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**Close-Out Report
For Installation Restoration (IR) Sites
Site 7 – Inert Chemical Landfill
Site 8 – Asbestos Landfill
Site 12 – Mercury Disposal Site
Site 17 – Building SDA 215**

**Naval Station Norfolk
Norfolk, Virginia**



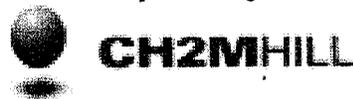
Prepared for

**Department of the Navy
Atlantic Division
Naval Facilities Engineering Command**

**Under the
LANTDIV CLEAN II Program
Contract N62470-95-D-6007
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March 2001

Prepared by



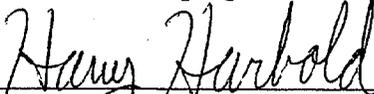
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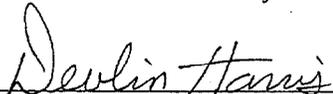
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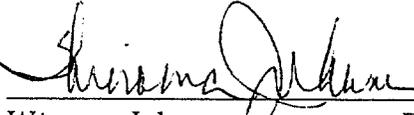
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Site 7 – Inert Chemical Landfill
Site 8 – Asbestos Landfill
Site 12 – Mercury Disposal Site
Site 17 – Building SDA 215**

**Naval Station Norfolk
Norfolk, Virginia**

In accordance with the Federal Facilities Agreement for the Naval Station Norfolk, signed February 1999, Installation Restoration Sites 7, 8, 12 and 17 were re-evaluated for the consideration of No Further Action alternative for these sites. Based on a review of available data this Closeout Report was completed for these sites. The site Project Managers and members of the Naval Station Norfolk Tier I Partnership determined that no further action is required and the land use will be unrestricted at each of the sites. This evaluation was based on consideration of field sampling data for soil and groundwater, risk screening, and professional judgement. In the event contamination posing an unacceptable risk to human health or the environment is discovered after execution of this site closeout report, the Partnership agrees to remediate the contamination if deemed necessary.

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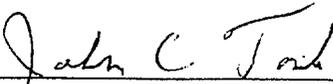
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1.0 Introduction

The Federal Facilities Agreement (FFA) for the Naval Station, Norfolk (NSN, previously named Naval Base Norfolk), which was signed by the Navy in February 1999 and by EPA on February 18, 1999, listed eight areas of concern (AOCs) identified as AOCs 1 through 8. The FFA required that the Project Managers evaluate these AOCs and make a determination which ones require no further actions and which ones will proceed to the Site Screening Process (See next section.) as Site Screening Areas (SSAs). For those AOCs that require no further action, a brief close-out report is required.

