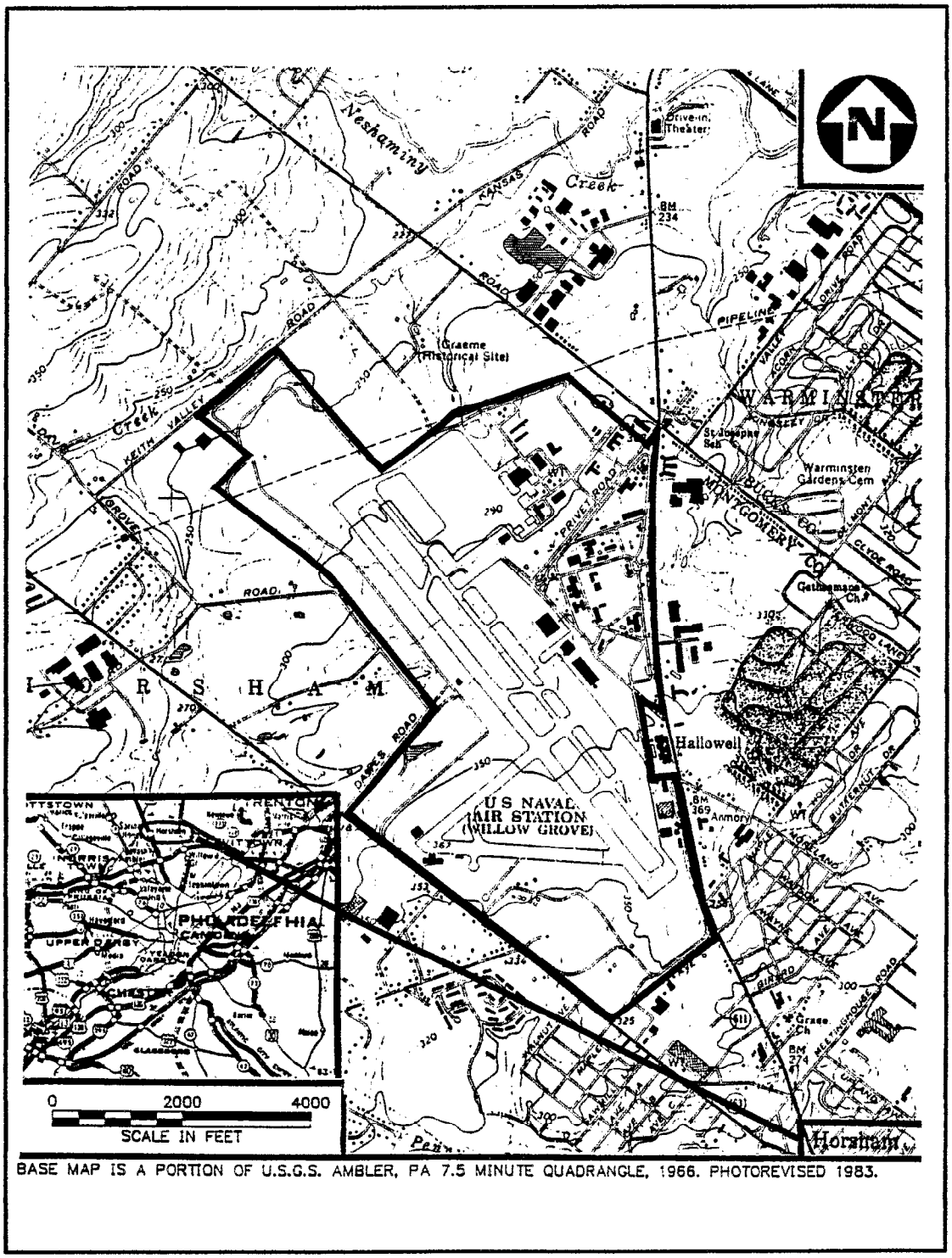
The Privet Road Compound consists of an open enclosure located north of and immediately across Privet Road from the Steam Plant, Building No. 6. The site is about 1 acre in size. The compound was constructed to serve as a transfer station for wastes following closure of the Ninth Street Landfill. However, between 1967 (when it was first used) and 1975, appreciable quantities of wastes were burned and buried at the site. During this time, the compound was essentially an open disposal area.

In general, wastes disposed at the compound were those not accepted by the regular trash pickup and off-base disposal service that was instituted in 1967. Materials reported to have been disposed at the compound are summarized below:

Paint wastes *	Sewage sludge *
Paint stripper *	Industrial pretreatment plant sludge *
Xylene, toluene*	Petroleum, oils, and lubricants (POLs) *
Isopropyl and methyl alcohol, acetone, MEK *	Oil and grease emulsion *
Freon *	Lead *
Trichloroethane (TCE)*	Silver *
Polychlorinated byphenyls (PCBs)	Mercury *
Battery acid (sulfuric)	Chromium *
Asbestos	General refuse *

* Materials disposed at both Sites 1 and 2.

The site is immediately adjacent to an open storm drainage swale. During the time that the site was an open disposal area (1967 to 1975), transport of contaminants due to stormwater runoff may have occurred. The storm drainage swale outfalls to the Air Reserve Facility Detention basin.



BASE MAP IS A PORTION OF U.S.G.S. AMBLER, PA 7.5 MINUTE QUADRANGLE, 1966. PHOTOREVISED 1983.

FIGURE 2-1

LOCATION MAP
NASJRB WILOW GROVE
HORSHAM TOWNSHIP, PA

Brown & Root Environmental

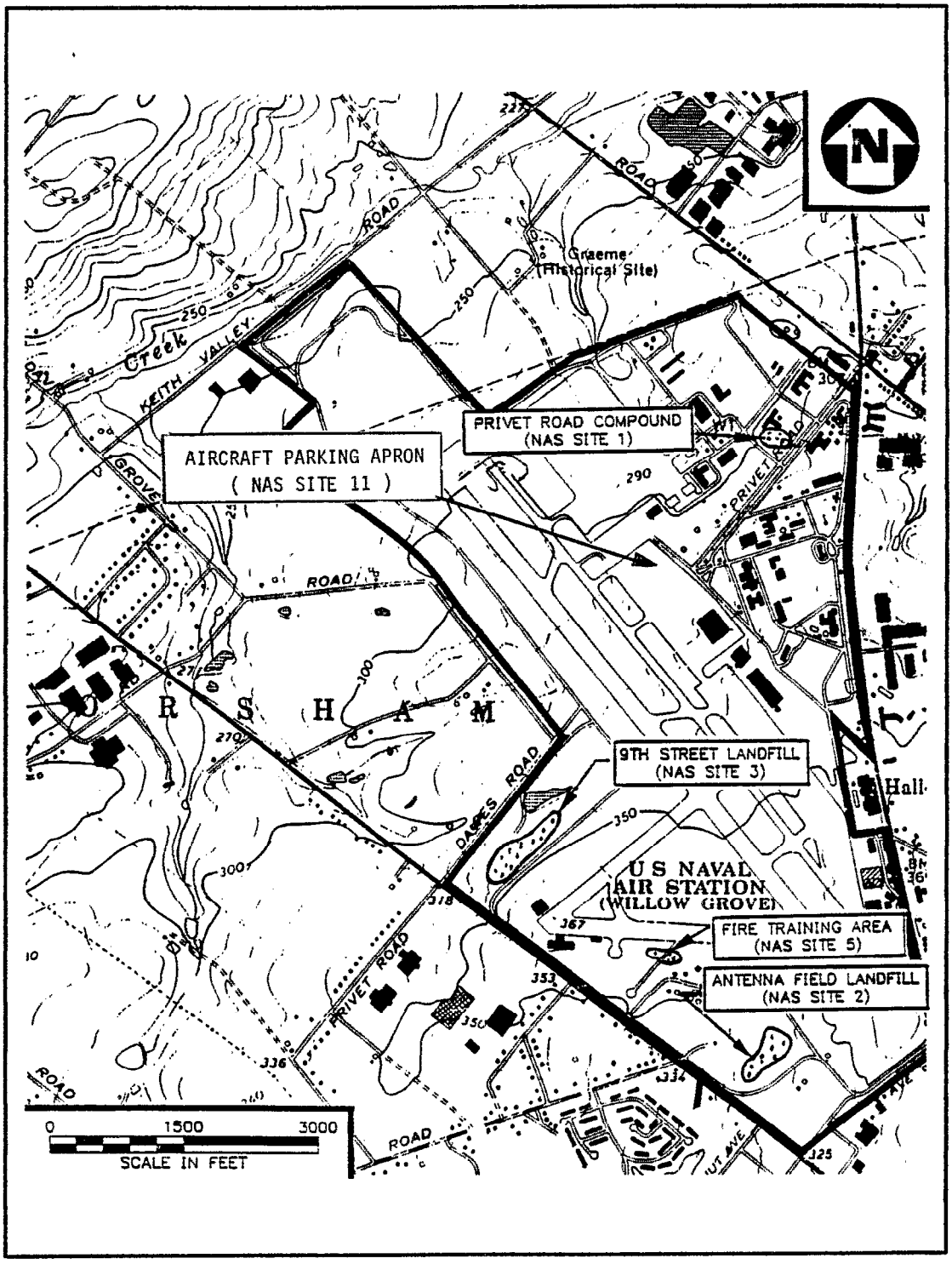


FIGURE 2-2

BASE PLAN – RI SITE AREAS
NASJRB WILOW GROVE
HORSHAM TOWNSHIP, PA

Brown & Root Environmental

2.1.2 Previous Site Investigation History

Previous site investigations (SI) at the Privet Road Compound included sampling of groundwater, subsurface soil, and drainage ditch sediment. Four 4-inch-diameter monitoring wells were installed at the site; groundwater samples were collected from these wells in June, September, and December 1989 and analyzed for volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides/PCBs, total and dissolved metals, total organic carbon (TOC), total petroleum hydrocarbons (TPHs), and cyanide. Two test borings were drilled at the site. From each boring, a discrete sample (VOC) and a composite sample (SVOC, pesticides/PCBs, metals, TOC, TPH, and cyanide) were submitted for laboratory analysis. Three sediment samples were collected from ditches bordering the northern and eastern boundaries of the site. Each sediment sample was analyzed for the TCL parameters, TOC, and TPH. Soil and sediment samples were collected in February 1989. Results of these analyses are summarized below:

Medium	Detected Substances of Concern	Maximum Detected Concentration
Groundwater	Trichloroethene (TCE) Tetrachloroethane (PCE) PCB Aroclor 1260 Dieldrin	8 ug/L 110 ug/L 9.5 ug/L 0.1 ug/L
Sediment	PCB Dieldrin Chromium Cyanide	500 ug/L 55 ug/L 415 ug/L 0.14 ug/L
Soil	PCB Aroclor 1260 DDT Chromium Arsenic	7,500 ug/L 31 ug/L 626 mg/kg 22 mg/kg

Other concerns included vinyl chloride, 1,1- or 1,2-dichloroethene, and lead.

An extended site investigation and Phase I RI were conducted in 1991 to characterize the source areas at Site 1, to evaluate the nature and extent of the groundwater plume, and to assess the potential for contaminants to migrate in the drainage swales bordering the site. The significant results from these studies are summarized below:

- 72 soil samples from 16 soil borings

  - VOCs were found infrequently and at low concentrations, including multiple detections of acetone (maximum concentration of 21 ug/kg), one detection of PCE (2 ug/kg), and one detection of carbon disulfide (1J ug/kg). The Privet Road Compound soils are not a significant source of volatile organic contamination.

- Aroclor 1260 was detected in 13 samples at concentrations ranging from 220 ug/kg to 230,000 ug/kg (the only detection above 50 ppm). Most of the detections occurred in samples taken from a subsurface depth of 4 feet or less.

- Inorganic compounds typically were found at concentrations similar to background levels. Cobalt and selenium are exceptions. Cobalt was found in all samples (maximum concentration of 30.2 mg/kg), and selenium was found in one sample (1.2 mg/kg).

• Five surface water samples

- VOCs were found infrequently, including acetone (two detections) at a maximum concentration of 1,300 ug/L and 4-methyl-2-pentanone (two detections) at a maximum concentration of 220 ug/L. The highest concentrations were detected in an upstream sample (SWS-5).

- Inorganic compounds were found at low levels, including lead (maximum concentration of 5.2 ug/L), manganese (maximum concentration of 41 ug/L), chromium (maximum concentration of 10 ug/L), and zinc (maximum concentration of 194 ug/L).

• Five sediment samples

- Samples were basically free of volatile organic and pesticide contamination. One sample (SS-1, an upstream sample) contained dieldrin at 210 ug/kg.

- The distributions of the inorganic compounds do not show any clear patterns. The maximum concentrations of cadmium, cobalt, copper, manganese, and nickel were found downstream of the site (SS-2), and the maximum concentrations of lead, arsenic, vanadium, and zinc were found upstream of the site (SS-1 and SS-6).

• Groundwater - hydrogeology and pumping test

- Two aquifers exist at Site 1: a shallow unconfined aquifer and a deeper confined aquifer. There is limited vertical communication between the aquifers. Groundwater flow direction in the unconfined aquifer generally follows surface

washrack area). Groundwater flow in the confined aquifer is strongly affected by the pumping of the two nearby Navy supply wells (NW-1 and NW-2). When NW-1 and NW-2 are in operation, the Air Force activity appears to be upgradient of the site for the confined aquifer.

- Groundwater - sampling of monitoring and supply wells

  - VOCs were frequently detected. Where clusters exist, the shallow wells are generally less contaminated than the deeper wells. TCE was detected at concentrations ranging from 1 ug/L to 120 ug/L. The highest concentration was from an intermediate well (PRW-7B) that is upgradient of the site under normal pumping conditions. Navy supply well NW-1 contained TCE at 13 ug/L and PCE at 53 ug/L. Navy supply well NW-2 contained TCE at 6 ug/L and PCE at 4 ug/L. No PCE was detected from the monitoring wells during the Phase I RI. During the SI, PCE was detected at a maximum concentration of 120 ug/L from well PRW-2.

  - Several metals were detected in unfiltered groundwater samples at notable concentrations, including antimony at 45 ug/L (well PRW-7B), vanadium at 43 ug/L (well PRW-4) and 24 ug/L (well PRW-5), and lead at a maximum level of 39.8 ug/L (well PRW-5B). Results from filtered analyses are lower for all metals.

2.2 NASJRB SITE 2 - ANTENNA FIELD LANDFILL

2.2.1 Description and History

The Antenna Field Landfill is located southwest of Runway 10/28 and about 100 yards south of the Marine Reserve Compound. The Antenna Field Landfill was the exclusive disposal area for solid waste generated by NASJRB Willow Grove activities between 1948 and 1960. The landfill consisted of trenches in which wastes were first burned and then buried. The boundaries of the landfill have been obscured by more recent regarding activities. However, a steep berm that roughly parallels the northern side of a wooded swale has been identified as the southern edge of the fill. A preliminary estimate of the boundaries of the site indicated that the landfill is about 9 acres in size. Hazardous materials that were suspected of having entered the site are similar to those disposed at Site 1, except for PCBs, battery acid and asbestos. The northern extent of the landfill is unknown.

2.2.2 Previous Site Investigation History

Three 4-inch-diameter monitoring wells were installed at the Antenna Field Landfill to assess groundwater quality at the site. Well ALW-2 is the designated upgradient well. After development, all wells were sampled for VOC, SVOC, total and dissolved metals, TOC, TPH, pesticides/PCBs, and cyanide in June, September, and December 1989. During each sampling event, four surface water samples were collected in conjunction with groundwater samples. Sample analytes were the same as for groundwater, with the exception of dissolved metals.

The Antenna Field Landfill eastern boundaries are delineated by a steep berm. An 8-foot-deep ditch bissects the landfill. Discharge from the ditch is to the south into an unnamed stream that discharges into Pennypack Creek 1/2 mile beyond the NASJRB boundary. Due to the clay cover atop the landfill, standing water after a precipitation event may exist on top of the landfill for an extended period of time.

Results of the SI investigations are summarized as follows:

Medium	Detected Substances of Concern	Maximum Detected Concentration
Groundwater	Dissolved Lead Cyanide	39.8 mg/L* 20 ug/L
Surface water	Dieldrin	0.3 ug/L
Sediment	PAHs Dieldrin Heptachlor epoxide Cyanide	536 mg/kg 510 ug/L 63 ug/L 0.93 mg/kg

*Value is suspect because of high turbidity of the sample.

An extended site inspection and Phase I RI were conducted in 1991 to characterize the source areas at Site 2 and to assess the potential for impact to the surface water ecosystem. The significant results from these studies are summarized below:

- 13 surface water samples
  - No VOCs, PCB, or pesticide compounds were detected. Two semivolatile organics were found at location SWS-4 [bis(2-ethylhexyl) phthalate at 10J ug/l and di-n-butyl phthalate at 30J ug/l].
  - Maximum concentrations of many inorganics (aluminum, iron, lead, potassium, and zinc) occurred either upstream or far downstream of the site. Other metals (e.g., barium and manganese) were found at similar concentrations from all

- 13 sediment samples

  - Contamination appears to be limited in extent and primarily found in the samples collected from the center of the landfill area.

  - PAHs were the most frequently detected compounds. PAH distribution appears fairly consistent, with the exception of one "hot spot" at SS-4 (162,800 ug/kg and 87,320 ug/kg from duplicate samples).

  - Only one volatile chemical (PCE) was detected, at a concentration of 13 ug/kg at SS-13 (upstream of the site).

  - Dieldrin was found in six of 13 samples with a maximum concentration of 490 ug/kg. The distribution of pesticides at the site, the low concentrations at which they occur, and their concentrations relative to background levels are not indicative of waste disposal activity but rather of past pesticide application at the base.

