



UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION I
JOHN F. KENNEDY FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203-0001

July 29, 1997

Mark Evans, Remedial Project Manager
U.S. Department of the Navy
Naval Facilities Engineering Command
Northern Division
10 Industrial Highway
Code 1823, Mail Stop 82
Lester, PA 19113-2090

Re: Base-wide Groundwater Remedial Investigation Data Needs at the Naval Submarine Base
("NSB") in Groton CT

Dear Mr Evans,

In an attempt to better coordinate our respective agencies' cleanup efforts with respect to groundwater contamination at the NSB, I have prepared a list of data needs for the upcoming Base-wide Groundwater Remedial Investigation ("RI"). This review was based in part on EPA's review of the Phase II RI and the Site Management Plan for the base. It is my hope that these ideas will be incorporated into the work plan that is currently planned to be started in October 1997.

EPA reviewed the Phase II RI Report in order to prepare the data list. EPA also considered the comments that we provide on the Draft Final Phase II RI (*see* letter dated May 23, 1996), Navy Responses (dated July 1996), and the August 7 and 8, 1996 meeting discussions and agreements regarding the Phase II RI and data gaps. This letter therefore addresses general data gaps identified on a site-wide basis as well as specific data gaps identified in the Phase II RI.

The purpose of this list was to provide the Navy with a list of all data that are anticipated to be necessary to adequately characterize the nature and extent of groundwater contamination at the NSB to complete a basewide groundwater RI. To prepare this list, EPA reviewed chemical data from available monitoring wells and residential wells, well boring logs, and water level information. EPA also focused on areas not previously investigated, in particular, the areas between study areas. This is important because of the interconnectedness and relative close proximity of some study areas at the NSB. It is possible that we may have missed some areas of contamination by separating the base into discrete source areas. After review of the Phase II RI, EPA prepared the following data list that suggests locations for new well installations, identifies additional soil sampling locations, proposes risk assessment exposure scenarios and groundwater models and/or statistical analyses.



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SITE-WIDE WELL INSTALLATION, MONITORING, & SAMPLING RECOMMENDATIONS

Specific Base-wide Monitoring Well Installation Locations

EPA recommends the installation and sampling of 67 overburden wells and 55 bedrock wells on the NSB. The locations of these recommended wells are illustrated on Figure 1 (attached).

- The following monitoring wells should be installed to provide additional contaminant distribution information and groundwater level data for the NSB. The purpose of these wells is to provide analytical and water level data for the entire site by adding water level data for the areas between the sites investigated in the Phase II RI. These proposed monitoring wells locations are illustrated on Figure 1 and include: 58 (ob/br), 59 (ob/br), 60 (br), 61 (br), 62 (br), 63 (br), 64 (br), 65 (br), 66 (ob/br), 67 (ob/br), 68 (ob/br), 69 (br), 70 (ob/br), 71 (ob/br), 72 (ob/br), 73 (ob/br), 74 (ob/br), 75 (ob/br), 76 (ob/br), 77 (ob/br), 78 (ob/br), and 79 (br) as indicated on Figure 1. Additional details concerning the monitoring well installation are described in the following table:

Table 1: Proposed Monitoring Well Installation Locations	
Monitoring Well ID	Purpose
58 (ob/br), 59 (ob/br), 60 (br), 61 (br), 62 (br)	To monitor the area east of the DRMO, and north of Area A Downstream and Torpedo Shops
63 (br)	To monitor the area north of the Area A Weapons Center
64 (br), 65 (br), 66 (ob/br), 67 (ob/br), 68 (ob/br)	To monitor the eastern border of the NSB and possible impacts on homeowners wells east of the site
69 (br), 70 (ob/br), 71 (ob/br), 72 (ob/br), 73 (ob/br), 74 (ob/br), 75 (ob/br), 76 (ob/br), 78 (ob/br)	To monitor the central portion of the NSB especially between the previously identified sites and to determine the extent of saturated overburden
77 (ob/br)	To monitor the area between the Area A Downstream and the Thames River
79 (br)	To monitor the northern boundary of the NSB

Soil Sampling Locations

At least one soil sample should be collected from the saturated sediments at each well location during the advancement of the soil borings. The soil sample submitted for laboratory analysis should be chosen based upon field observations and screening such as odor, staining, and PID or

FID measurements. These soil samples should be sampled for Target Compound List (“TCL”) volatile organic compounds, semi-volatile compounds, and pesticides/PCBs, and Target Analyte List (“TAL”) metals plus cyanide.