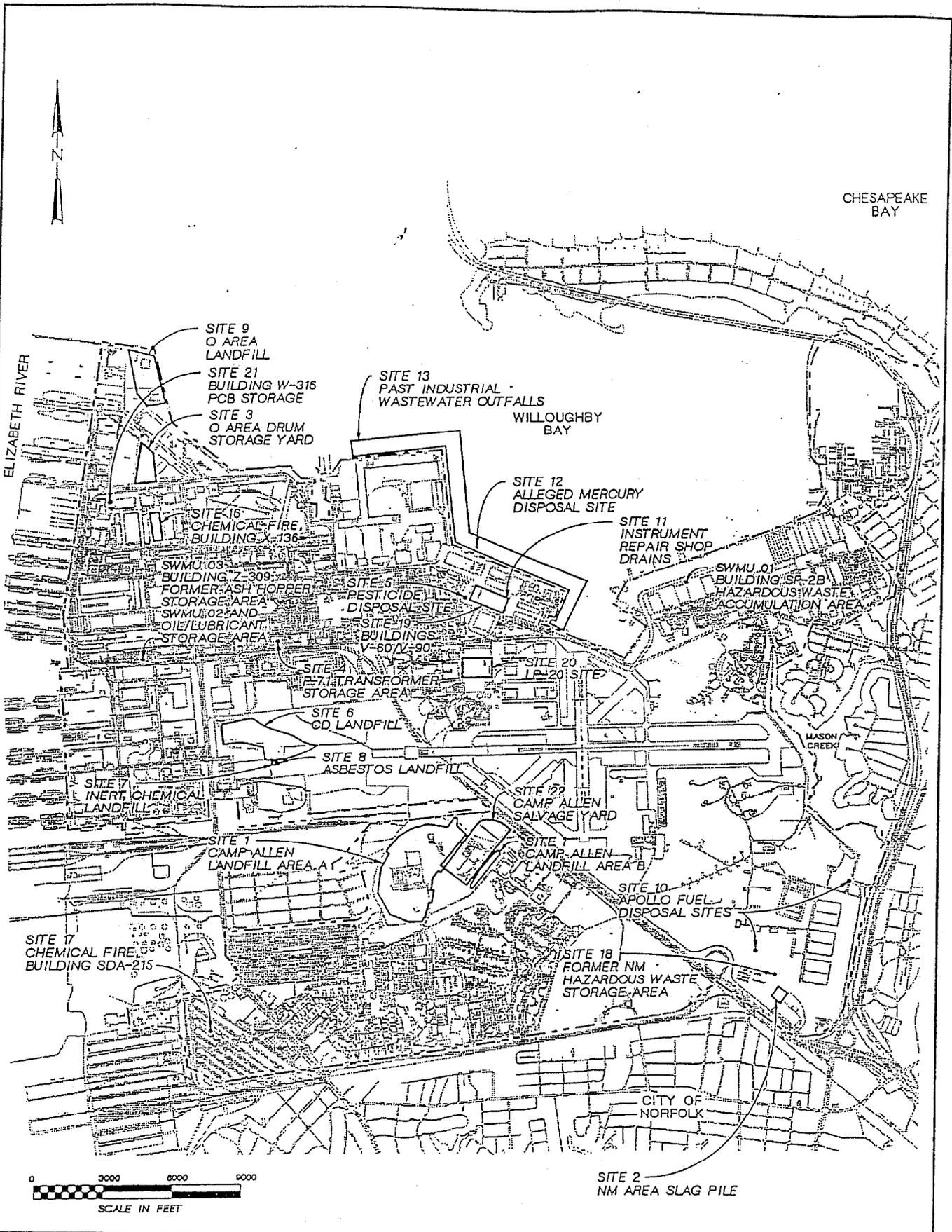
Prior to the development of the FFA, various Solid Waste Management Units (SWMUs) at the NSN were included in the Baker Environmental Phase I (October 1995) and/or Phase II (September 1996) Relative Risk Ranking (RRR) Study. Additional information on selected sites were collected as part of the Solid Waste Management Units Supplemental Investigation conducted under the LANTDIV CLEAN II program .

In general, the RRR Study evaluation of the SWMUs focused mainly on the surface and subsurface soil, with limited groundwater sampling. The Department of Defense developed the relative risk framework used in the RRR study to evaluate the potential risk posed by a site in relation to other sites. Relative risk is a management tool that uses actual media concentrations, potential exposure, and potential migration to indicate which sites may pose a risk to human health and the environment. Based on the relative risk results, the Navy can focus available resources for study and remediation on the sites ranked "high". Each SWMU was given a relative risk designation in the RRR Study. Further discussion of the site ranking process is located in the Site Management Plan, 1999-2000, Naval Base, Norfolk.

This Installation Restoration (IR) Sites Close-Out Report presents the sampling and analysis performed at IR Sites 7, 8, 12, and 17 at the Naval Station, Norfolk (NSN), Norfolk, Virginia. A reevaluation of 1997 Close-Out Reports data for each site using current risk screening criteria is presented.

An overall screening process outlined in the Federal Facilities Agreement (February 1999) was applied to all of the sites in the Naval Station Norfolk. Through that screening process, sites were categorized as follows:

- Installation Restoration (IR) sites. These sites will follow the full CERCLA process and will require cleanup or the implementation of institutional controls (ICs) to protect human health.
- Site Screening Areas (SSAs). These sites will go through a site screening process that will lead to either an RI/FS or a decision document.
- Areas of Concern (AOCs). These areas go through a more streamlined process to determine if they should be classified as SSAs, if the area should be closed out with no further action (NFA), or if additional evaluation is required to determine if the area should be classified as an SSA or be closed out.