  - Dinitrotoluenes and N-nitrosodiphenylamine were found in two samples (SS-2 and SS-4) that were collected from the southern boundary of the landfill in the ephemeral drainage.

  - Metals are potential contaminants of concern. Many metals were found at their highest concentrations from the duplicate samples taken at location SS-4, including barium, beryllium, cadmium, chromium, cobalt, copper, lead, nickel, selenium, and zinc. Mercury (0.12 mg/kg) and thallium (0.45J mg/kg) each had one positive detection (both at location SS-6). Arsenic was found at only one location (6.1J mg/kg at SS-9) at a concentration higher than the background mean concentration of 5.0 mg/kg.

- Three Groundwater samples

  - Three shallow monitoring wells were sampled.

  - No organic chemicals were detected in any of the wells.

  - Inorganic concentrations in unfiltered samples did not exceed drinking water standards.

2.3 NASJRB SITE 3 - 9TH STREET LANDFILL

2.3.1 Description and History

The Ninth Street landfill occupies about 9 acres against the western boundary of NASJRB Willow Grove and immediately north of Ninth Street. This landfill was opened to replace the Antenna Field Landfill, which was phased out in 1960. The method of disposal used at the Antenna Field, which involved burning the refuse and burying the residue in trenches, was also used at the Ninth Street Landfill. The types of materials disposed at this site are also assumed to be similar to those that were previously sent to the Antenna Field Landfill. The rate of waste generation was, however, greater over this period. A summary of wastes reportedly disposed at this site would be similar to the list presented in Section 2.1.1, with additional items including coal ash, metal scrap (empty drums) and tires.

In addition to its use for the landfilling activities of the Public Works Department, the site was used as an open disposal ground by various operations at NASJRB Willow Grove, as well as by reservists who disposed of household rubbish there. Material that had been disposed at random was periodically buried by the Public Works Department. Most of the waste was reported to be buried by the Public Works Department in the southwest and east-central position of the site; however, the entire area was suspected to have been used for waste disposal.

In 1967, the landfill was officially closed. One of the primary landfill areas (east-central) was covered and a salvage yard was established in the same location. In addition to empty drums and discarded equipment, PCB-containing transformers were stored and serviced at the salvage yard.

2.3.2 Previous Site Investigation History

A total of seven monitoring wells were installed at the Ninth Street Landfill. Four of the wells are shallow, 4-inch wells screened to intercept the water table. Three 2-inch wells were installed as deeper, well cluster companions. Groundwater samples were analyzed for VOC, SVOC, pesticides/PCBs, total and dissolved metals, TOC, TPH, and cyanide. Four surface water and sediment samples were taken at the Ninth Street Landfill site during each groundwater sampling event. Surface water and sediment samples were analyzed as above, with the exception of dissolved metals.

Six soil test borings were completed in the Ninth Street Landfill to characterize subsurface materials. A composite sample from each boring was submitted for analysis for SVOC, pesticides/PCBs, metals, TOC, TPH and cyanide.

Six surficial soil samples were collected from the baseball field at the landfill picnic area and analyzed as above.

Results of the SI investigations are summarized as follows:

Six surficial soil samples were collected from the baseball field at the landfill picnic area and analyzed as above.

Results of the SI investigations are summarized as follows:

Medium	Detected Substances of Concern	Maximum Detected Concentration
Groundwater	PCE TCE 1,1,1-trichloroethane Dieldrin Cyanide	75 ug/L 120 ug/L 2,800 ug/L 0.02 ug/L 0.02 ug/L
Surface water	Dieldrin	Below CRDL
Sediment	PAHs Dieldrin	194.6 mg/kg 300 ug/kg
Soil	Toluene 1,1,1-Trichloroethane PAHs (Surface soils) Dieldrin (SS) PCB Aroclor 1260 Cyanide (surface and subsurface soils)	180 ug/kg 22 ug/kg 16.6 mg/kg 1,300 ug/kg 61 ug/kg 0.35 mg/kg

SS- surface soils
SB- subsurface soils

An extended site inspection and Phase I RI were conducted in 1991 to characterize the volatile groundwater plume, to investigate the volatile, pesticide, and cyanide content of landfill soil, and to assess the extent of migration of polycyclic aromatic hydrocarbons (PAHs) and dieldrin in stream/lake sediments. The significant results from these studies are summarized below:

- 32 soil samples obtained from 16 soil borings and seven soil samples obtained from four test pits

  - VOCs were found infrequently at low concentrations [TCE at 2J ug/kg, benzene at 3 ug/kg, toluene at 2 ug/kg, and chlorobenzene at 2 ug/kg, all from SB-2 (3 feet)]. The landfill does not appear to be the source of the PCE that is contaminating the groundwater in this area.

  - PAHs were the most prevalent organic compounds. Their occurrence was widespread and the concentrations varied widely.

  - Dieldrin occurred in 27 of 40 samples at concentrations as high as 580 ug/kg. The upper confidence limit (UCL) on the mean of these samples is below the background UCL.

- PCBs were limited to two samples collected from Test Pit - 2 at depths of less than 10 feet. PCB concentrations were found below the Pennsylvania residential clean-up standard guideline.

- Four metals (antimony, arsenic, copper, and thallium) were found at average concentrations (using the confidence limits on the means) that exceed the background levels. The thallium result was from SB-7 (3 feet); the others were from either Test Pit - 2 or Test Pit - 4.

• Four surface water samples

- No organic chemicals were detected in any samples with the exception of one detection of bis(2-ethylhexyl) phthalate at 1J ug/L from SW-1.

- Metals concentrations overall are low. No clear patterns emerge from their mapped distribution.

• Six sediment samples

- No VOCs were detected in any samples, with the exception of one detection of acetone at 430 ug/kg and one detection of ethylbenzene at 6J ug/kg from SS-7.

- Several samples contained PAHs, with the highest concentrations (up to 116,440 ug/kg) reported from the pond sediments (SS-6 and SS-7). PAH levels upstream and downstream of the pond were much lower.

- Dieldrin was detected in three samples, with a maximum concentration of 1,400 ug/kg from SS-5, the marshy area upstream of the site. Aldrin was detected in two samples, with a maximum concentration of 120 ug/kg, again from location SS-5. PCBs were detected in several samples during the SI (maximum of 61 ug/kg) but were not detected during the RI. The distribution of PCBs and pesticides does not appear to be site related.

- The maximum concentrations of several metals were detected from location SS-7 (pond sample), including arsenic (5.4 mg/kg), cadmium (10.3 mg/kg), chromium (55.7 mg/kg), cobalt (13.1 mg/kg), copper (38.5 mg/kg), lead (279 mg/kg), nickel (30.2 mg/kg), vanadium (61.2 mg/kg), and zinc (208 mg/kg).

- Groundwater - hydrogeology

  - Two aquifers exist at the site, a shallow unconfined aquifer and a deeper confined aquifer. There is a strong upward vertical gradient between the two aquifers.

- Groundwater - sampling of monitoring wells

  - PCE was detected in four of five shallow monitoring wells at a maximum concentration of 61 ug/L. Two of the detections were from monitoring wells located upgradient of the site (including 15 ug/L from W-1). In the most upgradient shallow monitoring well (W-5), PCE was detected at 7 ug/L.

  - PCE was also detected in upgradient intermediate well W-1B at 29 ug/L; hydraulic head data indicate this well is completed in the unconfined aquifer. PCE was detected in downgradient intermediate wells W-4B (confined or transitional) at 56 ug/l and W-3B (confined) at 35 ug/L.

  - PCE was detected in downgradient deep well W-3C at 5 ug/l but not in downgradient deep well W-4C.

  - Total metals concentrations are higher than dissolved metals concentrations. No clear pattern emerges from the areal distribution of metals in groundwater. For some metals (e.g., arsenic, lead, manganese), the concentrations were greater in an upgradient well (Locality 1) than in any downgradient well.

2.4 NASJRB SITE 5 - FIRE TRAINING AREA

2.4.1 Description and History

The Fire Training Area was used for large-scale firefighting exercises from 1942 until 1975. During this 33-year period, these exercises were a primary method of disposal for flammable liquid wastes generated by the activity. Waste POL and various solvents and paint chemicals were consumed at the rate of at least 4,000 gallons per year in firefighting exercises. Between exercises, drums of these materials were stockpiled in the open area on the opposite side of the roadway from the burn area. Hundreds of drums and other large containers were reportedly stored in this area. Types of chemicals believed to have been spilled at this site include paint wastes, paint stripper (methylene chloride), xylene, toluene, and POLs.

Hundreds of drums and other large containers were reportedly stored in this area. Types of chemicals believed to have been spilled at this site include paint wastes, paint stripper (methylene chloride), xylene, toluene, and POLs.

2.4.2 Previous Site Investigation History

Four 4-inch monitoring wells were installed at the Fire Training Area. Groundwater samples were collected from these wells in June, September, and December 1989 and analyzed for VOC, TPH, and TOC.

Four test borings were drilled to characterize subsurface materials in the vicinity of SVCA anomalies. A composite sample from each boring was submitted for TPH and TOC analysis. Results of the SI investigations are summarized as follows:

Medium	Detected Substances of Concern	Maximum Detected Concentration
Groundwater	Benzene TCE PCE 1,1,1-Trichloroethane	Above MCLs " " "
Soil	Toluene Xylenes TCE PCE	5,700 mg/kg " " " "

An extended site inspection and Phase I RI were conducted in 1991 to characterize the nature and extent of soil contamination and to assess the extent of groundwater contamination at Site 5. The significant results from these studies are summarized below:

- Soils - 12 soil borings (up to 18 feet deep)
  - Very low concentrations of VOCs were found in few soil samples, and detections were sporadic. No significant patterns emerge from the areal distribution of contamination.
  - Groundwater contamination is significant and is centered around a "hot spot" located at well cluster 1.

2.5 SITE 11 - AIRCRAFT PARKING APRON

2.5.1 Description and History

The Aircraft Parking Apron is a former gravel-covered apron off the northeastern corner of the concrete runway/taxiway, reportedly used for fuel dumping. Construction in the area revealed suspected floating petroleum-type products on water that had accumulated in an excavation. Testing of the accumulated water showed elevated levels of petroleum compounds.

The area has been regraded as an embankment as part of the building construction activity.

2.5.2 Previous Site Investigation History

This area was not investigated during the RI. Contamination was discovered during recent construction activities. The petroleum oil fingerprint levels ranged from ND to 3,600 mg/L.

3.0 SCOPE OF WORK

This section presents the proposed scope of work to address the remaining information needs for the five identified sites at NASJRB Willow Grove.

3.1 NASJRB SITE 1

In order to determine the extent of PCB contamination "hot spot" in soils and to characterize the source area for volatile organic contamination of groundwater and the groundwater flow regime, including flow directions, upgradient vs. downgradient, effects of pumping on horizontal and vertical gradients, capture zones, etc., the following Phase II RI tasks are planned:

- Additional soil borings at the PCB "hot spot." Concentrate the investigation to delineate the limit of 10 ppm level in soils.
- Two rounds of monitoring well sampling for VOCs.
- Long-term water level study.
- "Background levels" investigation.

3.2 NASJRB SITE 2

The following data gaps exist for Site 2:

- There may be no downgradient groundwater monitoring points. The two "downgradient" wells may be, at best, sidegradient.
- The concern that a seasonal high water table may rise into the fill and subsequently affect groundwater quality has not been investigated.
- The landfill cap has never been tested to show it is composed of clean fill.
- There are no subsurface soil data.
- No seep/leachate samples were taken due to the absence of seeps during the extremely dry summer.

- There are no surface water/sediment quality sample results upgradient of the "hot spot" at SWS/SS 4.

The proposed Phase II RI tasks are as follows:

- Install a monitoring well cluster (shallow and intermediate wells) at a location downgradient and downdip of the fill. Install an intermediate well at ALW-3 to complete a cluster at the probable downgradient position (based on topography and drainage). Obtain groundwater quality and hydraulic head data to more fully understand groundwater flow regime and the nature and extent of any potential contamination.

- Install a series of temporary well points (e.g., Geoprobe borings) and/or piezometers through the fill, during a time of high seasonal water table, for water quality data.

- Conduct a surface soil sampling program of cover material.

- Conduct a subsurface soil sampling program.

- Collect seep samples during the wet season (as opportunity arises).

- Collect surface water/sediment sample(s) upgradient of SWS/SS 4.

- Compare metal results to background.

* Note: All proposed Phase II RI investigation activities at Site 2, Antenna Field Landfill, assume EPA will not stipulate a prescriptive remedy (e.g., landfill cap and periodic groundwater monitoring) for the site.

3.3 NASJRB SITE 3

In order to characterize the extent of groundwater contamination (groundwater is contaminated in the most upgradient well; groundwater contamination extends downdip to the wells located along the property boundary), to locate the source of groundwater contamination (hydrogeological and analytical data indicate the site is either not the source or is not the sole source of volatile organic contamination), to assess the groundwater flow regime and effects of pumping nearby off-base wells, and to determine whether the landfill cap is composed of clean fill, the following tasks are planned:

- Install three off-base well clusters to determine the downgradient extent of contamination.

- Install a new two-well cluster upgradient of W-5 and adjacent to the Army Reserve complex. Install one intermediate well as a couplet with existing well W-5. These wells will further delineate the horizontal and vertical extent of contamination upgradient of the site and, together with all the wells, will aid in assessing the impact of the site on the local groundwater quality (and evaluate the possible contribution of the Army Reserve complex).

- Conduct multiple rounds of hydraulic head measurements. For each round, measurements should be made as near to simultaneously as logistically possible. Consider a long-term (1 week) water-level study to investigate daily fluctuations and possible external influences. Research the potential existence of nearby public supply/irrigation/commercial process wells.

- Take surface water/sediment sample(s) at and downstream of the headwall (outfall for Army Reserve complex floor drains).

- Conduct a surface soil sampling program of the landfill cap.

- Compare results of surface water and sediment analysis to Reference Tables of guideline acceptable values.

- Perform statistical comparison of VOC results.

3.4 NASJRB SITE 5

The following data gaps exist for NASJRB Site 5:

- Extent of groundwater contamination has not been defined.

    - The vertical extent of contamination has not been defined: The deepest well at the "hot spot" contains significant levels of contamination. The hydraulic head distribution at this cluster indicates that no confined zone was penetrated (deepest well is about 80 feet). It is not known if confining conditions exist at depth. The potential for DNAPL to be flowing downdip (northwest) has not been investigated.

    - The lateral extent of contamination has not been fully defined.

- No surface water/sediment data exist for the ponds immediately south (downgradient) of the "hot spot."

- The extent of subsurface soil contamination is not known. No soil borings were taken near the "hot spot" during the Phase I RI. Soil samples taken during the SI from the borings for the cluster no. 1 monitoring wells contained 1,1,1-TCA at 5,700 ug/kg and TCE at 2,000 ug/kg.

- No analytical data exist concerning the nature and extent of surface soils contamination. These data are needed for the risk assessment.

- No analytical data exist concerning SVOCs, PCBs, or metals, all of which might reasonably be "expected" given the past waste disposal practices at this site.

The following tasks are planned for the Phase II RI:

- Install a deep well at cluster no. 1 to investigate vertical extent of groundwater contamination and local hydrogeological conditions (confining or transitional horizons?). Install an intermediate well at well cluster no. 3 to investigate the potential geologic effect on DNAPL migration. Install three additional well clusters (shallow and intermediate wells) downgradient of cluster no. 1 to more fully define lateral extent of contamination.

- Obtain surface water/sediment samples from both ponds.

- Conduct an additional soil boring program, concentrating on the "hot spot," in order to fully delineate the extent of subsurface soil contamination.

- Conduct a surface soil sampling program (0 to 2 inches). Alternatively, obtain surface samples from the top portion of the split-spoon sampler during the soil boring program.

- Analyze all samples for TCL VOCs, SVOCs, PCBs/pesticides, and TAL inorganics.

- Any Phase II RI activities (such as monitoring well placement) will consider future construction planned for adjacent area.

3.5 NASJRB SITE 11

In order to characterize the nature and extent of soil contamination and the potential impacts to groundwater and assess whether the suspected storm drain in the closed depression immediately downhill from the lip of the apron may have been the outfall for drainage from this former aircraft parking apron site, the following tasks are planned:

- Conduct a soil boring program.
- Install two well clusters (overburden, shallow bedrock) downgradient of soil contamination.
- Research prior utilities and conditions. Conduct surface water/sediment sampling near the former outfall, if appropriate.

3.6. GENERAL CONSIDERATION

Insufficient data exist concerning background concentrations for surface water/sediment samples. Sample at four off-site locations for surface water/sediments. Analyze for TCL VOCs, SVOCs, PCBs/pesticides, and TAL metals.

4.0 SITE CONTAMINANTS

Previous site inspections and RIs at four of the five specified sites included in the Scope of Work of this HASP have identified hazardous or toxic substances in one or more sampling media. These substances have been compiled on Table 4-1 in this section. The information presented includes the contaminant, physical and chemical properties, and toxicologic properties.