Groundwater Sampling Locations

Groundwater samples should be collected and analyzed from the newly installed monitoring wells immediately after completion of well installation and development. The groundwater samples should be analyzed for TCL volatile organic compounds, semi-volatile compounds, and pesticides/PCBs, and TAL metals plus cyanide.

Regular Site-wide Monitoring Recommendations

Quarterly groundwater sampling and water level measurements should be collected in January, April, June, and October so that data collection occurs during spring high and fall low groundwater elevations.

Groundwater and surface water elevation monitoring should be completed in selected wells and at selected staff gauges to provide additional information about the site-wide groundwater flow, the region adjacent to the Thames River, the area along the eastern border of the NSB including the residential wells east of the NSB, and in the Goss Cove Landfill area. The purpose of the installation of the additional staff gauges and collection of surface water elevations is to monitor elevation changes in surface water and compare them to changes in the groundwater elevations and to changes in concentrations of contaminants detected in groundwater samples collected from nearby monitoring wells.

- The quarterly groundwater sampling and monthly groundwater level monitoring as outlined in the RI should be continued with the addition of the following wells: 17 (ob/br), 50, 62 (br), 63 (br), 64 (br), 66 (ob/br), 68 (ob/br), 69 (br), 71 (ob/br), 73 (ob/br), and 78 (ob/br). The combination of the groundwater quality data and water table elevation data collected from these newly installed monitoring with the existing monitoring will provide a site-wide database. The rationale for quarterly groundwater sampling is outlined on the following page in Table 2. The addition of the water elevation data will allow the compilation of site-wide water table maps for each set of monthly water elevation data to evaluate seasonal changes.
- Staff gauges should be installed in the Upper and Lower Ponds (SG-A and SG-B). The following staff gauges should be monitored on a monthly basis in conjunction with the groundwater monitoring outlined above: SG-1 (DRMO area), SG-4 (Downstream water course), SG-5 (Torpedo Shops), and SG-6 (OBDA), SG-A (Upper Pond) and SG-A (Lower Pond). By monitoring the groundwater and surface water elevations concurrently, the relationship between them can be further evaluated.

Table 2: Proposed Additional Monitoring Wells for Groundwater Monitoring	
Well ID	Purpose
17 (ob/br)	To regularly monitor a well downgradient of the Area A Downstream and near the Thames River to evaluate potential impacts to the Thames River
50	To regularly verify possible impacts on the Thames River
62 (br)	To consistently monitor the groundwater on the northern edge of the NSB
63 (br)	To regularly monitor the area north of the Area A Weapons Area and downgradient of the OBDANE site
64 (br), 66 (ob/br), 68 (ob/br)	To consistently monitor the eastern border of the NSB and possible impacts on homeowners wells east of the NSB
69 (br), 73 (ob/br), and 78 (ob/br)	To regularly verify the presence/absence of contamination in the central portion of the NSB
71 (ob/br)	To regularly monitor the southern boundary of the NSB

SITE-SPECIFIC WELL INSTALLATION, MONITORING AND SAMPLING RECOMMENDATIONS

Area A Wetland and Area A Downstream Water Courses/OBDA

The installation of the following monitoring wells is necessary to address the presence of vinyl chloride in monitoring well 2DMW29S and the presence of pesticides in the vicinity of the Area A wetland and Area A Downstream. Monitoring well 2DMW29S is located close to the storm sewer/drainage way that receives discharge from the Torpedo Shop. Vinyl chloride was detected at a concentration of 130 micrograms per liter ($\mu\text{g/l}$) on January 23, 1994 and 53 $\mu\text{g/l}$ on July 12, 1994 in groundwater samples collected from this well.