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- Property Boundary -
- Norfolk Naval Base

Figure 1-1
Base Map With
IR Site Locations
Norfolk Naval Base

Sites 7, 8, 12, and 17 are categorized as IR sites. (See Figure 1-1.) Although Close-Out reports for these sites were initially prepared in 1997, the No Further Action classification for these sites was based on a comparison of the site data to Industrial RBCs. The FFA required that these sites be re-evaluated based on a comparison of the site data to Residential RBCs and background conditions.

The reevaluation of the sites initially included comparisons of the concentrations of detected chemical to current USEPA Region III Risk Based Concentrations (RBCs) for residential and industrial soils, USEPA Region III tap water RBCs, USEPA national drinking water and Maximum Contaminant Levels (MCLs), and background soil concentrations. The concentrations of chemicals exceeding these criteria were then compared to the upgradient concentrations (for groundwater) and background concentrations (for soil) to determine if the detected concentrations exceeded the upgradient and background concentrations. The results of the reevaluation as well as site histories, descriptions, and sampling event details are presented in this report.

Concern over potential groundwater impacts of these sites is further mitigated because the City of Norfolk supplies all potable water to the City and to Naval Station, Norfolk, and there are no potable water supply wells at NSN.

For each site the report is comprised of the following sections:

Background. Includes the site description and a brief discussion of previous investigations.

Field Activities. Includes a brief discussion of previous field activities, including the numbers of samples collected, sampling techniques, sample locations, and the analyses performed.

Risk Characterization. Includes a discussion of the exceedances of comparison criteria by medium.

Conclusions and Recommendations. Summarizes the basis for the NFA determination

2.0 Site 7—Inert Chemical Landfill

This section summarizes the information related to the field activities and sampling performed at Site 7, The Inert Chemical Landfill. The rationale for recommending this site for no further action is also presented.

2.1 Site Background

The following sections describe previous site uses, investigations, and actions taken. The construction and geographical location of the landfill are also described.

2.1.1 Site History

The Inert Chemical Landfill was used for a single disposal of overage inert chemical, primarily unused ion exchange resins. Eighty-four pallets of materials were buried in this landfill on June 25, 1979, with approval of the Solid Waste Hazardous Management Division, Virginia SDH. This landfill was constructed with a 1-foot clay base and 6-foot clay side berms. The final landfill cover consisted of two-feet of soil capped with one-foot of clay. The contents of the disposal area were excavated and disposed of through a Navy Public Works Center (PWC) contract in 1982.

The department of the Navy (DON) initiated the Navy Assessment and Control of Installation Pollutants (NAICP) Program in 1981. The NAICP Program utilized a three phase approach to site study and cleanup. The program encompassed an Initial Assessment Study (IAS), Confirmation and Characterization studies and Remedial Measures. The 1983 IAS was to identify and assess sites posing a potential threat to human health or the environment due to contamination from past hazardous materials operations. The Inert Chemical Landfill was one of the 18 possible areas of concern identified during this study.