TABLE 4-1
NASJRB WILLOW GROVE
POTENTIAL CHEMICAL HAZARDS

Substance	CAS Number	Appearance and Odor	Exposure Limits	Ionization Potential	Toxic and Pharmacologic Effects	Flammability, etc.
Benzene	71-43-2	Colorless to light yellow liquid with an aromatic odor	PEL: 1 ppm STEL: 5 ppm TLV: 0.5 ppm A2; 2.5 ppm STEL* IDLH: 500 ppm carcinogen * Notice of Intended Change	9.25	• Bone marrow suppression • Primary irritant to skin, eyes are upper respiratory tracts • Dermatitis • Headaches, dizziness, nausea	Incompatible with chlorine, bromine, and iron. Reacts with oxidizers and diboranes
Beryllium	7440-41-7	hard, brittle gray-white solid	PEL: 0.002 mg/m^3 TLV: 0.002 mg/m^3 A2 IDLH: 4 mg/ m^3 Be	---	• Suspected human carcinogen • Conjunctivitis, corneal burns • Pneumonitis, chest pain • Weakness	Reacts with HCl, H_2SO_4, HNO_3. Attached by strong bases, chlorinated hydrocarbons, active metals
Carbon tetrachloride	56-23-5	Colorless liquid with a characteristic ether-like odor	PEL: 10 ppm TLV: 5 ppm A3 Skin A3 STEL: 10 ppm A3 IDLH: 200 ppm	11.47	• Human carcinogen • CNS depressant • Nausea and vomiting • Skin irritant • Liver and kidney damage	Incompatible with chemically active metals
Chlorobenzene	108-90-7	Colorless liquid with an almond-like odor	PEL: 75 ppm TLV: 10 ppm A3 IDLH: 2,400 ppm	9.07	• Irritant - eyes, skin nose • CNS effects - drowsiness, incoordination • Nausea and vomiting • Liver and kidney damage	Incompatible with strong oxidizers
Chloromethane (methyl chloride)	74-87-3	Colorless gas with faint, sweet odor	PEL: 100 ppm TLV: 50 ppm Skin STEL: 100 ppm IDLH: 2,000 ppm	11.28	• Dizziness, drowsiness, in coordination, confusion • Nausea and vomiting • Abdominal pains • Liver, kidney damage	Incompatible with chemically active metals
Trans 1,2-DCE Dichloroethylene	540-59-0	Colorless liquid with an ether-like odor	PEL: 200 ppm TLV: 200 ppm IDLH: 1,000 ppm	9.65	• CNS depressant • Eye and respiratory tract irritant	Incompatible with strong oxidizers and alkalis
Dinitrotoluene	25321-14-6	Orange-yellow chrystalline solid	PEL: 1.5 mg/m^3 SKIN TLV: 0.15 mg/m^3 SKIN, A2 IDLH: 200 mg/m^3 carcinogen	NA	• Anoxia, cyanosis • Anemia, jaundice • Blood, liver	Incompatible with strong oxidizers caustics, metals
Ethylbenzene	100-41-4	Colorless liquid with an aromatic odor	PEL: 100 ppm TLV: 100 ppm IDLH: 2,000 ppm STEL: 125 ppm	8.76	• Eye and mucous membrane irritant • Headache and coma • Dermatitis	Incompatible with strong oxidizers
Tetrachloroethylene (Perchloroethylene) (PCE)	127-18-14	Colorless liquid with a mild, chloroform-like odor	PEL: 100 ppm TLV: 25 ppm, A3 STEL: 100 ppm, A3 IDLH: 160 ppm (carcinogen)	9.32	• Eye, nose, and throat irritant • Flushed face and neck • Nausea, vertigo, dizziness • Suspect animal carcinogen	Incompatible with strong oxidizers and chemically active metals
Toluene	108-88-3	Colorless liquid with a sweet pungent, benzene-like odor	PEL: 200 ppm SKIN TLV: 50 ppm IDLH: 500 ppm STEL: none listed	8.82	• CNS depressant: confusion, euphoria, dizziness, headache, fatigue, insomnia, parathesia • Dermatitis • Dilated pupils • Chronic: possible liver, kidney damage	Incompatible with strong oxidizers

Substance	CAS Number	Appearance and Odor	Exposure Limits	Ionization Potential	Toxic and Pharmacologic Effects	Flammability, etc.
1,1,1-Trichloroethane (1,1,1-TCA) (methyl chloroform)	71-55-6	Colorless liquid with a mild chloroform-like odor	PEL: 350 ppm TLV: 350 ppm STEL: 450 ppm IDLH: 700 ppm	11.00	• CNS depressant, headache, poor equilibrium • Eye irritant • Dermatitis	Incompatible with strong caustics, strong oxidizers, and chemically active metals
Trichloroethene	79-01-6	Colorless liquid with a chloroform-like odor	PEL: 100 ppm TLV: 50 ppm A5 STEL: 100 ppm A5 IDLH: 1,000 ppm	9.45	• Headache and dizziness • Nausea and vomiting • Dermatitis • Cardiac arrhythmias, liver injury • Eye irritant	Incompatible with strong caustics and chemically active metals
Vinyl Chloride	75-01-4	Colorless gas that liquefies in a freezing mixture	PEL: 1 ppm; TLV: 5 ppm A1 Ceiling: 5 ppm	10.00	• Human carcinogen • Weakness, pallor, abdominal pain, GI bleeding, enlarged liver	Incompatible with strong copper, oxidizers, peroxides, aluminum, iron, and steel
Xylene	1330-20-7	Colorless liquid with an aromatic odor.	PEL: 100 ppm TLV: 100 ppm A4 STEL: 150 ppm IDLH: 1,000 ppm	8.56 (o,m) 8.44 (p)	• CNS effects: dizziness, excitement, drowsiness, incoherence, staggering gait • Irritant - eyes, nose, throat • Corneal vacuolization • Liver, kidneys, GI tract	Incompatible with strong oxidizers
Aldrin	309-002	Colorless to dark brown crystalline solid.	PEL: 0.25 mg/m^3 SKIN TLV: 0.25 mg/m^3 SKIN IDLH: 25 mg/m^3 (Carcinogen)	NA	• Headache, dizziness, nausea, • Vomiting, convulsions, jerks • Liver and kidney damage	Incompatible with mineral acids, active metals, acid catalyst, phenol.
Chlordane	57-74-9	Amber-colored viscous liquid with a pungent chlorine-like odor	PEL: 0.5 mg/m^3 SKIN TLV: 0.5 mg/m^3 A3 SKIN IDLH: 500 mg/m^3	NA	• Eye & skin irritant • CNS effects: blurred vision, confusion, delirium, vomiting, diarrhea, irritability, tremors • lung, liver, and kidney damage	Incompatible with strong oxidizers, alkaline reagents
Dieldrin	60-57-1	Colorless to light tan solid with a mild chemical odor.	PEL: 0.25 mg/m^3 SKIN TLV: 0.25 mg/m^3 SKIN IDLH: 50 mg/m^3 (Carcinogen)	NA	• Headache, dizziness, nausea, • Vomiting, limbjerks • Liver and kidney damage	Incompatible with strong oxidizers and active metals.
Aroclor 1260 (PCB)	11096-82-5	Mild hydrocarbon odor.	PEL: NA TLV: NA	NA	• Nausea, vomiting, jaundice, edema, abdominal	Incompatible with strong oxidizers.
Bis-(2-ethyhexyl)phthalate	117-81-7	Colorless oily liquid with a slight odor.	TLV: 5 mg/m^3 PEL: 5 mg/m^3 IDLH: 5000 mg/m^3	NA	• Irritant to eyes and mucous membranes, CNS effects, liver injury, reproductive effects	Incompatible with nitrates, strong oxidizers, acids and alkalis.
Cyanide	57-12-5	White solid with faint almond odor.	PEL: 5 mg/m^3		• Weakness, headache, confusion, nausea, vomiting, eye and skin irritant, slow gasping respiration, cyanide rash, loss of appetite, URT irritant.	Reacts with hypochlorite solutions, F2, Mg, nitrates and nitrites. On contact with acids or water emits toxic$(CN)^-$ vapors.
Di-n-butylphthalate	84-74-2	Colorless oily liquid with a weak aromatic odor.	PEL: 5 mg/m^3 TLV: 5 mg/m^3 IDLH: 4000 mg/m^3	NA	• Irritant to eyes, URT and GI tract.	Incompatible with nitrates, strong oxidizers, alkalis and acids.
N-nitrosodiphenylamine	156-10-5	Green plates with bluish luster or steel blue plates.	Not Listed	NA	• Eye irritant • Mutagen • Carcinogen	Experimental when heated, emits toxic No_x fumes

Substance	CAS Number	Appearance and Odor	Exposure Limits	Ionization Potential	Toxic and Pharmacologic Effects	Flammability, etc.
Cadmium	7440-43-9	Metal - silver white, lustrous odorless solid	PEL: 5 ug/m^3 TLV: 0.01 mg/m^3 total dust A2 0.002 mg/m^3 respirable dust A2 IDLH: 9 mg/m^3	Not Listed	• Suspected potential carcinogen • Kidney toxin • Respiratory tract irritant • Pulmonary edema, dyspnea, chest tightness	Incompatible with strong oxidizers, sulfur, selenium, and tellurium
Chromium	7440-47-3	Blue-white to steel-gray, lustrous, brittle, hard solid	PEL: 1 mg/m^3 (metal) TLV: metal/Cr^{+3} 0.5 mg/m^3 A4; Cr^{+6} water soluble 0.05 mg/m^3 A1; Cr^{+6} water insoluble 0.01 mg/m^3 A1 IDLH: 250 mg/m^3	Not applicable	• Histologic fibrosis of lungs • Skin and lung irritant • Human carcinogen	Incompatible with strong oxidizers and alkalis
Cobalt	7440-48-4	Odorless, silver-gray to black solid	PEL: 0.1 mg/m^3 TLV: 0.02 A3 IDLH: 20 mg/m^3	NA	• Skin and respiratory tract irritant; asthma, diffuses nodular fibrosis hypersensitivity, dermatitis • Irritant to eyes, mucous membranes, and pharynx • Dermatitis • Increased risk with Wilson Disease • Liver damage	Incompatible with strong oxidizers and ammonium nitrate. Incompatible with oxidizers, alkalis, sodium azide, and acetylene
Copper	7440-50-8	Metal - Reddish, lustrous, malleable, odorless solid	PEL: 1 mg/m^3 (dust) 0.1 mg/m^3 (fume) TLV: 1 mg/m^3 (dust) 0.2 mg/m^3 (fume) IDLH: 100 mg/m^3 as dust, mist, or fume	Not applicable		
Lead	7439-92-1	Metal -A heavy, ductile, soft gray solid	PEL: 0.05 mg/m^3 (inorganic dust/fumes) TLV: 0.15 mg/m^3 (inorganic dust/fumes) IDLH: 100 mg/m^3	Not Applicable	• Weakness, lassitude, insomnia, tremors (CNS, PNS, effects) • Lung/kidney toxin • Blood system toxin • Constipation, abdominal pain, colic • Facial pallor, gingival lead line • Malnutrition, low weight	Incompatible with strong oxidizers, hydrogen peroxide, and acids
Manganese	7439-96-5	Metal - a lustrous brittle, silvery solid	PEL: 5 mg/m^3 (dust); 5 mg/m^3 (fume) ceiling TLV: 0.2 mg/m^3 IDLH: 500 mg/m^3 as mn	Not Listed	• Parkinson's, metal fume fever • Insomnia, mental confusion • Dry throat, cough, tight chest • Rales, flu-like fever	Incompatible with oxidizers; will react with water or steam to produce hydrogen
Mercury	7439-97-6	Silver-white heavy, odorless liquid	PEL: 0.1 mg/m^3 Skin TLV: 0.025 mg/m^3 Alkyl 0.01 mg/m^3 Aryl 0.1 mg/m^3 Skin-inorganic/metal IDLH: 10 mg/m^3 except for alkyls which is 2 mg/m^3	---	• Irritant of skin and mucous membranes • Kidney toxin • CNS effects - weakness, fatigue, tremors • Coughing, sneezing, chest pain, difficulty in breathing • Watery eyes	Incompatible with acetylenes and ammonia

Substance	CAS Number	Appearance and Odor	Exposure Limits	Ionization Potential	Toxic and Pharmacologic Effects	Flammability, etc.
Chromium	7440-47-3	Blue-white to steel-gray, lustrous, brittle, hard solid	PEL: 1 mg/m^3 (metal) TLV: metal/Cr^{+3} 0.5 mg/m^3 A4; Cr^{+6} water soluble 0.05 mg/m^3 A1; Cr^{+6} water insoluble 0.01 mg/m^3 A1 IDLH: 250 mg/m^3	Not applicable	• Histologic fibrosis of lungs • Skin and lung irritant • Human carcinogen	Incompatible with strong oxidizers and alkalis
Cobalt	7440-48-4	Odorless, silver-gray to black solid	PEL: 0.1 mg/m^3 TLV: 0.02 A3 IDLH: 20 mg/m^3	NA	• Skin and respiratory tract irritant; asthma, diffuses nodular fibrosis hypersensitivity, dermatitis	Incompatible with strong oxidizers and ammonium nitrate.
Copper	7440-50-8	Metal - Reddish, lustrous, malleable, odorless solid	PEL: 1 mg/m^3 (dust) 0.1 mg/m^3 (fume) TLV: 1 mg/m^3 (dust) 0.2 mg/m^3 (fume) IDLH: 100 mg/m^3 as dust, mist, or fume	Not applicable	• Irritant to eyes, mucous membranes, and pharynx • Dermatitis • Increased risk with Wilson Disease • Liver damage	Incompatible with oxidizers, alkalis, sodium azide, and acetylene
Lead	3	Metal -A heavy, ductile, soft gray solid	PEL: 0.05 mg/m^3 (inorganic dust/fumes) TLV: 0.15 mg/m^3 (inorganic dust/fumes) IDLH: 100 mg/m^3	Not Applicable	• Weakness, lassitude, insomnia, tremors (CNS, PNS, effects) • Lung/kidney toxin • Blood system toxin • Constipation, abdominal pain, colic • Facial pallor, gingival lead line • Malnutrition, low weight	Incompatible with strong oxidizers, hydrogen peroxide, and acids

TABLE 4-1
POTENTIAL CHEMICAL HAZARDS
NASJRB WILLOW GROVE

Substance	CAS Number	Appearance and Odor	Exposure Limits	Ionization Potential	Toxic and Pharmacologic Effects	Flammability, etc.
Nickel	7440-02-0	Metal - lustrous, silvery solid	PEL: 1 mg/m^3 TLV: metal/insoluble (1 mg/m^3); soluble (0.1 mg/m^3) IDLH: 10 mg/m^3 as Ni	Not applicable	• Skin sensitizer and eye irritant • Headache, vertigo • Nausea and vomiting • *Epigastric pain* • Lung carcinogen	Incompatible with strong acids, sulfur, selenium, wood, and other combustibles
Thallium	1707-53	Depends on soluable compound	PEL: 0.01 mg/m^3 TLV: 0.1 mg/m^3 SKIN IDLH: 15 mg/m^3	NA	• CNS effects: nausea, diarrhea,abdonminal pain, tremors, chest pain, tremors, chest pain, pulmonary edema, liver, kidney damage, alopecia	Varies.
Vanadium	1314-62-1	Yellow-orange powder	PEL: 0.05 mg/m^3 (as V205 dust) TLV: 0.5 mg/m^3 (as V205 dust)	NA	• Irritant to eyes, skin and respiratory tract, green tongue, metallic taste	Incompatible with lithium and chlorine trifluoride.
Zinc	7440-66-6	Bluish-white, lustrous, metallic element	PEL: zinc oxide dust - 15 mg/m^3 zinc oxide fume - 5 mg/m^3 TLV: zinc oxide fume - 5 mg/m^3 zinc oxide dust - 10 mg/m^3 IDLH: zinc oxide - 500 mg/m^3	Not Listed	• Skin irritant • Metal fume fever • Inhalation may cause sweet taste, throat dryness, cough, weakness, aches, chills, fever, nausea, and vomiting	Flammable in dust form when exposed to heat or flame

PEL TWA = Occupational Safety and Health Administration (OSHA) Permissible Exposure Limits; Time Weighted Average
TLV TWA = American Conference of Governmental Industrial Hygienists (ACGIH) Threshold Limit Values; Time Weighted Average
IDLH = Immediately Dangerous to Life and Health
IP = Ionization Potential
CAS = Chemical Abstract Service
CNS = Central Nervous System
(C) = Ceiling
STEL = Short Term Exposure Limit (15 minute)
A1 = ACGIH definition - Confirmed Human Carcinogen
A2 = ACGIH definition - Suspected Human Carcinogen
A3 = ACGIH definition - Animal Carcinogen
A4 = Not classifiable as a Human Carcinogen
A5 = ACGIH definition - Not suspected as a Human Carcinogen
PPM = Parts per million
mg/m^3 = milligrams per cubic meter of air
NA = Not Available

5.0 RISK ANALYSIS

The primary hazards, although minimal, associated with this investigation include potential exposure via inhalation of vapors and particulates and direct skin/eye contact and/or absorption. Table 4-1 presents the contaminants known or suspected to be present in the areas of study and outlines toxicity data.

The use of real-time monitoring instruments, visual observation, olfactory detection, and perception of irritation will aid in the identification of exposure to site contaminants. Personal protective equipment (PPE) and standard work practices (Sections 7.0 and 6.0 of this plan) will be used when necessary to help reduce or eliminate exposures and, therefore, reduce the potential for adverse health effects. In accordance with the requirements for PPE specification in Section 7.0, a self-contained breathing apparatus (SCBA) operated in the positive-pressure mode will be used by personnel if breathing zone concentrations of organic vapors exceed background levels.

Table 5-1 (page 5-2) identifies hazards associated with each task and presents control measures that will be taken to reduce or eliminate those hazards.