To investigate the possible presence of contaminants in the vicinity of monitoring well 2DMW29S, in the sediments and surface water of Upper Pond, Lower Pond, OBDA Pond, and in streams 1, 2, and 3, the following tasks are suggested:

- Overburden and bedrock monitoring wells should be installed at locations 1, 2, 3 as indicated on Figure 1. The purpose of these wells is to investigate the possible presence of vinyl chloride concentrations upgradient of monitoring well 2DMW29S. These new wells should be sampled and analyzed for volatile organic compounds (VOCs).

- Overburden and bedrock monitoring wells should be installed at locations 4 and 5 as indicated on Figure 1. The purpose of these wells is to investigate the possible presence of vinyl chloride concentrations downgradient of monitoring well 2DMW29S and the possible presence of pesticides up-gradient and side-gradient of the golf course. These new wells should be sampled and analyzed for VOCs and pesticides. In addition, monitoring wells 2DMW29S and 2DMW30S should be sampled and analyzed for VOCs concurrently with the sampling and analysis of the new monitoring wells.
- Overburden and bedrock monitoring wells should be installed at locations 10, 11, and 12. The purpose of these wells is to investigate the possible presence of pesticides upgradient of the OBDA area, Upper and Lower ponds, and OBDA Pond as indicated on Figure 1.
- Overburden and bedrock monitoring wells should be installed at locations 13, 14, and 15 (the overburden monitoring wells may be very shallow). The purpose of these wells is to investigate the possible presence of pesticides downgradient of the OBDA area, Upper and Lower ponds, and OBDA Pond as indicated on Figure 1. Groundwater samples should also be collected from monitoring wells 2DMW26S and 2DMW26D and analyzed in conjunction with these new suggested monitoring wells.
- Overburden and bedrock monitoring wells should be installed at locations 16, 17, 18, 19, 20, and 77. The purpose of these wells is to investigate the possible presence of pesticides downgradient of the golf course as indicated on Figure 1. Groundwater samples should also be collected from monitoring wells 2DMW28S and 2DMW28D and analyzed in conjunction with these new suggested monitoring wells.

Torpedo Shops

As recommended in the Phase II RI, the investigation of soil and groundwater in the vicinity of abandoned sewer lines/leach field to delineate the extent of VOC contamination. Monitoring well locations were suggested to investigate the groundwater quality in the vicinity of abandoned sewer lines and leach fields owing to the detection of VOCs in monitoring well 7MW3S and downgradient in monitoring well 2DMW29S (described in the previous section). Specifically, minor concentrations of several VOCs, 1,1,1-trichloroethane, 1,1-dichloroethane, were detected in groundwater samples collected from monitoring well 7MW3S on 12/6/90 and at smaller concentrations on other sampling dates. The installation and sampling of following monitoring wells is recommended:

- Overburden and bedrock monitoring wells should be installed at locations 6 and 7 as indicated on Figure 1. The purpose of these wells is to investigate the possible presence of VOCs in the sewer lines and in the original leach field upgradient of monitoring well 7MW3S. These new wells should be sampled and analyzed for VOCs in conjunction with sampling monitoring well 7MW3S.

- Overburden and bedrock monitoring wells should be installed at locations 8 and 9 as indicated on Figure 1. The purpose of these wells is to investigate the possible presence of VOCs downgradient of monitoring well 7MW3S. These new wells should be sampled and analyzed for VOCs in conjunction with sampling monitoring well 7MW3S.