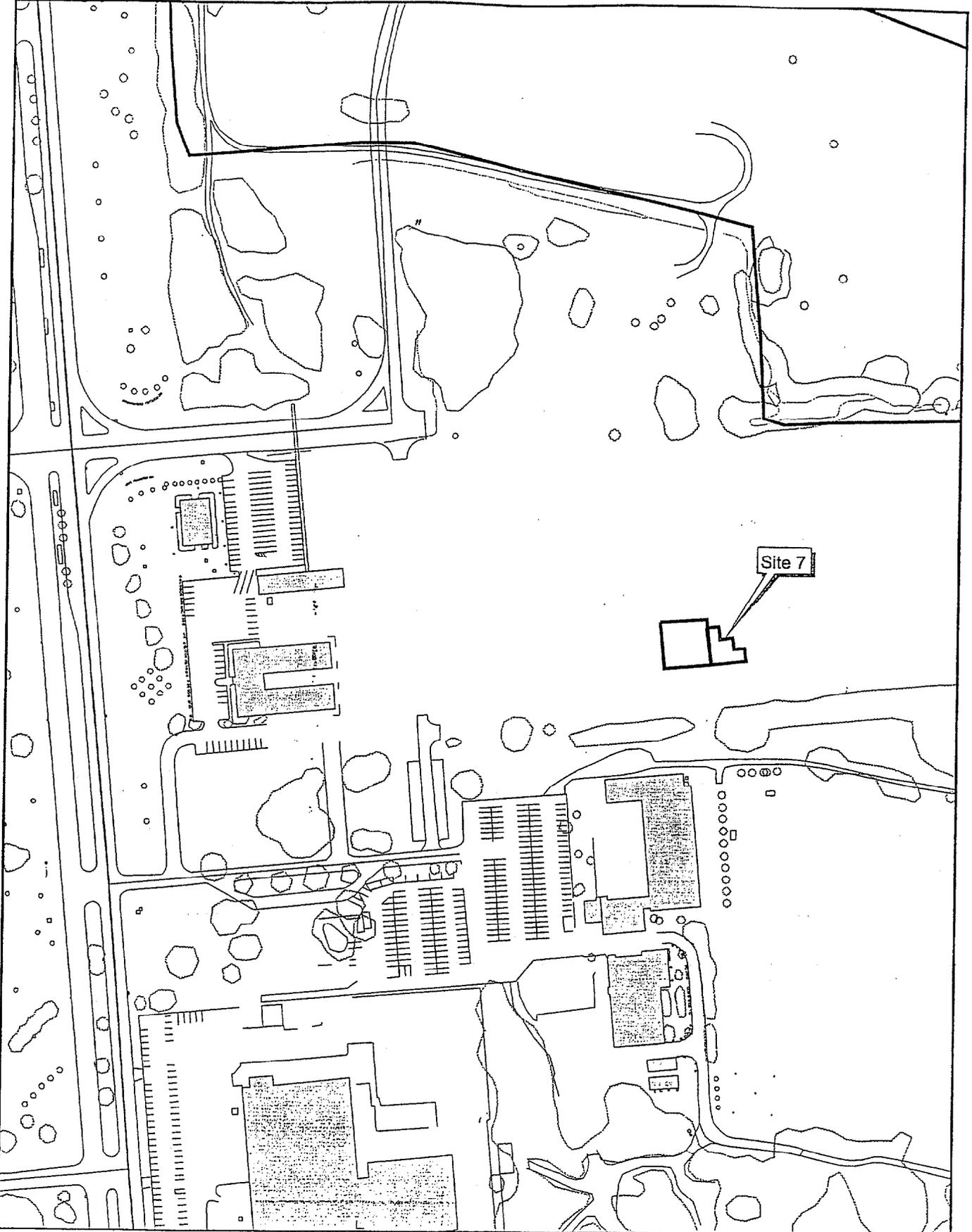
In 1996 the site was investigated as part of a Relative Risk Ranking System (RRRS) Data Collection Sampling and Analysis Report (Baker, January 1996). Based on the results of the 1996 RRRS a Close-Out Report was completed in December 1997. CH2M HILL was later contracted to reevaluate the analytical results presented in the 1997 Close-Out Report.

2.1.2 Site Description

The Inert Chemical landfill is located east of Hampton Boulevard and south of CD Landfill, as shown in Figure 2-1. Figure 2-2 highlights the sample locations. The landfill is approximately 2,000 square feet in size.

2.2 Field Activities

This section presents information related to the field activities associated with the sampling performed at Site 7. Details of sampling events are provided.