In addition, physical hazards must also be addressed. Physical hazards could involve the following:

- Contact with energized sources
- Exposure to moving machinery
- Uneven or unstable terrain (slip, trip, spill hazard)
- Strain or muscle pulls from manual lifting
- Noise in excess of 85 dBA
- Cold stress/heat stress
- Overhead and eye hazards

Control efforts for these potential hazards include requirements that machinery on site (e.g., drill rigs) be kept properly maintained, positioned, guarded, and operated. No drilling masts or any such projecting items shall be permitted within a 20-foot radius of energized overhead sources. Also, any areas targeted for subsurface investigation shall first be investigated to determine the presence of underground utilities. No intrusive activities will be permitted until the area has been cleared (Pennsylvania One Call System or other service).

Personnel shall be advised of hazards from contact with moving machinery pinch points. Personal protective clothing must fit properly and be taped, not only to minimize chemical exposure but also to minimize potential entanglement with moving machinery. Additionally, equipment will be shut down and locked out before maintenance functions are performed.

TABLE 5-1
RISK ANALYSIS SUMMARY

Task	Potential Hazards	Controls
Test pitting operations, soil gas survey (if using Geoprobe or similar equipment), surface soil sampling, and subsurface soil sampling.	Inhalation of airborne contaminants	• Stand upwind. • Utilize monitoring instruments. • Use proper respiratory PPE (Section 7.0). • Wet down dusty areas (if appropriate).
	Direct contact with contaminants	• Avoid unnecessary contact. • Utilize PPE (Section 7.0). • Follow decontamination procedures (Section 9.0). • Utilize good personal hygiene practices. • Follow "Site Standard Work Practices" (Section 6.0).
	Ingestion of contaminants	• No hand-to-mouth contact. • Utilize good personal hygiene practices. • Follow decontamination procedures (Section 9.0). • Follow "Site Standard Work Practices" (Section 6.0).
	Contact with moving/ rotating machinery parts	• Follow "Site Standard Work Practices" (Section 6.0). • Do not operate any equipment unless all appropriate machine guarding devices are in place and in proper working order.
	Contact with overhead or underground utilities	• Follow "Site Standard Work Practices" (Section 6.0). • Underground utilities must be identified prior to drilling and excavating.
	Excessive noise	• Hearing protection will be available on site.
	Overhead and eye hazards	• Hard hats and safety glasses will be worn if within 20 feet of drilling operations.
	Excavation cave-ins (test pitting only)	• No personal entry into excavation will be permitted. • Follow "Site Standard Work Practices" (Section 6.0).

TABLE 5-1
RISK ANALYSIS SUMMARY
PAGE 2 OF 3

Task	Potential Hazards	Controls
Concrete Cutting	Contact with moving/ rotating machinery parts	• Follow "Site Standard Work Practices" (Section 6.0). • Do not operate any equipment unless all appropriate machine guarding devices are in place and in proper working order.
	Contact with overhead or underground utilities	• Follow "Site Standard Work Practices" (Section 6.0). • Underground utilities must be identified prior to drilling and excavating.
	Excessive noise	• Hearing protection will be available on site.
	Overhead and eye hazards	• Hard hats and safety glasses will be worn if within 20 feet of drilling operations.
Well Drilling Soil Boring	Inhalation of airborne contaminants	• Stand upwind. • Utilize monitoring instruments. • Use proper respiratory PPE (Section 7.0). • Wet down dusty areas (if appropriate).
	Direct contact with contaminants	• Avoid unnecessary contact. • Utilize PPE (Section 7.0). • Follow decontamination procedures (Section 9.0). • Utilize good personal hygiene practices. • Follow "Site Standard Work Practices" (Section 6.0).
	Ingestion of contaminants	• No hand-to-mouth contact. • Utilize good personal hygiene practices. • Follow decontamination procedures (Section 9.0). • Follow "Site Standard Work Practices" (Section 6.0).
	Contact with moving/ rotating machinery parts	• Follow "Site Standard Work Practices" (Section 6.0). • Do not operate any equipment unless all appropriate machine guarding devices are in place and in proper working order.
	Contact with overhead or underground utilities	• Follow "Site Standard Work Practices" (Section 6.0). • Underground utilities must be identified prior to drilling and excavating.
	Excessive noise	• Hearing protection will be available on site.

TABLE 5-1
RISK ANALYSIS SUMMARY
PAGE 3 OF 3

Task	Potential Hazards	Controls
Well Drilling Soil Boring (continued)	Overhead and eye hazards	• Hard hats and safety glasses will be worn if within 20 feet of drilling operations.
Surface water, sediment, seep sampling, Monitoring well sample, water levels measurements	Inhalation of airborne contaminants	• Stand upwind. • Utilize monitoring instruments. • Use proper respiratory PPE (Section 7.0). • Wet down dusty areas (if appropriate).
	Direct contact with contaminants	• Avoid unnecessary contact. • Utilize PPE (Section 7.0). • Follow decontamination procedures (Section 9.0). • Utilize good personal hygiene practices. • Follow "Site Standard Work Practices" (Section 6.0).
	Ingestion of contaminants	• No hand-to-mouth contact. • Utilize good personal hygiene practices. • Follow decontamination procedures (Section 9.0). • Follow "Site Standard Work Practices" (Section 6.0).
	Heat stress/cold stress	• Increase fluid intake • Take frequent breaks • Wear layered clothing (windproof, waterproof)

To minimize pedestrian access to the excavation areas, barricades (i.e., orange cones, plastic drums) and warning tape will be placed at the perimeter of the work zone.

Uneven or unstable terrain hazards will exist primarily during excavation operations and are created when the walls of the excavation are improperly sloped. No one, under any circumstances, shall enter a test pit; workers can become seriously injured or killed if they fall into the excavation or are engulfed by a cave-in. Proper sloping and shoring techniques, as required by OSHA 29 CFR 1926 Subpart P, will be observed to reduce this hazard.

During lifting tasks, personnel are to lift with the force of the load carried by their legs and not by their backs. An appropriate number of personnel must be used when lifting or handling heavy equipment. These procedures are to be employed to minimize the potential for back strain.

Hearing protection will be available on site. Use will be determined by the site safety officer based on the following: If individuals must raise their voices to be heard when standing within 2 feet of a co-worker, hearing protection must be worn.

Employees will be monitored for signs of heat/cold stress. Fluids will be increased, and breaks will be provided at the discretion of the HSO.

Overhead and eye hazards will be controlled by utilizing hard hats and safety glasses if personnel are within 20 feet of drilling operations. Personnel must also be aware of their surroundings with respect to overhead and eye hazards.

Field investigations in the outdoor environment may present a potential risk of contact with biological hazards such as biting insects and animals and poisonous plants. Biting animals include spiders, ticks, mites, and fleas, as well as small mammals (e.g., raccoons). Poisonous plants include poison oak and ivy. Of particular concern in the northeast region of the United States is the deer tick, which may carry the microbiological agent for Lyme disease and other serious diseases such as Human Granulocytic Ehrlichiosis (HGE) and Babesiosis. Contact with the deer tick may occur in forested areas that support the deer population.

Personal protective measures to be employed to minimize contact with ticks (i.e., deer tick) include the following:

- When not wearing the proper protective clothing, avoid tall grass and brush where ticks lurk.

- Wear whole-body, white-colored Tyvek coveralls over your work clothes. Tuck your pants leg into your socks and your shirt into your pants. Wear an attached hood or hat. Tape ankles and wrists.

- Wear rubber boots.

- Use tick and insect repellents such as DEET-containing products if protective clothing is not worn. Do not apply to face and hands.

- Spray apply a permethrin insect repellent to protective clothing. Do NOT apply this product to skin.

- Inspect clothes frequently when in field for presence of ticks. Use a partner to check your back.

- Use trails when possible and do not bushwhack.

- Do not wear your work clothes home. Wash work clothes often or put into the dryer to kill any ticks.

- Inspect your body thoroughly when you get in from the field. Check behind your knees and ears, navel, armpits, and groin. Have a companion check your back and scalp. Take a bath to drown any possible ticks.

- If a tick bite is confirmed, remove the tick with fine tweezers, apply topical antibiotic, save the tick, and call the physician. Do NOT use your fingers to remove or handle the tick.

- Be aware of any signs and symptoms of Lyme disease, HGE, and other tick-borne illnesses.

Additional control measures for these physical hazards are included in Section 6.0, Standard Work Practices.

6.0 SITE STANDARD WORK PRACTICES

All RI activities will follow B & R Environmental health and safety standard operating procedures where appropriate.

The following requirements are B & R Environmental health and safety standard work procedures:

- Eating, drinking, chewing gum or tobacco, taking medication, and smoking are prohibited in any location where the possibility for the transfer of contamination exists.

- Upon leaving a contaminated area, hands and face must be thoroughly washed. Any protective outer clothing is to be decontaminated, removed, and left at a designated area before personnel enter a clean area.

- Contact with potentially contaminated substances must be avoided. Whenever possible, contact with the ground or with contaminated equipment must also be avoided.

- No facial hair, which interferes with a satisfactory fit of the mask-to-face seal, is allowed on personnel required to wear respiratory protection equipment.

- The use of contact lenses is prohibited for all hazardous waste site operations.

- All personnel must familiarize themselves with the elements of the site-specific health and safety plan prior to commencing work on site. Additionally, a Site Safety Follow-Up Report must be filed with each trip report following completion of a task.

- All personnel must satisfy medical monitoring procedures.

- All personnel must follow action levels presented in the Personal Protective Equipment section of this report (Section 7.0).

- All electrical tools must be connected to a ground fault circuit interrupter (GFCI) and/or must be grounded with a third wire, and the cord must be double insulated and in good working condition.

- No flames or open fires will be permitted on site.

- Site personnel must immediately notify B & R Environmental Health Sciences of all incidents for OSHA recordkeeping purposes.

- If personnel note any warning properties of chemicals (irritation, odors, symptoms, etc.) or even remotely suspect the occurrence of exposure, they must immediately notify the health and safety officer (HSO) for further direction.

- All site personnel must complete a medical data sheet to be maintained on site.

- Equipment decontamination solutions and sample preservatives must be handled in well-ventilated areas. Stand upwind when possible.

- The "buddy system" shall be employed for all site activities.

- Post Exhibits 1 and 2 (pages 6-5 and 6-6) on site, preferably near the most available telephone.

- Post OSHA poster on site.

- Material safety data sheets for all substances brought on site will be maintained on site. All personnel will review this information before conducting work.

- The locations of all underground utilities must be identified and marked before any subsurface activities are initiated.

- Personnel must develop hand signals with equipment operators.

- All drill rigs and other machinery with exposed moving parts must be equipped with an operational emergency stop device. Drillers and geologists must be aware of the location of this device. This device must be tested prior to job initiation and periodically thereafter.

- The driller and helper shall not simultaneously handle moving augers unless there is a standby person to activate the emergency stop.

- The driller must never leave the controls while the tools are rotating unless all personnel are kept clear of the rotating equipment.

- A long-handled shovel or equivalent must be used to clear drill cuttings away from the hole and from rotating tools. Hands and/or feet are not to be used for this purpose.
- A remote sampling device must be used to sample drill cutting if the tools are rotating or if the tools are readily capable of rotating. Samplers must not reach into or near the rotating equipment. If personnel must work near any tools that could rotate, the driller must shut down the rig prior to initiating such work.

- Drillers, helpers, and samplers must secure all loose clothing when in the vicinity of drilling operations.

- Only equipment that has been approved by the manufacturer may be used in conjunction with site equipment and specifically to attach sections of drilling tools together. Pins that protrude excessively from augers shall not be allowed.

- No person shall climb the drill mast while tools are rotating.

- A checkered flag will be required at the top of the drill dig boom to ensure that flying aircraft will see the upright rig.

For test pitting operations:

- No one, under any circumstances, shall enter a test pit. Personnel must use remote samplers to collect samples from test pits or collect the samples from the backhoe bucket. The latter is recommended.

- Personnel must not lean over test pits.

- Personnel must stand upwind from the test pits and away from the reach of the backhoe, tires, and outrigger.

- Personnel must stand a minimum of 2 feet from the edge of any test pit. Unstable pits must be sloped at the sides to prevent cave-in.

- Personnel must develop hand signals with the backhoe operator.

- No open pits will be left unattended, under any circumstances.

- The backhoe operator shall not undermine the excavation.

- The HSO shall frequently inspect the test pits for slide or cave-in potential.
- All work areas must be kept free of ground clutter.
- Persons working near test pitting operations must remain more than 3 feet from the boom when the backhoe is operating.
- A dig permit will be required from the Environmental Division of the NASJRB of Public Works Department prior to any digging or drilling. The Contractor shall also call 1-800-242-1776 for a State of Pennsylvania digging permit.

EXHIBIT 1
EMERGENCY REFERENCE INFORMATION
(Post On Site)

Site: NASJRB Willow Grove Project Number: N5564 (CTO No. 227)

Emergency Information:

Ambulance (Name):	NASJRB	(215) 672-1600
Hospital (Name):	NASJRB Clinic	(215) 672-6360
Police (Local or State):	Horsham Police Department	(215) 672-2800
	NASJRB Security Police	(215) 672-6067 or 6068
Fire Department:	NASJRB F.D. Fire Department	(215) 672-1333
Project Manager:	Russell Turner	610) 971-0900 (office)
Site Health and Safety Officer:	TBA	On-Site

Dialing Instructions:

Emergency Contacts (Medical and Health):

- Regional Physician: Occupational Health Center, 795 E. Marshall Street, West Chester, PA 19380, Drs. Donze, Stroz, Elicker (610) 431-2262
- NAVY CLEAN Health and Safety Manager: Matthew M. Soltis, CSP, CIH 421) 921-8912
- National Response Center (**for environmental emergency only):** 1-800-424-8802
- Poison Control Center: (215) 922-5523

Directions to Hospital:
Dispensary is at corner of 17th Street and Avenue A.

Emergency Procedure for Overt Personnel Exposure:

- Skin Contact: Remove contaminated clothing. Wash immediately with water. Use soap, if available.
- Inhalation: Remove from contaminated atmosphere. Use artificial respiration, if necessary. Transport to hospital.
- Ingestion: Never induce vomiting on an unconscious person. Also, never induce vomiting when acids, alkalis, or petroleum products are suspected. Contact the Poison Control Center.
- All personnel suspected of over exposures should be transported to the hospital for medical evaluation.

EXHIBIT 2

American Red Cross

First Aid

BITES Animal Bites · Thoroughly wash the wound with soap and water. Flush the area with running water and apply a sterile dressing. Immobilize affected part until the victim has been attended by a physician. See that the animal is kept alive and in quarantine. Obtain name and address of the owner of the animal.

Insect Bites · Remove "stinger" if present. Keep affected part down below the level of the heart. Apply ice bag. For minor bites and stings apply soothing lotions, such as calamine.

BURNS AND SCALDS Minor Burns · DO NOT APPLY VASELINE OR GREASE OF ANY KIND. Apply cold water applications until pain subsides. Cover with a dry, sterile gauze dressing. Do not break blisters or remove tissue. Seek medical attention.

Severe Burns · Do not remove adhered particles of clothing. Do not apply ice or immerse in cold water. Do not apply ointment, grease or vaseline. Cover burns with thick sterile dressings. Keep burned feet or legs elevated. Seek medical attention immediately.

Chemical Burns · Wash away the chemical soaked clothing with large amounts of water. Remove victim's chemical soaked clothing. If dry lime, brush away before flushing. Apply sterile dressing and seek medical attention.

CRAMPS Symptoms · Cramps in muscles of abdomen and extremities. Heat exhaustion may also be present.

Treatment · Same as for heat exhaustion.

CUTS Apply pressure with sterile gauze dressing, and elevate the area until bleeding stops. Apply a bandage and seek medical attention.

EYES Foreign Objects · Keep the victim from rubbing his his eye. Flush the eye with water. If flushing fails to remove the object, apply a dry, protective dressing and consult a physician.

Chemicals · Flood the eye thoroughly with water for 15 minutes. Cover the eye with a dry pad and seek medical attention.

FAINTING Keep the victim lying down. Loosen tight clothing. If victim vomits, roll him onto his side or turn his head to the side. If necessary wipe out his mouth. Maintain an open airway. Bathe his face gently with cool water. Unless recovery is prompt, seek medical attention.

FRACTURES Deformity of an injured part usually means a fracture. If fracture is suspected, splint the part, DO NOT ATTEMPT TO MOVE INJURED PERSON; seek medical attention immediately.

FROSTBITE Symptoms · Just before frostbite occurs skin may be flushed, then change to white or grayish-yellow. Pain may be felt early then subsides. Blisters may appear, affected part feels very cold and numb.

Treatment · Bring victim indoors, cover the frozen area, provide extra clothing and blankets. Rewarm frozen area quickly by immersion in warm water---NOT HOT WATER. DO NOT RUB THE PART. Seek medical attention immediately.

HEAT EXHAUSTION Caused by exposure to heat · either sun or indoors. Symptoms · Near normal body temperature. Skin is pale and clammy. Profuse sweating, tiredness, weakness, headache, perhaps cramps, nausea, dizziness, and possible fainting.

Treatment · Keep in lying position and raise victim's feet. Loosen clothing, apply cool wet cloths. If conscious, give sips of salt water (1 teaspoon of salt per glass) over a period of one hour If vomiting occurs, discontinue the salt water. Seek medical attention immediately.

SUNSTROKE Symptoms · Body temperature is high (106 degrees F or higher). Skin is hot, red, and dry. Pulse is rapid and strong. Victim may be unconscious.

Treatment · Keep victim in lying position with head elevated. Remove clothing and repeatedly sponge the bare skin with cool water or rubbing alcohol. Seek medical attention immediately.