DRMO Area

Minor concentrations of VOCs were detected in monitoring wells 6MW8S and in 6MW3S. Additional monitoring wells should be installed on this site because the impact on the groundwater from the high concentrations of VOCs detected in the soil needs to be further investigated. The impact of the remediation completed in this area in January 1995 needs to be verified to prove that the potential exposure and associated risk has been minimized. The locations of several additional monitoring wells are outlined below and these new wells should be sampled and analyzed for VOCs in conjunction with sampling monitoring wells 6MW8S and 6MW3S.

- A bedrock monitoring well should be installed at location 21 adjacent to monitoring well 6MW8S as indicated on Figure 1. The purpose of this well is to investigate the possible presence of VOCs in the bedrock.
- Overburden and bedrock monitoring wells should be installed at location 22 as indicated on Figure 1. The purpose of these wells is to investigate the possible presence of VOCs in the overburden and bedrock upgradient of monitoring well 6MW8S.
- An overburden monitoring well should be installed at location 23 between monitoring wells 6MW8S and 6MW3S as indicated on Figure 1. The purpose of this well is to investigate the possible presence of VOCs in the overburden (this well is located near test borings 6TB4, 6TB16, and 6TB17 where VOCs were detected in the soil samples).
- Overburden and bedrock monitoring wells should be installed at location 24 downgradient of monitoring well 6MW8S as indicated on Figure 1. The purpose of these wells is to investigate the possible presence of VOCs in the overburden and bedrock (this well is located near test borings 6TB4, 6TB16, and 6TB17 where VOCs were detected in the soil samples).
- An overburden monitoring well should be installed at location 25 in the scrap metal storage area as indicated on Figure 1. The purpose of this well to investigate the possibility that leaching of solvents from the scrap metal pieces may have taken place. Investigative activities were not performed in the scrap metal storage area during the Phase II RI.

Goss Cove Landfill

High concentrations of organic and inorganic compounds have been detected in the soil and in the groundwater in the Goss Cove Landfill site. Several monitoring wells should be installed in this area to investigate the detected compounds. In particular, the presence of tetrachloroethylene ("PCE") in the groundwater needs to be addressed. PCE was detected at concentrations of 120 µg/l and 5600 µg/l in monitoring wells 8MW8S and 8MW8D on June 28, 1994. Data collected from these additional investigative activities will be used for the feasibility study and to reevaluate the potential human health and ecological risk estimates.

- Overburden and bedrock monitoring wells should be installed at locations 26, 27, 28, and 29 as indicated on Figure 1. The purpose of these wells is to investigate the possible presence of VOCs immediately adjacent to the dry cleaners.
- Overburden and bedrock monitoring wells should be installed at locations 30, 31, and 32 as indicated on Figure 1. The purpose of these wells is to investigate the possible presence of VOCs downgradient of monitoring wells 8MW8S and 8MW8D.
- Bedrock monitoring wells should be installed at locations 33, 34, and 35 as indicated on Figure 1. The purpose of these wells is to investigate the possible presence of VOCs downgradient of monitoring wells 8MW8S and 8MW8D. The bedrock wells installed at locations 33 and 34 should be adjacent to monitoring wells 8MW4 and 8MW7S.
- The new monitoring wells listed above should be sampled in conjunction with collection of groundwater samples from the existing monitoring wells, 8MW8S, 8MW7S, and 8MW4 and analyzed for VOCs.

Lower Subase

Total petroleum hydrocarbons ("TPH"), lead, semi-volatile compounds ("SVOCs") were detected in groundwater samples collected from several monitoring wells and TPH and lead were in the soil in the Lower Subase Area. Noncarcinogenic risks were found to be above the EPA acceptable limit for one of the receptor groups for a portion of this site. Additional data needs to be collected to further evaluate this risk. In particular, SVOCs need to be quantified for the soil in this area. This SVOC data and all other new data should then be included in recalculation of risk assessment scenarios.