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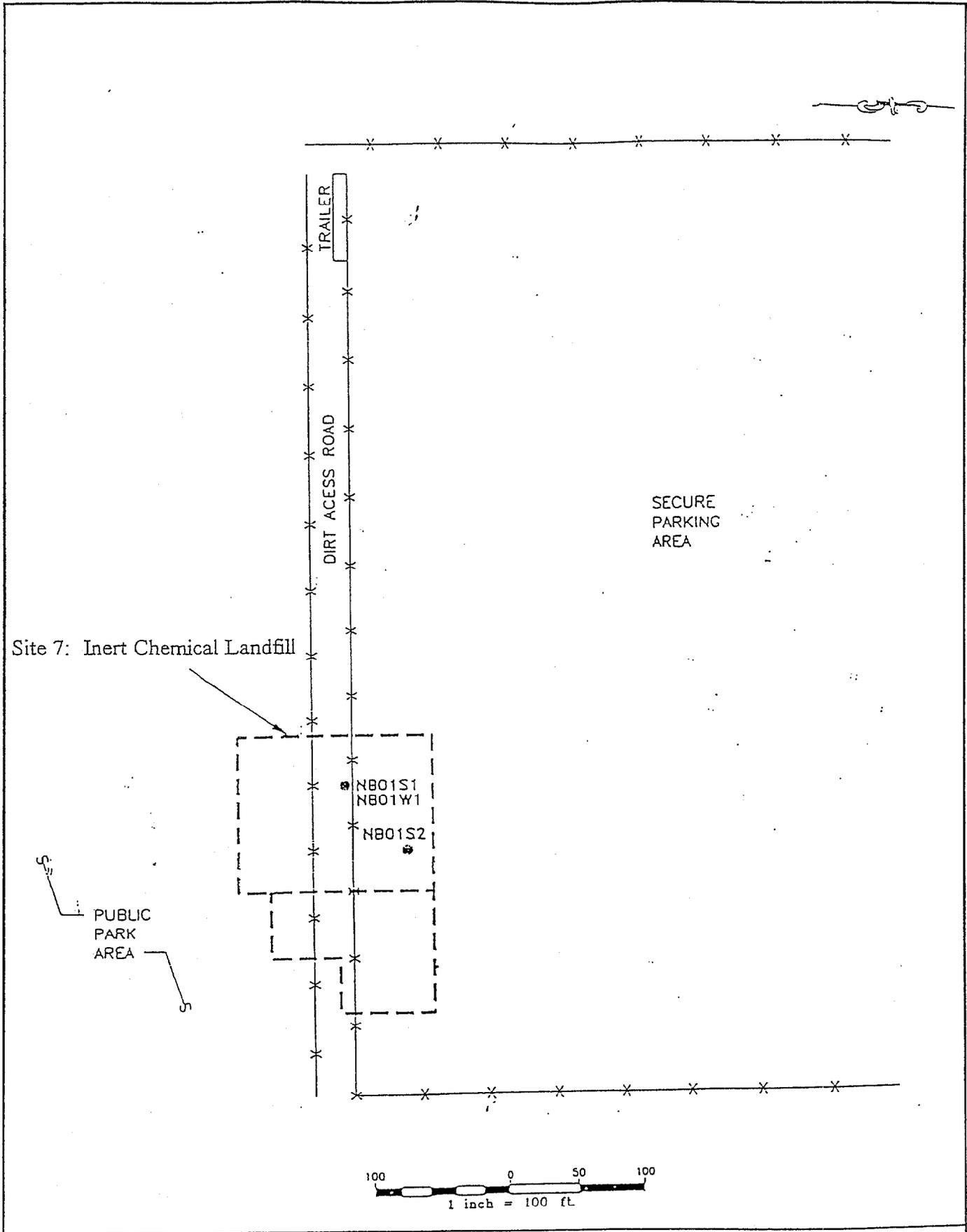
-  Buildings
-  Roads



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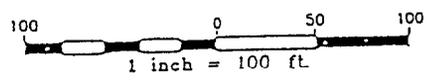
Figure 2-1
Site Map
Site 7 Inert Chemical Landfill
NFA Sites
Naval Station Norfolk



Site 7: Inert Chemical Landfill

PUBLIC PARK AREA

SECURE PARKING AREA



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- NB01S1
- - Surface Soil Sampling Point
- NB01W1 - Groundwater Sampling Point

Figure 2-2: Inert Chemical Landfill Sampling Locations Naval Base Norfolk Norfolk, Virginia

Source: Lantdiv, 1995

2.2.1 Historical Sampling Activities

The landfill was investigated as part of the RRRS in 1996. The RRRS was conducted to determine the potential risk at NSN and establish a ranking of sites using the Naval Facilities Engineering Command, Atlantic Division (LANTDIV) RRRS. The objectives of the field investigation were to gather contaminant, pathway and receptor information to be used in the Navy's RRRS and to collect samples for laboratory analysis where no data was available for use in the RRRS.