POISONING Call the poison control center for instruction on immediate care. If victim becomes unconscious, keep the airway open. If breathing stops give artificial respiration, by mouth to mouth breathing. Call an emergency squad as soon as possible.

POISON IVY Remove contaminated clothing; wash all exposed areas thoroughly with soap and water followed by rubbing alcohol. If rash is mild, apply calamine or other soothing skin lotion. If a severe reaction occurs, seek medical attention.

PUNCTURE WOUNDS If puncture wound is deeper than skin surface, seek medical attention. Serious infection can arise unless proper treatment is received.

SPRAINS Elevate injured part and apply ice bag or cold packs. DO NOT SOAK IN HOT WATER. If pain and swelling persist, seek medical attention.

UNCONSCIOUSNESS Never attempt to give anything by mouth. Keep victim lying flat, maintain open airway If victim is not breathing provide artificial respiration by mouth to mouth breathing and call an emergency squad as soon as possible.

LOCATION OF HOSPITAL

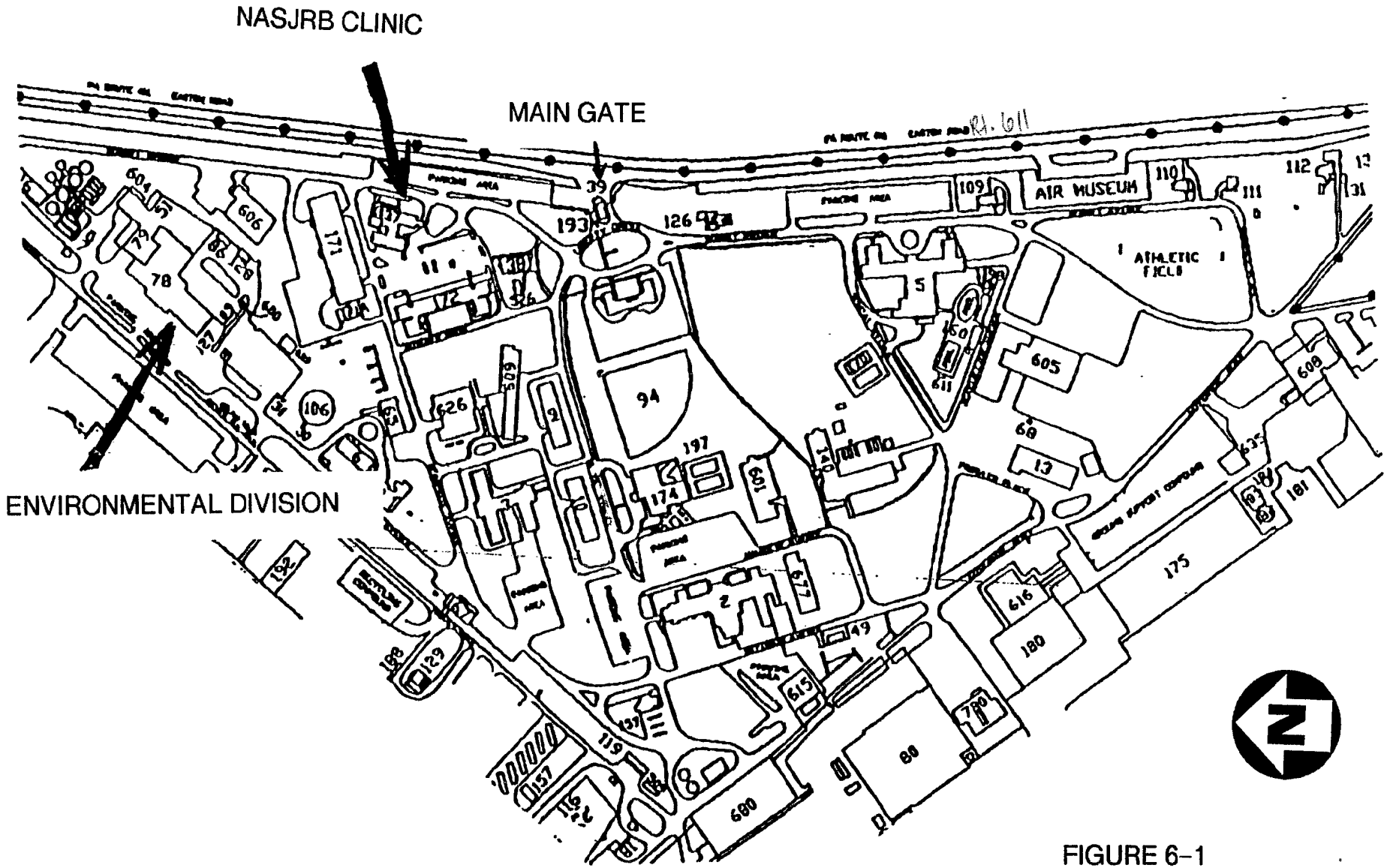
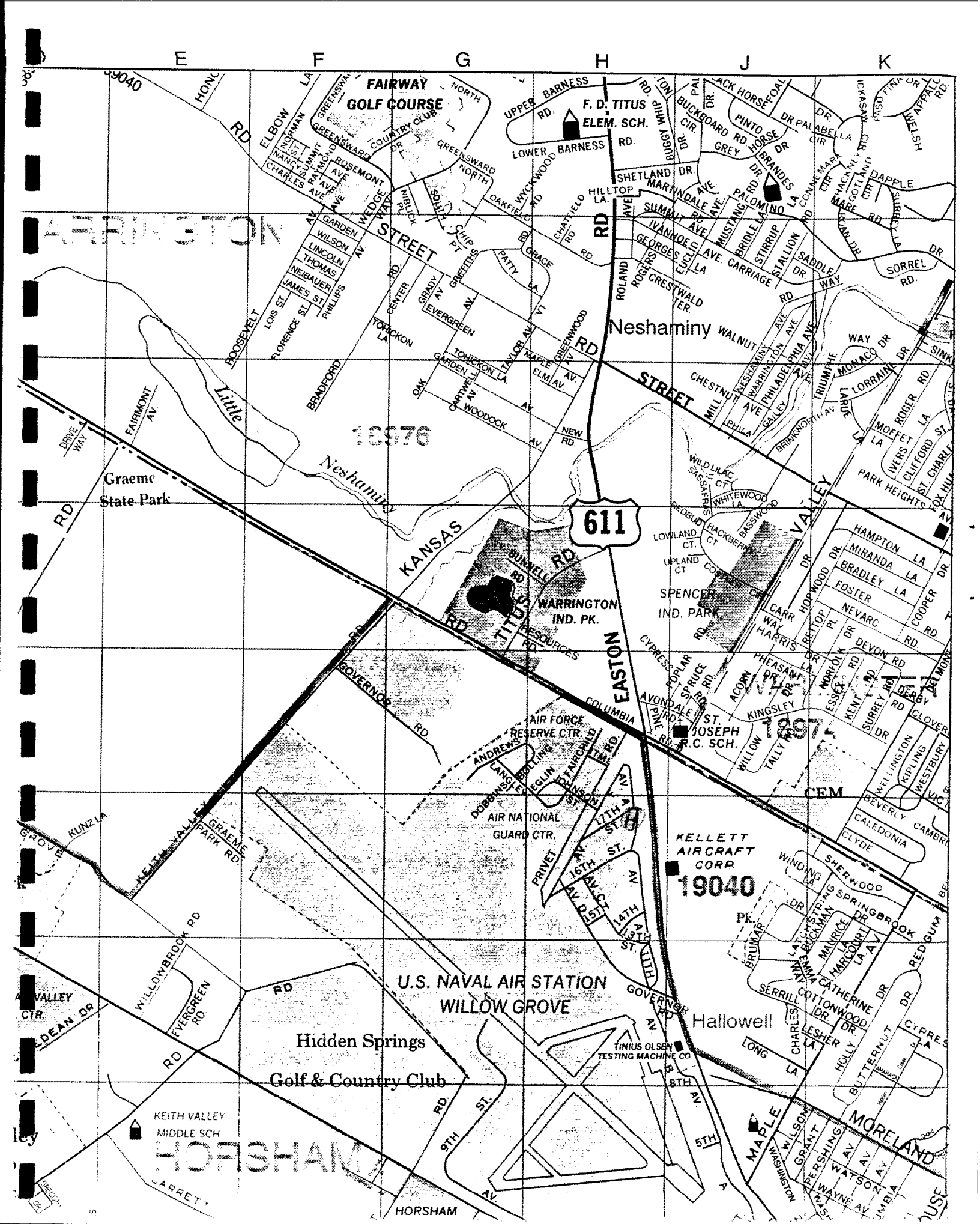


FIGURE 6-1


E
F
G
H
J
K
FAIRWAY GOLF COURSE
F. D. TITUS ELEM. SCH.
UPPER BARNESS RD.
LOWER BARNESS RD.
ELBOW LA
HONC RD
NORTH GREENSWARD COUNTRY CLUB DR
GREENSWARD NORTH
NORMAN ST
NANCY ST
SUMMIT AVE
RAYMOND AVE
ROSEMONT AVE
CHARLES AVE
WEDGE WAY
GARDEN AV
WILSON AV
LINCOLN AV
THOMAS AV
NEIBAUER AV
JAMES ST
PHILLIPS AV
LOIS ST
FLORENCE ST
ROOSEVELT RD
CENTER RD
GRADY AV
EVERGREEN AV
TORRICKON LA
GREENWOOD AV
TAYLOR AV
MAPLE AV
ELM AV
GARDEN LA
OAK LA
WOODOCK AV
NEW RD
BRADFORD RD
GREIFFITHS
PATTY LA
GRACE RD
CHIP PT
NIBLICK PL
SOUTH
OAKFIELD RD
WYCKWOOD RD
CHATFIELD RD
HILLTOP LA
ROLAND RD
ROGERS RD
CRESTWALD TER
GEORGES LA
EUCLID AVE
CARRIAGE LA
STIRRUP LA
STALLION LA
SADDLE DR
SORREL RD
WAY
MARWINDALE AVE
SUMMIT RD
IVANHOE AVE
MUSTANG RD
BRIDLE LA
PALOMINO LA
BRANDES DR
BUCKBOARD CIR
BUGGY WHIP DR
PINTO DR
GREY HORSE DR
JACK HORSEFOAL DR
PALABEL DR
CONNEMARA CIR
HACKNEY RD
GOTTLAND CIR
DAPPLE CIR
MARE RD
ROAN DR
SABLE LA
WELSH RD
APPALOOSA RD
PASO FINO DR
ICKASAW RD
ARRINGTON
Neshaminy
WALNUT
CHESTNUT
MILL
STREET
RD
WAY DR
MONACO DR
LORRAINE DR
TRIUMPHE AVE
PHILADELPHIA AVE
WARRINGTON AVE
NESHAMINY AVE
GALLEY
PHILA
BRINKNOTTH AV
LARUE LA
ROGER RD
MOFFET LA
IVERS LA
CLIFFORD ST
ST. CHARLES
PARK HEIGHTS
FOX HILL
VALLEY
18976
Little Neshaminy
Graeme State Park
DRIVE WAY
FAIRMONT AV
KANSAS RD
611
WILD LILAC CT
SASSAFRAS CT
WHITEWOOD LA
REDBUD CT
HACKBERRY CT
BASSWOOD CT
LOWLAND CT
UPLAND CT
COPPER CT
BUNNELL RD
TITUS RD
WARRINGTON IND. PK.
SPENCER IND. PARK
RESOURCES RD
HAMPTON LA
MIRANDA LA
BRADLEY LA
FOSTER
NEVARC
COOPER RD
HOPWOOD DR
CARR WAY
HARRIS RD
BETTOP PL
DEVON RD
GOVERNOR RD
EASTON RD
CYPRESS
POPLAR
SPRUCE RD
PHEASANT DR
ACORN DR
NORFOLK RD
ESSEX RD
KENT RD
SURREY RD
DERBY RD
CLOVER DR
KINGSLEY
AVONDALE RD
PINE RD
WILLOW
TALLY HO
ST. JOSEPH R.C. SCH.
1897
CEM
WELLINGTON
KIPLING
WESTBURY
BEVERLY
CALEDONIA
CLYDE
CAMBRI
AIR FORCE RESERVE CTR.
ANDREWS
LANGLEY
BOLLING
EGLIN
FAIRCHILD
TIM. RD
JOHNSON ST
DOBBINS
AIR NATIONAL GUARD CTR.
17TH ST
16TH ST
15TH ST
14TH ST
13TH ST
12TH ST
11TH ST
AV H
AV D
AV C
PRIVET
KELLETT AIRCRAFT CORP.
19040
WINDING LA
SHERWOOD
SPRINGBROOK
Pk.
BRUMAR
LATHSTRING
BRICKMAN
MAURICE
HARCOURT
LA AV
CATHERINE
COTTONWOOD
SERRILL
CHARLES
LESHER
LONG LA
HOLLY
BUTTERNUT
REDGUM
CYPRES
MABLE
WILSON
GRANT
PERSHING
WATSON
WAYNE AV
MORELAND
WASHINGTON
U.S. NAVAL AIR STATION
WILLOW GROVE
Hallowell
TINIUS OLSEN TESTING MACHINE CO
Hidden Springs
Golf & Country Club
KEITH VALLEY
KEITH VALLEY MIDDLE SCH
HORSHAM
HORSHAM
JARRETT
KUNZ LA
GROVE
GRAEME PARK RD
WILLOWBROOK RD
EVERGREEN RD
DEAN DR
VALLEY CTR
9TH ST
8TH AV
5TH

7.0 PERSONAL PROTECTIVE EQUIPMENT

PPE anticipated for use has been summarized in Table 7-1 (below). Standard work clothes will include, as a minimum, long-sleeve shirts, long pants, and steel-toed hard-soled work boots.

TABLE 7-1
PPE ANTICIPATED FOR EACH SITE TASK/OPERATION

Task/Operation	PPE Anticipated
Well drilling, test pitting, soil gas survey (if using Geoprobe or similar equipment)	Level C: Respirators, hard hat, safety glasses with side shields, steel-toed hard-soled work boot, Tyvek, coveralls surgical-style inner glove, nitrile outer glove, disposable boot covers. Respirators as per Table 7-2. Gloves and boots will be taped. Note: If encountered materials appear to present an increased dermal threat and the task presents a splash potential or possible contact with contaminated materials, affected personnel will upgrade to Saranex coveralls and Viton gloves.
Aquifer monitoring, groundwater sampling, and aquifer pumping tests	Level C: Respirators, steel-toed, hard-soled work boot, Tyvek, surgical-style inner glove, nitrile outer glove, disposable boot covers, splash goggles. Gloves and boots will be taped. Respirators as per Table 7-2. Note: If encountered materials appear to present an increased dermal threat and the task presents a splash potential or possible contact with contaminated materials, affected personnel will upgrade to Saranex coveralls and Viton gloves.
Surveying	Level D: Standard work clothes, steel-toed, hard-soled work boots, surgical-style gloves, disposable boot covers
Concrete Cutting	Level D: Standard work clothes, steel-toed, hard-soled work boots, surgical-style gloves, disposable boot covers, hearing protection, safety glasses.

Action levels with respect to respiratory protection requirements and/or withdrawal from site are summarized in Table 7-2 (below).

TABLE 7.2
ACTION LEVELS FOR RESPIRATORY UPGRADES
NWS EARLE

Monitoring Device	Action Level	Action
Photoionization Detector (PID)	0-10 ppm above Background at source	• Continue work • Monitor breathing zone
	10 ppm above Background and < 50 ppm above background in breathing zone	• Monitor breathing zone with benzene Draeger tube, confirm benzene concentration 1-10 are organic vapor cartridge > 10 ppm (benzene) Level B protection
	> 50 ppm above background in breathing zone	• Evacuate to unaffected area and return only when readings subside below action level. If readings do not subside, contact H&S.
Flame Ionization Detector (FID)	≤ Background	• Continue work
	> Background	• Monitor breathing zone
	> Background and < 50 ppm above background in breathing zone	• Monitor breathing zone with benzene Draeger tube, Benzene 1-10ppm, use organic vapor cartridge respirator, if > 10 ppm benzene, use Level B protection
	> 50 ppm above background in breathing zone	• Evacuate to unaffected area and return only when readings subside below action level. If readings do not subside, contact H&S.
Draeger Tube for Benzene	< 1 ppm	• Continue work
	> 1 ppm	• Evacuate to unaffected area and return only when readings subside below action level. If readings do not subside, contact H&S.

8.0 MEDICAL SURVEILLANCE

8.1 REQUIREMENTS FOR B & R ENVIRONMENTAL PERSONNEL

B & R Environmental personnel, whose work may require their presence in areas where potential exposures to hazardous materials exist, shall participate in the B & R Environmental medical monitoring program and must have a completed Medical Data Sheet (Exhibit 3, page 8-2) attached to this HASP. All medical examinations performed for B & R Environmental personnel for these purposes shall be conducted in accordance with OSHA General Industry Standards 29 CFR 1910.120 and 1910.134.

8.2 REQUIREMENTS FOR SUBCONTRACTORS

Subcontractors are required to obtain a certificate of their ability to perform hazardous waste site work and to wear respiratory protection. The Subcontractor Medical Approval Form (Figure 8.1, page 8-3) can be used to satisfy this requirement, providing it is properly completed and signed by a licensed physician. Subcontractors who have a company medical surveillance program meeting the requirements of paragraph (f) of 29 CFR 1910.120 can substitute Figure 8.1 with a letter, on company letterhead, containing all the information in the example letter presented as Figure 8.2. Figure 8.2 and Figure 10.1 can be combined into one letter.