In addition, as reported in the RI, the TPH concentrations exceeded the 500 milligrams per kilograms (mg/kg) Connecticut Department of Environmental Protection remediation standard for pollutant mobility. This exceedance indicates that there is a potential for migration into the groundwater and to consequently impact the groundwater. The possibility that migration of petroleum products and oily substances into the Thames needs further investigation. Moreover, additional data needs to be collected to evaluate potential remediation options to mitigate these

substances and to prevent migration of petroleum products and oily substances. Both the human and ecological risk scenarios need to be recalculated with the addition of the new data.

- In order to investigate the absence/presence of TPH, lead, SVOCs and fluctuations in the groundwater elevations because of tidal influences on the groundwater in the Lower Subbase area, the following shallow monitoring wells should be installed, 36, 37, 38, 39, and 40. Water level measurements should be completed at high tide and at low tide, and water samples should be collected during high tide and analyzed for TPH, lead, and SVOCs at these newly installed monitoring wells.
- The following wells should be monitored on a quarterly basis during high tide and low tide: 12MW11, 13MW1, 13MW2, 13MW8, 13MW9, 13MW12, 13MW14, 13MW16, 13MW18, and 13MW19. Water level measurements should be completed and water samples should be collected during high tide and analyzed for TPH, lead, and SVOCs.

Thames River

The existence of a zone of salt water intrusion associated with tidal influxes of the Thames River should be investigated. By delineating this zone, the region where potential groundwater contamination should be addressed is also defined.

- The following monitoring wells should be sampled and the groundwater analyzed for total dissolved solids during the spring and fall (April and October) to define the zone of salt water intrusion: 16 (ob/br), 17 (ob/br), 18 (ob/br), 19 (ob/br), 21(br), 22 (ob/br), 25(ob), 6MW3D, 8MW1, 8MW2S, 8MW3, 13MW4, 13MW5, 13MW7, 13MW9, 13MW11, 13MW12, 13MW13, 13MW15, 20MW2, 20MW3, 20MW4, 20MW5, and 20MW6.

SITE-SPECIFIC WATER LEVEL MONITORING RECOMMENDATIONS

Groundwater elevation monitoring should be completed in selected wells to provide additional information about the region adjacent to the Thames River, along the eastern border of the NSB including the residential wells east of the NSB, and in the Goss Cove Landfill area.

Eastern Border

Water levels should be monitored for one year along the eastern border. It is essential that the direction of groundwater flow between these homeowners' wells and the NSB is verified for at least one year.

Goss Cove Landfill

Monthly water levels should be collected in the following monitoring wells. These wells include: 8MW4, 8MW6S, 8MW7S, 8MW8S, 8MW8D, 27 (ob/br), 30 (ob/br), 33 (br), 34 (br), and 35 (br).

RISK ASSESSMENT EXPOSURE SCENARIOS

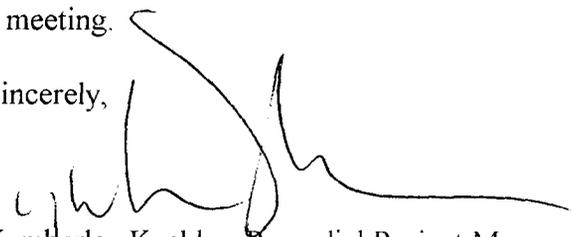
EPA recommends that the Navy establish risk assessment exposure scenarios consistent with department policy on federal facilities.

GROUNDWATER MODELING AND/OR STATISTICAL ANALYSIS

EPA recommends that no groundwater modeling be performed at this time unless there is a particular data gap that is established.

I hope that you find these comments helpful while you are developing the base-wide groundwater RI work plan. I look forward to working with you and the Connecticut Department of Environmental Protection toward the cleanup of contaminated groundwater at the NSB. Please do not hesitate to contact me at (617) 573-5777 should you have any questions or wish to arrange a meeting.

Sincerely,



Kimberlee Keckler, Remedial Project Manager
Federal Facilities Superfund Section

Attachment

cc: Mark Lewis, CTDEP, Hartford, CT
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