EXHIBIT 3
MEDICAL DATA SHEET

This form must be completed by all on-site B & R Environmental personnel and subcontractors, prior to the commencement of activities, and shall be kept in the site command post during site activities. This form must be delivered to any attending physician when medical assistance is needed.

Site _____

Name _____ Home Telephone (___) _____

Address _____

_____

_____

Date of most recent physical examination* ____/____/____

Age Height Weight _____

Name of next of kin Telephone (___) _____

Drug allergies or other allergies _____

_____

Previous Illnesses or Exposures to Hazardous Substances:

_____

_____

Current Medication (prescription and non-prescription):

_____

_____

Medical Restrictions _____

_____

Name, address, and phone number of personal physician _____

_____

_____

*Confirmed by Site HSO _____ ____/____/____

Signature of HSO Date

For employees of _____
Company Name

Participant Name:_____ Date of Exam: _____

Part A

The above-named individual has:

1. Undergone a physical examination in accordance with OSHA Standard 29 CFR 1910.120, paragraph (f) and found to be medically

   ( ) qualified to perform work at the _____ work site
   ( ) not qualified to perform work at the _____ work site
   and,

2. Undergone a physical examination as per OSHA 29 CFR 1910.134 (b)(10) and found to be medically

   ( ) qualified to work in respiratory protection
   ( ) not qualified to perform work in respiratory protection

My evaluation has been based on the following information, as provided to me by the employer.

( ) A copy of OSHA Standard 29 CFR 1910.120 and appendices.
( ) A description of the employee's duties as they relate to the employee's exposures.
( ) A list of known/suspected contaminants and their concentrations (if known).
( ) A description of any personal protective equipment used or to be used.
( ) Information from previous medical examinations of the employee which is not readily available to the examining physician.

Part B

I, _____, have examined _____
Physician's Name (print) Participant's Name (print)
and have determined the following information:

1. Results of the medical examination and tests (excluding findings or diagnoses unrelated to occupational exposure):

_____
_____
_____

FIGURE 8.1
SUBCONTRACTOR MEDICAL APPROVAL FORM

Brown & Root Environmental
A Division of Halliburton NUS Corporation

2. Any detected medical conditions which would place the employee at increased risk of material impairment of the employee's health:

_____

_____

_____

3. Recommended limitations upon the employee's assigned work:

_____

_____

_____

I have informed this participant of the results of this medical examination and any medical conditions which require further examination or treatment.

Based on the information provided to me, and in view of the activities and hazard potentials involved at the _____ work site, this participant

( ) may
( ) may not

perform his/her assignment task.

Physician's Signature_____

Address_____

Phone Number_____

NOTE: Copies of test results are maintained and available at:

_____

Address

FIGURE 8.1 (CONTINUED)
SUBCONTRACTOR MEDICAL APPROVAL FORM

Brown & Root Environmental
A Division of Halliburton NUS Corporation

FIGURE 8.2
MEDICAL SURVEILLANCE LETTER

The following statements must be typed on company letterhead and signed by an officer of the company.

LOGO
XYZ CORPORATION
555 E. 5th Street
Nowheresville, Kansas 55555

Month, day, year

Mr. Russell Turner, Project Manager
Brown & Root Environmental
993 Old Eagle School Road, Suite 415
Wayne, Pennsylvania 19087-1710

Subject: Medical Surveillance
NASJRB Willow Grove

Dear Mr. Turner:

As an officer of XYZ Corporation, I hereby state that the persons listed below participate in a medical surveillance program meeting the requirements contained in paragraph (f) of Title 29 of the Code of Federal Regulations, Part 1910.120 entitled "Hazardous Waste Operations and Emergency Response: Final Rule." I further state that the persons listed below have had physical examinations under this program within the last 12 months and that they have been cleared, by a licensed physician, to perform hazardous waste site work and to hear respiratory protection. I also state that, to my knowledge, no person listed below has any medical restrictions that would preclude him/her from performing their assigned activities at the NASJRB Willow Grove Site.

LIST EMPLOYEE NAMES AND DATES OF MOST RECENT PHYSICAL EXAMS HERE

Should you have any questions, please contact me at 555/555-5555.

Sincerely,

(Name of Company Officer)
Title

MEDICAL SURVEILLANCE LETTER	**Brown & Root Environmental** *A Division of Halliburton NUS Corporation*

9.0 DECONTAMINATION PROCEDURES

All employees and equipment leaving the work site must go through proper decontamination procedures.

Specific PPE Decontamination Procedures:

- Equipment drop
- Wash and rinse boot covers and outer gloves
- Remove tape
- Remove SCBA harness assembly (if worn)
- Remove coveralls
- Remove boot covers and outer gloves
- Remove respirator (if worn)
- Remove inner gloves

Decontamination of Sampling Bottles or Other Equipment:

- If necessary, bottles containing samples will be sprayed with Alconox and lightly wiped with clean paper towels.

- Follow Navy specifications for equipment decontamination.

Decontamination Evaluation and Modification:

- Any grossly contaminated reusable items (i.e., boot covers) that are not visibly cleaned via decontamination efforts are to be discarded.

- Discard and replace decontaminated wash and rinse solutions if/when they become visibly discolored or otherwise noticeably affected.

- Periodically screen employees with monitoring instruments before and after decontamination operations.

Decontamination and/or disposal procedures for decontamination equipment, solutions, or solvents shall follow Navy directions, to be determined by the Project Manager and implemented by the FOL.

10.0 TRAINING REQUIREMENTS

10.1 INTRODUCTORY AND REFRESHER TRAINING

10.1.1 Requirements for B & R Environmental Personnel

All B & R Environmental personnel must complete 40 hours of introductory hazardous waste site training prior to performing work at NASJRB Willow Grove. Additionally, B & R Environmental personnel who have had introductory training more than 12 months prior to site work must have completed 8 hours of refresher training within the past 12 months before being cleared for site work.

In addition, the B & R Environmental field operations leader is required to have completed an 8-hour supervisory training course.

Documentation of B & R Environmental introductory and refresher training is specified on Table 10-1 (below).

TABLE 10-1
PREVIOUS TRAINING RECORD

Name	Type(s) of Training Received	Date(s) Training Received
Charles Meyer	40-Hour Introductory 8-Hour Refresher 8-Hour Supervisory	March 1983 May 1996 June 1990
Don Whalen	40-Hour Introductory 8-Hour Refresher 8-Hour Supervisory	October 1989 May 1996 June 1990
Vince Shickora	40-Hour Introductory 8-Hour Refresher 8-Hour Supervisory	June 1989 May 1996 June 1990
Robert Good	40-Hour Introductory 8-Hour Refresher 8-Hour Supervisory	June 1989 April 1996 June 1990

Additional B & R Environmental personnel will be added as assignments are made.

10.1.2 Requirements for Subcontractors

All B&R Environmental subcontractor personnel must have completed introductory hazardous waste site training or equivalent work experience as defined in OSHA Standard 29 CFR 1910.120(e) and 8 hours of refresher training meeting the requirements of 29 CFR 1910.120(e)(8) prior to performing field activities at the NASJRB Willow Grove Site. Subcontractors must certify that each employee has had such training by sending B&R Environmental a letter, on company letterhead, containing the information in the example letter provided as Figure 10.1 (page 10-2). Copies of all training certificates must be maintained on site. Figures 10.1 and 8.2 can be combined into one letter.

FIGURE 10.1
OSHA COMPLIANCE LETTER

The following statements must be typed on company letterhead and signed by an officer of the company.

LOGO
XYZ CORPORATION
555 E. 5th Street
Nowheresville, Kansas 55555

Month, day, year

Mr. Russell Turner, Project Manager
Brown & Root Environmental
993 Old Eagle School Road, Suite 415
Wayne, Pennsylvania 19087-1710

Subject: OSHA Compliance and Training
NASJRB Willow Grove Site

Dear Mr. Turner:

As an officer of XYZ Corporation, I hereby state that I am aware of the potentially hazardous nature of the subject project. I also understand that it is our responsibility to comply with all applicable occupational safety and health regulations including those stipulated in Title 29 of the Code of Federal Regulations (CFR), Parts 1900 through 1910 and Part 1926.

I also understand that Title 29 CFR 1910.120, "Hazardous Waste Operations and Emergency Response: Final Rule," requires, but is not limited to, medical surveillance, for applicable employees, and appropriate level of training as required in paragraph (e) of 29 CFR 1910.120 for employees engaged in certain hazardous waste operations. I hereby state that I have reviewed these requirements; that I understand Title 29 of the CFR, Parts 1900 through 1910, and Part 1926; and that XYZ Corporation and all of its employees who will perform work at the NASJRB Willow Grove Site are in full compliance.

The following employees have had 40 hours of introductory hazardous waste site training or equivalent work experience as required by 29 CFR 1910.120(e) and have had 8 hours of refresher training as required by 29 CFR 1910.120(e)(8).

LIST EMPLOYEE NAMES, TYPE(S) OF TRAINING RECEIVED, AND DATES OF TRAINING HERE

Sincerely,

(Name of Company Officer)
Title

FIGURE 10.1 **OSHA COMPLIANCE LETTER**	**Brown & Root Environmental** *A Division of Halliburton NUS Corporation*

10.2 SITE-SPECIFIC TRAINING

B & R Environmental will provide site-specific training to all B & R Environmental employees and subcontractor employees who will perform work on this project. This training will only be provided once, and personnel who do not attend will not be permitted to perform work at this project. Site-specific training will include the following:

- Names of personnel and alternates responsible for site safety and health
- Safety, health, and other hazards present on site
- Use of PPE
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan and addenda
- The elements of the site emergency response plan site
- Review of relevant MSDS for substances brought on site

This training will be documented using Figure 10.2. Any additional training will be documented using Figure 10.3.

My signature below indicates that I am aware of the potential hazardous nature of performing groundwater investigation activities at the NAS Willow Grove Site and that I have received site-specific training, which included the elements presented below:

- Names of personnel and alternates responsible for safety and health
- Safety, health, and other hazards present on site
- Use of personal protective equipment
- Work practices to minimize risks from hazards
- Safe use of engineering controls and equipment
- Medical surveillance requirements
- Signs and symptoms of overexposure
- The contents of the health and safety plan and addenda
- The elements of the site emergency response plan
- Review of relevant MSDS for substances brought on site

I further state that I have been given the opportunity to ask questions and that all of my questions have been answered to my satisfaction.

Name	Signature	Date
Vincent Shickora		3-3-97
Robin Lounsbury	Robin Lounsbury	3-28-97
Rick Empson		3-31-97
Jerry Malack		3-31-97
Rick Hoffman		3-31-97
Jay Devor		4-9-97
Donald Whalin		4-10-97
Scott Auberger		4-15-97
Craig K. Conner		4-15-97

FIGURE 10.2
SITE-SPECIFIC TRAINING DOCUMENTATION

Brown & Root Environmental
A Division of Halliburton NUS Corporation

Attendees	Subject - Coverage	Instructor	Date
AL. Pramik.	Health & Safety	V. Shickora	4-17-97.
THOMAS KIMMEL	" " "	"	4-29-97
GERALD Coppola	"	"	5-12-97
ANTHONY MASCARO	"	"	5-12-97
	"	"	
Charles Meyer	"	"	6/17/97
Joseph D. Pasquale	"	"	7/25/00
Joseph L Gabriel	"	"	7/25/00
ROBERT GOOD	"	ROBERT GOOD	7/25/00
Mike Hyber	"	"	9/8/00
Hmon Eichelberger	"	"	9/8/2000

FIGURE 10.3
ADDITIONAL SITE-SPECIFIC TRAINING RECORD

Brown & Root Environmental
A Division of Halliburton NUS Corporation

11.0 EMERGENCY RESPONSE PLAN (ERP)

Through the course of site activities, potentials for emergency response efforts exist. Pre-emergency planning (such as determining and/or verifying appropriate off-site emergency response agencies) is the responsibility of the site HSO. Emergency reference information is included in Site Standard Work Practices (section 6.0) of this HASP. The site HSO is also responsible for determining and documenting the following information, upon arrival at the NASJRB Willow Grove Site, prior to the initiation of any field activities and for communicating these requirements to all affected site personnel.

In the event of any emergencies (i.e., fires, significant spills or releases, etc.), site personnel shall be immediately evacuated to a safe place of refuge and shall notify the B & R Environmental project manager (Russell Turner) and the health and safety manager (HSM) (Matthew M. Soltis) and any appropriate off-site response agencies. In view of this approach, this section of the HASP is provided to be in compliance with OSHA Standard 29 CFR 1910.38(a) (as permitted by OSHA 29 CFR 1910.120 (l)(1)(ii).

11.1 EMERGENCY ESCAPE PROCEDURES AND ESCAPE ROUTE ASSIGNMENTS

Emergency escape routes and safe places of refuge shall be identified and established for each of the work site locations and communicated to all affected personnel prior to task initiation. When these routes and locations are designated, consideration shall be given to factors such as accessibility, prevalent and/or existing wind speed and direction, distance from potentially affected areas, etc. The information shall be modified, if necessary, as work progresses. Any such modifications shall be effected by the site HSO.

11.2 PROCEDURES TO BE FOLLOWED BY PERSONNEL WHO MUST REMAIN ON SITE TO OPERATE ANY CRITICAL OPERATIONS BEFORE EVACUATING

If the designated emergency evacuation signal is given, all personnel at the work site are to immediately report to the designated safe place of refuge via the identified primary (or secondary) emergency escape routes indicated by the site HSO. At the time of this ERP preparation, it is not anticipated that any personnel will need to remain at their work site to maintain any critical operations. If this condition should change, the site HSO shall identify the personnel and their responsibilities in this regard and amend this plan accordingly. Any such modifications must be communicated to the B & R Environmental HSM for concurrence.

11.3 PROCEDURES TO ACCOUNT FOR ALL PERSONNEL FOLLOWING AN EVACUATION

In the event that an emergency evacuation is effected during the course of site work at any of the site areas, personnel shall immediately report to the designated refuge location and remain there. The HSO, assisted by the FOL, shall conduct a roll call (using the site logbook) to account for all personnel to ensure that a total work site evacuation has taken place. The FOL shall be responsible for concurrently initiating the emergency communication procedure (notifying NASJRB Willow Grove personnel). If/when all personnel have been accounted for, an evaluation of the event that led to the evacuation shall be conducted to determine if work is to be resumed (and, if so, under what conditions - if any) or if personnel are to go through any necessary decontamination efforts and leave the site. This evaluation is to be performed by the site HSO, with assistance from the FOL, and guidance from the B & R Environmental HSM and appropriate Navy personnel. Under no circumstances are workers to depart from the refuge location until so directed.

If the roll call identifies that any personnel are not accounted for, this information shall be immediately communicated to the off-site emergency response agency upon their arrival. This information is to be supplemented with any additional information available that could be of assistance in conducting rescue operations (i.e., last known location of the missing personnel, etc.). Site personnel are not authorized to participate in emergency response/rescue operations.

11.4 RESCUE AND MEDICAL DUTIES

Site personnel are not authorized to participate in rescue and first aid procedures. However, any personnel present who are trained to perform emergency first aid activities may perform these functions if needed. Any such personnel are identified below:

Name	Trained In	Certified By	Expiration Date of Certifcation
1.			

Any use of first aid equipment must be documented on the attached First Aid Supply Usage Form (page 11-3).

FIGURE 11.1

FIRST AID SUPPLY USAGE FORM

Project Number	Date	Item(s) Used	Kit Number
		None	

Please submit this form as soon as possible to the B & R Environmental equipment manager for first aid supply replenishment.

11.5 EMERGENCY REPORTING PROCEDURES

Upon arrival at the work site, prior to the initiation of any field activities, the site HSO shall obtain the information specified on the attached Emergency Reference and American Red Cross First Aid forms and post copies of these near all on-site telephones (Exhibits 1 and 2 in Section 6.0).

Emergency reporting functions shall be the responsibility of the FOL. The FOL shall become thoroughly familiar with this plan prior to the initiation of any site work activities.

In the event that an emergency incident occurs and response assistance is necessary, the FOL shall contact the appropriate Navy agency (or agencies) and communicate the following information:

- Nature of the incident (fire, spill, chemical exposure, physical injury, etc.)
- Number of injuries and type(s) of injury (injuries)
- Possible contaminants that may be encountered in response efforts

If off-site emergency response is needed, those agencies will be contacted by Navy personnel. On-site emergency event coordination efforts (i.e., controlling the affected areas, accounting for site personnel, etc.) shall be the responsibility of the B & R Environmental site HSO, until/unless relieved of these duties by the arrival of appropriate emergency response personnel.

11.6 SITE EMERGENCY ALARM SYSTEM

Work areas are anticipated to consist of small areas where all personnel are within visible and audible range of each other and will therefore not need any special alarm systems as long as verbal communication is not hampered.

11.7 ERP INITIAL TRAINING AND REFRESHER TRAINING

All site personnel shall be trained in the contents of this ERP as part of the initial site-specific health and safety training. All site visitors shall be informed of restricted areas, emergency communication signals, refuge location, and other safety requirements. Site visitors must be escorted by B & R Environmental or NASJRB Willow Grove personnel at all times. Any visitors must also be entered in the site logbook so they can be accounted for in the event of any evacuations.

12.0 AIR MONITORING

Monitoring/Sampling Equipment Checklist

One HNu P1-101 (PID) equipped with an 11.7 eV probe will be utilized for each activity. The 11.7 eV probe was selected because many of the site contaminants have ionization potentials exceeding 10.2 eV.

The above-specified instrument shall be used on a frequent basis throughout all activities. At a minimum, monitoring will be conducted at the beginning of each task and frequently during all site activities. Ambient air will be monitored, as well as workers' breathing zones. From a health and safety standpoint, workers' breathing zones are the primary areas of concern. If at any time this instrument indicates a potential hazard, monitoring will be performed more frequently. See Section 7.0 of this HASP for additional information regarding instrument action levels.

Methods of Maintenance and Calibration

All equipment maintenance and calibration efforts shall be conducted by Thomas Patton or Ron Richmond at the B & R Environmental warehouse facility. Additionally, daily field calibrations and operational checks will be conducted and documented by the Site HSO Officer. These efforts shall be performed in accordance with the following B & R Environmental health and safety SOPs, which are located in Appendix B:

- No. ME01: Use, Calibration, and Maintenance of the HNU PI-101

Field Calibration

The results of instrument calibration performed in the field must be recorded on Table 12-1 (page 12-2) and returned to the Health Sciences Department with the Site Health and Safety Follow-Up Report.

TABLE 12-1
DOCUMENTATION OF FIELD CALIBRATION

SITE NAME: NAS WILLOW GROVE

PROJECT NO.: 5564 (CTO 227)

Date of Calibration	Instrument Name and Model	B & R Environmental Instrument I.D. Number	Person Performing Calibration	Instrument Settings		Instrument Readings		Calibration Standard (Lot Number)	Remarks/ Comments
				Pre-Calibration	Post-Calibration	Pre-Calibration	Post-Calibration		

Direct-Reading Instrument Response Data

Any readings obtained through the use of direct-reading instruments must be recorded throughout the duration of project activities. This information is to be recorded on Table 12-2 (page 12-4) and returned to the B & R Environmental HSM with the Site Health and Safety Follow-Up Report at the conclusion of the project site activities.

TABLE 12-2
DIRECT-READING INSTRUMENT RESPONSE DATA

SITE NAME: NAS WILLOW GROVE

PROJECT NO.: 5564

PAGE _____ OF _____

Date and Time(s)	Instrument Operator Name	Instrument Used	Instrument Reading and Duration	Location (e.g., borehole vs breathing zone)	Operation(s) Being Performed	Personnel in Vicinity at Time of Readings and Level of PPE Worn
Example 12-12-91/14:30	Joe Field	HNU 101	15 ppm/15 min.	breathing zone	sample location no. 12	Jim Technician/Level B George Grunt/Level B

TABLE 12-2
DIRECT-READING INSTRUMENT RESPONSE DATA
PAGE TWO

SITE NAME: NAS WILLOW GROVE

PROJECT NO.: 5565

PAGE _____ OF _____

Date and Time(s)	Instrument Operator Name	Instrument Used	Instrument Reading and Duration	Location (e.g., borehole vs breathing zone)	Operation(s) Being Performed	Personnel in Vicinity at Time of Readings and Level of PPE Worn

13.0 CONFINED-SPACE ENTRY

No confined-space operations are anticipated to be involved in the performance of planned project activities. Therefore, specific procedures for such efforts are not applicable and are not addressed in the HASP. Furthermore, confined space entry operations are prohibited under this HASP without specific authorization by the CLEAN Health and Safety Manager or regional HSM (M. Gillie, CIH).

14.0 SITE CONTROL

Work zones will be delineated for each of the site areas included in this effort. The HSO is responsible for delineating these zones based on site conditions. B & R Environmental will designate and utilize these work zones in conjunction with proper decontamination procedures to prevent the spread of contaminants into previously unaffected areas of the site. It is anticipated that a three-zone approach will be used during work at this site: exclusion zone, contamination reduction zone, and support zone.

14.1 EXCLUSION ZONE

The exclusion zone (EZ) will be considered those work areas with known or suspected contamination. The EZs for this project will be limited to those areas where active work is being performed and/or anywhere there is believed to be the potential for exposure to site contaminants. Where appropriate, EZs will be designated as the actual work area, minimizing their size. For example, the work area in the immediate vicinity of a monitoring well (approximately a 20-foot radius around the well) will commonly be established as an EZ.

No one may enter or perform work in an established EZ unless they satisfy all medical surveillance and training requirements and they are properly outfitted in the appropriate PPE. All authorized personnel and visitors will sign a daily in/out log maintained by the FOL.

14.2 CONTAMINATION REDUCTION ZONE

A contamination reduction zone (CRZ) will be established as a buffer area between the designated EZs and any areas of the site where contamination is not suspected. CRZ locations will be established at the perimeter of the EZ locations. If necessary, a heavy equipment decontamination area will be established as a separate CRZ for this project.

14.3 SUPPORT ZONE

The support zone for this project will be established in areas where exposure to site contaminants would not be expected during normal working conditions or foreseeable emergencies.

The support zone will be the area where the site command post (i.e., site trailer) is positioned and where supplies and equipment are maintained.

14.4 SITE RESTORATION

Once site work has been completed, the FOL and HSO will assure that the work areas have been cleaned and reclaimed and are suitable for passage of the facility personnel.

14.5 SITE COMMUNICATIONS

Site communications will be maintained using verbal communication, hand signals, air horns, telephones, and two-way radio systems. Verbal and hand signals are limited to heavy equipment operations and when personnel are working in close proximity to each other.

14.6 BUDDY SYSTEM

All site personnel entering a CRZ or exclusion zone will practice the buddy system. A buddy system requires that at least two individuals work as a team and are in close enough proximity to each other to maintain voice and visual contact.

15.0 SPILL CONTAINMENT PROGRAM

15.1 GENERAL REQUIREMENTS

Accidental spills or releases of hazardous materials or hazardous wastes are most likely to occur during groundwater, and pump test investigations. All spills or releases shall immediately be reported to the HSD. Small spills shall be contained and cleaned up by personnel assigned to the management unit as soon as possible after the event has occurred. In the case of uncontrolled spills or Immediately Dangerous to Life and Health (IDLH) situations, the HSO will immediately notify the FOL to initiate the ERP (Chapter 11.0).

15.2 CONTAINMENT METHODS

15.2.1 Groundwater Investigations/Pump Tests

Sorbing socks or containment dikes shall immediately be placed around the edge of the spill area to prevent the material from contaminating the surrounding environment.

- If it is a small spill, the material shall be shoveled and contained within double plastic bags and placed within a 55-gallon drum. The areas shall be rinsed at least three times to remove visual surface contamination.

- If it is a large spill, a backup vacuum vehicle shall be employed to vacuum the contaminated surface area. The area shall be washed with water. The area shall be rinsed at least three times to remove any visual surface contamination.

15.2.1.1 Absorbent Materials

Once a spill has been contained, loose sorbent material (e.g., vermiculite) may be used to absorb surface liquids. Nonsparking shovels and brooms shall be used to clean up the spent absorbent material.

15.2.1.2 Spill Kits

Commercially available spill kits shall be readily available to each management unit team during building investigations. These kits shall be the J.T. Baker, Incorporated Spill Kit or equivalent, containing as a minimum, the following items:

- Containment materials
- Absorbent materials
- Chemical-resistant suit, gloves, and boots
- Chemical safety goggles
- Nonsparking scooping device
- Disposable bags
- Duct tape

15.3 SPILL TOOLS

The following hand tools shall be readily available to the HSO during groundwater investigations and pump tests in order to provide backup support to management unit personnel:

- Nonsparking shovels
- Drum patching and plugging kits
- Overpack drums
- Brooms and dust pans
- Hand pump garden sprayers
- Absorbent materials

15.4 AREA RELEASE CRITERIA

Any area contaminated from a spill or release of a hazardous material shall be visually free of surface contamination. The area shall be monitored by the HSO using a PID/FID or detector tubes to determine residual contamination. If the area surveyed is at background levels, the area shall be released as being decontaminated.

15.5 HAZARDOUS WASTE REFUSE

Any solid waste generated during hazardous waste cleanup procedures shall be contained within double plastic bags and placed within a 55-gallon drum. The drum shall be sealed and the contents recorded by the HSO within his daily logbook and on the RCRA Hazardous Waste Label which shall be affixed to the side of the drum.

15.6 HAZARDOUS WASTE DISPOSAL

Hazardous waste generated from hazardous waste cleanup procedures shall be disposed of by a State of Pennsylvania approved Resource Conservation and Recovery Act (RCRA) treatment, storage, and disposal facility.

Original Signatures

HEALTH AND SAFETY PLAN ADDENDUM
FOR
NASJRB WILLOW GROVE
PUMP REPLACEMENT AND
REMEDIAL INVESTIGATIONS

Horsham Township, PA

Contract No. N62472-90-D-1298
Contract Task Order 0277

Submitted to:
Northern Division
Environmental Branch, Code 18
Naval Facilities Engineering Command
10 Industrial Highway, Mail Stop #2
Lester, Pennsylvania 19113-2090

Submitted by:
Tetra Tech NUS Inc.
600 Clark Avenue Suite 3
King of Prussia, PA 19406-1433

FEBRUARY 1999

APPROVED BY:

RUSSELL E. TURNER
PROJECT MANAGER
TETRA TECH NUS INC.

MATTHEW M. SOLTIS, CSP, CIH
CLEAN HEALTH AND SAFETY MANAGER
TETRA TECH NUS INC.

SITE-SPECIFIC TRAINING DOCUMENTATION
HEALTH AND SAFETY PLAN ADDENDUM
for
PRODUCTION WELL PUMP REPLACEMENT
AT BUILDINGS 31 AND 32
and
MONITORING WELL INSTALLATION, ROCK CORING
AND HYDROGEOLOGIC INVESTIGATIONS AT SITE'S 1 AND 5
for
NASJRB WILLOW GROVE
Horsham Township, Pennsylvania

My signature below indicates that I am aware of the potential hazardous nature of performing specific tasks within the Cost Impact Letter No. 7 Scope of Work for Monitoring Well and Rock Core installation, Water Level Monitoring and Groundwater Sample Collection, and Production Well Pump Removal and Replacement at NASJRB Willow Grove, Horsham Township, Pennsylvania. I have reviewed the HASP and associated addenda and have received site-specific training that included the elements contained therein.

I further state that I have been given the opportunity to ask questions and that all of my questions have been answered to my satisfaction.

Name	Signature	Date
Joesph DiNaspeala		7/25/00
Joseph C Gabriel		7/25/00
Michael Huber		9/8/00
Aaron Eichelberger		9/8/2000

The following information represents modifications to the Health and Safety Plan for Remedial Investigations (RI) at NASJRB Willow Grove, Horsham Township, Pennsylvania (February 1997). These modifications have been generated to address additional planned activities, as presented in the Contract Task Order 277, CIL No. 7. This document will be incorporated as an addendum to the aforementioned Health and Safety Plan (HASP). This addendum addresses the additional tasks associated with this scope of work. Where potential hazards have been identified and associated with the planned activity, the necessary actions to be taken to mitigate these hazards have also been identified.

The following sections of the final HASP dated February 1997 are to be amended to include the information identified within the text of this addendum. It is the PM's responsibility to forward copies of this addendum to the field crew (Tetra Tech NUS and associated subcontractors) to be inserted into the field copies of the HASP. It is the FOL's responsibility to ensure that all members of the field crew review and understand the addendum. This will be accomplished through the Site-Specific Training. In addition to the review process, the final HASP (field copies) sections will be highlighted to indicate areas revised as a result of this addendum. The FOL will ensure all fieldcrew members indicate, by signing a field team review sheet in the back of this document, they have reviewed the elements of this addendum, understand the requirements, and any questions they may have had, have been answered to their satisfaction.

Sections	1.0	Introduction
	3.0	Scope of Work
	4.0	Site Contaminants
	5.0	Risk Analysis
	8.0	Medical Surveillance
	10.0	Training Requirements

The modifications of the individual sections are as follows:

SECTION 1.0 INTRODUCTION

Proposed Dates of Work: February 17, 2000 through August 2000

Project Team:

NAME	RESPONSIBILITY
Russ Turner	Project Manager (PM)
Vincent Shickora	Field Operations Leader (FOL)
Charles Meyer	Alternate FOL
TBA	Site Safety Officer (SSO)
Matthew M. Soltis, CSP, CIH	CLEAN Health and Safety Manager (HSM)

Non-Tetra Tech NUS Personnel/Affiliation: TBA

Plan Preparation: Michelle F. Gillie, CIH, Tetra Tech NUS
Reviewed and approved by: Matthew Soltis, CIH, CSP, Tetra Tech NUS

Reviewed:

Project Manager: Russ Turner, Tetra Tech NUS

SECTION 3.0 SCOPE OF WORK

The following work will be performed as part of the new scope of work:

- Removal of two obsolete existing pumps from two Navy production wells and replacement with new pumps of similar capacity
- Performance of water level monitoring and sample collection
- Installation of monitoring wells and one rock coring at Site 5 - Fire Training Area.

SECTION 4.0 SITE CONTAMINANTS

No additional chemical contaminants have been identified at this site. The potential hazards for pump removal/replacement, water level monitoring and groundwater sample collection are identical to those listed for groundwater sampling and water level measurements in the original HASP.

SECTION 5.0 RISK ANALYSIS

Installation, sampling, water level monitoring, and rock coring will entail similar risks to the installation and sampling of monitoring wells covered in the original HASP.

The removal and installation of new pumps at the Navy wells in Buildings 31 and 32 will entail similar risks to the installation of monitoring wells covered in the original HASP. In

addition, a truck-mounted boom will be employed in the vicinity of other structures and overhead utility lines to remove the old pumps and riser pipes, and to install the new pumps and riser pipes. Plumbing and electrical connections will be disconnected and connected at each of the new pump installation areas. The Navy will provide **LOCK OUT/TAG OUT** service for the electrical and plumbing connections at Buildings 31 and 32. The plumbing/electrical Subcontractor will be responsible to verify the Navy **LOCK OUT/TAG OUT** procedure to render the equipment safe for the Subcontractor's work.

SECTION 8.0 MEDICAL SURVEILLANCE

Name	Date of Last Medical Exam
Charles Meyer	12-31-98
Vincent Shickora	12-15-98

SECTION 10.0 TRAINING REQUIREMENTS

TABLE 10.1
PREVIOUS TRAINING RECORD

Name	Type(s) of Training Received	Date(s) Training Received
Charles Meyer	40-Hour Introductory 8-Hour Refresher 8-Hour Supervisory	3/84 4/99 6/90
Vincent Shickora	40-Hour Introductory 8-Hour Refresher 8-Hour Supervisory	8/98 5/99 6/90

16.0 FIELD TEAM REVIEW

Must be signed by each field team member prior to the site visit.

I have read and understand the contents of this HASP and will comply with its provisions, requirements, and restrictions.

Site: NAVAL AIR STATION JOINT RESERVE BASE- WILLOW GROVE

Name (PRINT)	Signature	Date
Vincent Shickora		3-3-97
Robin Lounsbury	Robin Lounsbury	3-31-97
Rick Empsum		3-31-97
Jerry Malack		3-31-97
Rick Hoffman		3-31-97
Joy Devos		4-9-97
Don Whalen		4-9-97
Craig K. Conner		4-15-97
Scott Alborallo		4-15-97
Al Pranik		4-17-97
Thomas Kimmel		4-29-97
Anthony Mascaro		5-12-97
Gerald Coppola		5-12-97
Charles Meyer		6/17/97
Robert Good		7/21/00
Joseph C Gabrian		7/25/00
Joseph D Bisgaier		7/25/00
Aaron Eichelberger		9/8/2000
Mike Huber		9/8/00

APPENDIX A

SITE HEALTH AND SAFETY FOLLOW-UP REPORT

SITE HEALTH AND SAFETY FOLLOW-UP REPORT

Appendix A must be filled out and returned to the Site Health and Safety Officer after each site visit.

Person responsible for follow-up report: Vincent Shickora

Actual date(s) of work: 3-3-97 through 7-25-97

1. **Actual Project Team:**

B&R Environmental Personnel	Discipline/Tasks
Vincent Shickora	Field leader / Health + Safety Officer
Tobin Lounsbury	Geologist / Sampler
Chuck Meyer	Sampler
Rob Good	Sampler / Geologist
Eric Huss	Sampler
Joy Dever	Sampler
Matt Woolford	Sampler
Don Whalen	Geologist

Non-B&R Environmental Personnel	Discipline/Tasks
Rick Empson	Driller
Rick Hoffmen	Drillers Helper
Jerry Malack	Drillers Helper
Al Pranik	Drillers Helper
Greig Conner	Drillers Helper
Scott Alberella	Driller
Gerald Coppola	Surveyor
Anthony Mascaro	Surveyor
Tom Kimmel	Surveyor

2. **Personal Protective Equipment Used:**

• Level of Respiratory Protection Used	Activity
Level D	All activities

• Field Dress	Activity
Hard Hat, Safety glasses, Steel-Toe boots, Tyvek coveralls, Latex and Nitrile gloves.	For Sampling and Drilling Activities

3. **General Safety**

Were any health or safety problems encountered while on site?

Explain: None

4. Incident Report Information

Did any team member report:	Yes	No
• Chemical exposure		✓
• Illness, discomfort, or unusual symptoms		✓
• Environmental problems (heat, cold, etc.)		✓
• Injury		✓

Explain: NA

Was an Employee Incident Report Completed? _____ Yes ✓ No

5. Evaluation of Site Health and Safety Plan

Was Health and Safety Plan adequate? ✓ Yes _____ No

What changes would you recommend?

None

FIRST AID SUPPLIES USAGE FORM

Project Number	Date	Item(s) Used	Kit Number
		N/A	

Please submit this information as soon as possible to the B&R Environmental/EMG Equipment Manager for first-aid supply replenishment. Telephone number: (412) 262-4583.

SCBA LOG

Site: NASJRB Willow Grove

Location: _____

Dates of Investigation: _____

User	Date of Use	SCBA Number	Satisfactory Checkout (Yes/No - Initials)	Date Cleaned
	N/A			

SCBA Performance Comments:

Vincent Shickora
Site Manager

7-25-97
Date

Return to HSO at Completion of Activity

AIR-PURIFYING RESPIRATOR LOG

Type of Respirator: _____

Site: _____

Location: _____

Dates of Investigation: _____

User	Date of Use	Cleaned and Inspected Prior to Use (initials)	Cartridges Changed Prior to Use (Yes/No)	Total Hours on Cartridge
	NA			

_____ _____

Site Manager Date

Return to HSO at Completion of Activity

INCIDENT REPORT

Report No. _____

Site: NASJRB Willow Grove Project No. _____

Location: _____

Date of Report: NA Preparer's Name: _____

Name and Address of Injured: _____ SSN: _____ Age: _____

_____ Sex: _____

Years of Service: _____ Time at Present Job: _____ Title/Classification: _____

Division/Department: _____ Date of Incident: _____ Time: _____

Incident Category: _____ Motor Vehicle _____ Property Damage _____ Fire
_____ Chemical Exposure _____ Near Miss _____ Other

Severity of Injury of Illness: _____ Nondisabling _____ Disabling
_____ Medical Treatment _____ Fatality

Amount of Damage: $_____ Property Damage: _____

Estimated Number of Days Away from Job: _____

Nature of Injury or Illness: _____

1. **Classification of Injury:**

_____ Fractures	_____ Heat Burns	_____ Cold Exposure
_____ Dislocations	_____ Chemical Burns	_____ Frostbite
_____ Sprains	_____ Radiation Burns	_____ Heat Stroke
_____ Abrasions	_____ Bruises	_____ Heat Exhaustion
_____ Lacerations	_____ Blisters	_____ Concussion
_____ Punctures	_____ Toxic Respiratory	_____ Faint/Dizziness
_____ Bites	Exposure	_____ Toxic Respiratory
_____ Respiratory Allergy	_____ Toxic Ingestion	_____ Dermal Allergy

Part of the Body Affected: _____

Degree of Disability: _____

Date Medical Care Was Received: _____

Where Medical Care Was Received: _____

Address (if off site): _____

2. Incident Location

Causative agent most directly related to accident (object, substance, material, machinery, equipment, conditions): _____

_____

_____

_____

Was weather a factor? _____

Unsafe mechanical/physical/environmental condition at time of accident (be specific):

_____

_____

_____

Unsafe act by injured and/or others contributing to the accident (be specific, must be answered):

_____

_____

_____

Personal factors (improper attitude, lack of knowledge or skill, slow reaction, fatigue):

_____

_____

_____

Level of personal protective equipment required by Site Safety Plan:

_____

_____

_____

Modifications: _____

_____

_____

_____

Was injured using required equipment? _____

_____

If not, how did actual equipment use differ from plan? _____

_____

_____

_____

What can be done to prevent a recurrence of this type of accident (modification of machine, mechanical guards, correct environment, training)?

_____

_____

_____

Detailed narrative description (how did accident occur, why; objects, equipment, tools used, circumstances, assigned duties). Be specific.

_____

_____

_____

(Use back of sheet, if required)

Witnesses to accident: _____

_____

_____

Signature of Preparer _____

Signature of Site Manager _____

3. **Department Appraisal and Recommendation**

In your opinion, what actions or equipment contributed to this accident?

_____

_____

_____

Your recommendation:

_____

_____

_____

Date: _____ Signature of Department Manager _____

4. **Costs of the Incident (to be completed by Health Sciences Department)**

Temporary total	_____	Permanent partial	_____
Death or permanent total	_____		
Started losing time	_____	Part of body	_____
Returned to work	_____	Percent loss or	
Time charge	_____	loss of use	_____
		Time charge	_____
Compensation	$_____	Medical	$_____
Other	$_____	Total	$_____

Name and Address of Hospital _____

_____

Name and Address of Physician _____

_____

cc: Office Health and Safety Supervisor
Administrative Manager
Manager of Health Sciences
Medical Consultant

INCIDENT FOLLOW-UP REPORT

(To be Completed by Health Sciences Department)

Date of Incident: _____

Name: _____ Employee No. _____

Site: _____

Brief description of incident: _____

_____

_____

_____

_____

_____

_____

Outcome of incident: _____

_____

_____

_____

_____

_____

_____

Physician's recommendations: _____

_____

_____

_____

_____

_____

_____

Date returned to work: _____

ATTACH ANY ADDITIONAL INFORMATION TO THIS FORM

cc: Office Health and Safety Supervisor
Administrative Manager
Manager of Health Services
Medical Consultant

APPENDIX B

BROWN & ROOT ENVIRONMENTAL STANDARD OPERATING PRATICES

1.0 PURPOSE

To establish procedures for the use, maintenance, and calibration of the HNU PI-101 Organic Vapor Meter.

2.0 SCOPE

Applies to each usage of the HNU PI-101 photoionization detector by NUS/EMG personnel.

3.0 GLOSSARY

None.

4.0 RESPONSIBILITIES

Office Health and Safety Supervisor (OHSS) - The OHSS shall insure that the user has been appropriately trained and certified in the usage of the HNU instrument. He/she shall also insure that the instrument is properly maintained and calibrated prior to its release for field service.

Instrument User - The user should be personally secure that he/she has been adequately trained and understands the operation and limitations of the instrument. He/she is further responsible to insure that the appropriate probe(s) have been selected for compounds to be found on site and that the instrument has been calibrated and is working properly.

5.0 PROCEDURES

5.1 PRINCIPLE OF OPERATION

The HNU System portable photoionizer detects the concentration of many organic gases as well as a few inorganic gases. The basis for detection is the ionization of gaseous species. The incoming gas molecules are subjected to ultraviolet (UV) radiation, which is energetic enough to ionize many gaseous compounds. The molecule is transformed into charged-ion pairs, creating a current between two electrodes. Each molecule has a characteristic ionization potential, which is the energy required to remove an electron from the molecule, yielding a positively-charged ion and the free electron. The instrument measures this energy level.

5.2 INSTRUMENT CONFIGURATION

Three probes, each containing a different UV light source, are available for use with the HNU. Probe energies are 9.5, 10.2, and 11.7eV. All three detect many aromatic and large-molecule hydrocarbons. The 10.2 and 11.7eV probes, in addition, detect some smaller organic molecules and some halogenated hydrocarbons. The 10.2eV probe is the most useful for environmental response work, since it is more durable than the 11.7eV probe and detects more compounds than the 9.5eV probe.

5.3 CALIBRATION

The primary HNU calibration gas is benzene (or isobutylene, a benzene equivalent). The span potentiometer knob is adjusted for benzene calibration. A knob setting of zero increases the sensitivity to benzene approximately ten-fold. The instrument's response can be adjusted to give more accurate readings for specific gases and eliminate the necessity for calibration charts. Daily calibration is to be performed in accordance with Attachment G.

5.4 SPECIALIZED USES

While the HNU is used primarily as a qualitative instrument, it can also be used to detect certain contaminants or at least to narrow the range of possibilities. Noting instrument response to a contaminant source with different probes can eliminate some contaminants from consideration. For instance, a compound's ionizing potential may be such that the 9.5eV probe produces no response, but the 10.2 and 11.7eV probes do elicit a response. Also, HNU does not detect methane or hydrogen cyanide.

5.5 INSTRUMENT ADVANTAGES

The HNU is easy to use in comparison to many other types of monitoring instrumentation. Its range detection limit is also in the low parts per million range. Response time is rapid; the meter needle reaches 90 percent of the indicated concentration in 3 seconds for benzene. HNU can be zeroed in a contaminated atmosphere.

5.6 CAUTIONS

The instrument can monitor only certain vapors and gases in air. Nonvolatile liquids, toxic solids, particulates, and many other toxic gases and vapors cannot be detected. Because the types of compounds that the HNU can detect is only a fraction of the chemicals possibly present at a field site, a zero reading does not necessarily signify the absence of air contaminants.

The instrument is nonspecific, and its response to different compounds is relative to the calibration setting. Instrument readings may be higher or lower then the true concentration. These discrepancies can be especially serious problems when monitoring for total contaminant concentrations, if several different compounds are being detected at once. In addition, the response of this instrument is not linear over the entire detection range. Care must, therefore, be taken when interpreting the data. All identifications should be reported as tentative until they can be confirmed by more precise analysis. Concentrations should be reported in terms of the calibration gas and span potentiometer of the gas-select-knob setting.

The instrument cannot be used as an indicator for combustible gases or oxygen deficiency.

6.0 REFERENCES

HNU Systems, Inc. Instruction Manual for Model PI 101 Photoionization Analyzer, 1975.

E. & E. FIT Operation and Field Manual: HNU Systems PI 101 Photoionization Detector and Century Systems (Foxboro) Model OVA-128 Organic Vapor Analyzer.

Personal Communication with Fran Connel, HNU Systems, Inc., January 4, 1984.

7.0 ATTACHMENTS

Attachment A - Start-up and Shutdown Procedures
Attachment B - Maintenance and Calibration Schedule
Attachment C - Calibration Procedure
Attachment D - Cleaning the UV Light Source Window
Attachment E - Cleaning the Ionization Chamber
Attachment F - Troubleshooting
Attachment G - Daily Calibration

ATTACHMENT A

START-UP AND SHUTDOWN PROCEDURES

Start-up

1. Attach the probe to the readout unit. Match the alignment key, then twist the connector clockwise until a distinct locking is felt.

2. Turn the FUNCTION switch to the battery check position. Check to ensure that the indicator reads within or beyond the green battery arc on the scale plate. If the indicator is below the green arc, or if the red LED comes on, the battery must be charged prior to using.

3. To zero the instrument, turn the FUNCTION switch to the STANDBY position and rotate the ZERO POTENTIOMETER until the meter reads zero. Wait 15-20 seconds to ensure that the zero adjustment is stable. If not, then readjust.

4. Check to see that the SPAN POTENTIOMETER is set at the appropriate setting for the probe being used. Follow procedures in Attachment G in the performance of daily calibrations.

5. Set the FUNCTION switch to the desired ppm range.

6. Listen for the fan operation to verify fan function.

7. Check instrument with an organic point source (such as a magic marker) prior to usage to verify instrument function.

Shut Down

1. Turn FUNCTION switch to OFF.

2. Place the instrument on the charger.

ATTACHMENT B

MAINTENANCE AND CALIBRATION SCHEDULE

Function	Frequency
• Routine Calibration	Prior to each use*
• Factory Check-out and Calibration	Yearly or when malfunctioning
• Wipe Down Read-Out Unit	After each use
• Clean UV Light Source Window	Every month or as use and site conditions dictate
• Clean the Ionization Chamber	Monthly
• Recharge Battery	After each use

* In accordance with the specifications identified in Attachment G.

ATTACHMENT C

CALIBRATION PROCEDURE

Calibration Procedure 1

1. Run through start-up procedures as per Attachment 1.
2. Fill a sampling bag with HNU calibration gas of known contents.
3. Allow sample bag contents to be drawn into the probe and check response in ppm.
4. If the reading deviates ± 15 percent from the concentration of the calibration gas, the instrument requires maintenance.
5. Each office must develop a mechanism for the documentation of calibration results. This documentation includes:
   a. date inspected
   b. person who calibrated the instrument
   c. the instrument number (Serial number or Other ID number)
   d. the result of the calibration (ppm, probe ev, span pot setting)
   e. identification of the calibration gas (source, type, concentration)

Calibration Procedure 2 (for HNU Calibration Canisters Equipped with a Regulator)

1. Run through start up procedures as per Attachment 1.
2. Connect a sampling hose to the regulator outlet and the other end to the sampling probe of the HNU.
3. Crack the regulator valve.
4. Take reading after 5-10 seconds.
5. If the reading deviates ± 15 percent from the concentration of the calibration gas, the instrument requires maintenance.
6. Calibration documentation should be as in No. 5 above.

ATTACHMENT D

CLEANING THE UV LIGHT SOURCE WINDOW

1. Turn the FUNCTION switch to the OFF position and disconnect the sensor/probe from the Read Out/Control unit.

2. Remove the exhaust screw located near the base of the probe. Grasp the end cap in one hand and the probe shell in the other. Separate the end cap and lamp housing from the shell.

3. Loosen the screws on the top of the end cap and separate the end cap and ion chamber from the lamp housing, taking care that the lamp does not fall out of this housing.

4. Tilt the lamp housing with one hand over the opening, so that the lamp slides out of the housing into your hand.

5. The lamp window may now be cleaned with any of the following compounds using lens paper:

   a. HNU Cleaning Compound-All lamps except the 11.7 eV
   b. Carbon tetrachloride-All lamps except the 11.7 eV
   c. Methanol-All lamps

6. Following cleaning, reassemble by first sliding the lamp back into the lamp housing. Place the ion chamber on top of the housing, making sure the contacts are properly aligned.

7. Place the end cap on top of the ion chamber and replace the two screws. Tighten the screws only enough to seal the O-ring. Do Not Overtighten.

8. Line up the pins on the base of the lamp housing with pins inside the probe shell and slide the housing assembly into the shell. It will only fit one way.

ATTACHMENT E

CLEANING THE IONIZATION CHAMBER

1. Turn the FUNCTION switch to the OFF position and disconnect the sensor/probe from the Read Out/Control unit.

2. Remove the exhaust screw located near the base of the probe. Grasp the end cap in one hand and the probe shell in the other. Separate the end cap and lamp housing from the shell.

3. Loosen the screws on the top of the end cap and separate the end cap and ion chamber from the lamp housing, taking care that the lamp does not fall out of this housing.

4. The ion chamber may now be cleaned according to the following sequence:

   a. acetone rinse with agitation (10 min.), then dry (preferably with oven at 100°C).

   b. methanol rinse with agitation (10 min.), then dry (preferably with oven at 100°C).

5. Place the ion chamber on top of the housing, making sure the contacts are properly aligned.

7. Place the end cap on top of the ion chamber and replace the two screws. Tighten the screws only enough to seal the O-ring. Do Not Overtighten.

8. Line up the pins on the base of the lamp housing with pins inside the probe shell and slide the housing assembly into the shell. It will only fit one way.

ATTACHMENT F

TROUBLESHOOTING

To be performed by qualified technician only.

1. No meter response in any switch position (including BATT CHK).

   A. Broken meter movement.

      (1) Tip instrument rapidly from side to side. Meter needle should move freely and return to zero.

   B. Electrical connection to meter is broken.

      (1) Check all wires leading to meter and clean the contacts of quick-disconnects.

   C. Battery is completely dead.

      (1) Disconnect battery and check voltage with a volt-ohm meter.

   D. If none of the above solves the problem, consult the factory.

2. Meter responds in BATT CHK position, but reads zero or near zero for all others.

   A. Power supply defective.

      (1) Check power supply voltages per Figure 11 of the HNU owner's manual. If any voltage is out of specification, consult the factory.

   B. Input transistor or amplifier has failed.

      (1) Rotate zero control; meter should deflect up/down, as control is turned.

      (2) Open probe. Both transistors should be fully seated in sockets.

   C. Input signal connection broken in probe or readout.

      (1) Check input connector on printed circuit board. The input connector should be firmly pressed down.

      (2) Check components on back side of printed circuit board. All connections should be solid and no wires should touch any other object.

      (3) Check all wires in readout for solid connections.

ATTACHMENT G

DAILY CALIBRATION OF HNU PI-101

HNU PI-101 organic vapor meters are to be field calibrated at the beginning of each work day, prior to actual on site usage.

In order to accomplish this, HNUs assigned to jobs shall be accompanied with a calibration gas cylinder, an appropriate fitting, and a flexible connecting hose. The procedure for performing field calibration is as follows:

1. Connect the probe to the instrument and turn it on.
2. Attach the eight-inch extension to the probe.
3. Set the Span Potentiometer to the setting specified on the calibration cylinder.
4. Connect the cylinder fitting to the cylinder.
5. Connect the cylinder and the instrument together with the flexible tubing.
6. Open the cylinder valve and wait 15 seconds.
7. Instrument reading should coincide with the designed reading stated on the calibration cylinder label.
8. If item number 7 does not coincide, adjust the Span Potentiometer until the desired reading is achieved. Any such adjustments must be within the following limits:

Probe	Initial Span Pot. Setting	Maximum Acceptable Span Pot. Adjustment
9.5 eV	5.0	1.0
10.2 eV	9.8	8.5
11.7 eV	5.0	2.0

If these limits are exceeded, the sensitivity and accuracy of the instrument is hindered. At these points, the instruments are to be returned to the NUS Equipment Manager for inspection, necessary cleaning and maintenance, and recalibration.

The manufacturer also recommends that the lamp inside of the probe be checked twice per week (16 hours of use) and cleaned at least weekly. This involves removing any noticeable obstructions or contamination from the lamp by wiping it off with a clean, soft cloth being careful not to scratch the circular window.

ATTACHMENT G
DAILY CALIBRATION OF HNU PI-101
PAGE TWO

In using this instrument to protect NUS employees and subcontractors, it is imperative that it is accurately responding to airborne substances present at the work site. By implementing these procedures, this end will be better achieved.

Additionally, all calibration activities must be documented in field log books, instrument calibration log sheets, or equivalent. This information must include the date inspected, the person calibrating the instrument, the instrument serial or identification number, the probe lamp eV (9.5 , 10.2, or 11.7), identification of calibration gas (gas source stated on the cylinder label), the initial and final Span Potentiometer settings, and the instrument resultant reading. This information must be submitted to the Site Safety officer at the completion of the job.