2.2.2 Sample Collection

Sample location and selection of analyte parameters were determined during site reconnaissance performed prior to the field sampling event. Site reconnaissance was performed by Baker Environmental, LANTDIV, and NSN personnel. Sample locations and depths were based on the history and information available for the site and best engineering judgement.

One groundwater and two surface soil samples were collected for analysis at the site.

2.3 Risk Characterization

This section presents the analytical data from the 1996 RRRS. A discussion of the data includes the identification of screening and regulatory exceedances and exceedances of background concentrations.

2.3.1 Analytical Results

Table 2-1 shows the maximum detected compounds and their comparison to the EPA's Risk Based Concentrations (RBCs). Soil samples are compared to the industrial and residential RBCs and the groundwater samples are compared to the tap water RBCs.

Analytical results are discussed in the 1997 Close-Out Report. In the Close-Out Report the industrial screening criteria were consistent with the land-use at the time of the report. No organic compounds were detected in the soil exceeding the industrial RBCs. Arsenic, ubiquitous to the geographic region, was the only inorganic compound detected in the soil above the industrial RBC.

The reevaluation of the 1997 analytical results was completed using current residential RBC guidelines. Benzo (a) pyrene, benzo (b) fluoranthene, arsenic, and iron were found in exceedance of current Residential RBCs as shown in Table 2-2. However, the arsenic concentrations were below background levels and the Benzo(a) pyrene, benzo(b) flouranthene and the iron concentrations only slightly exceeded background levels. All three of these constituents were detected in the background soils of the area. No organic compounds were detected at concentrations exceeding the industrial RBCs. Table 2-2 shows samples that exceeded RBCs, parameter concentrations, the current RBC values, and background limits.

Table 2-1 Comparison of maximum detected Site constituents to RBCs

Sample Number	Constituent	Result (mg/kg)	Qualifier	Industrial RBC (mg/kg)	Exceed Industrial RBC?	Residential RBC (mg/kg)	Exceed Residential RBC?
NB01S2	Acetone	0.02		200000.00	no	7800.00	No
NB01S2	Chlorobenzene	0.00	J	41000.00	no	1600.00	No
NB01S2	Methylene chloride	0.00	J	760.00	no	85.00	No
NB01S2	Toluene	0.00	J	410000.00	no	16000.00	No
NB01S2	2-methylnaphthalene	0.22	J	NA	no	NA	No
NB01S2	Acenaphthene	0.20	J	120000.00	no	4700.00	No
NB01S2	Acenaphthylene	0.06	J	NA	no	NA	No
NB01S2	Anthracene	0.18	J	610000.00	no	23000.00	No
NB01S2	Benzo(a)anthracene	0.48		NA	no	NA	No
NB01S2	Benzo(a)pyrene	0.52		0.78	no	0.09	Yes
NB01S2	Benzo(b)fluoranthene	1.40		7.80	no	0.88	Yes
NB01S2	Benzo(g,h,i)perylene	0.16	J	NA	no	NA	No
NB01S2	Benzo(k)fluoranthene	0.78		78.00	no	8.80	No
NB01S2	Bis(2-ethylhexyl)phthalate	0.09	J	410.00	no	46.00	No
NB01S2	Carbazole	0.06	J	290.00	no	32.00	No
NB01S2	Chrysene	1.00		780.00	no	88.00	No
NB01S2	Dibenzo(a,h)anthracene	0.05	J	NA	no	NA	No
NB01S2	Dibenzofuran	0.17	J	8200.00	no	310.00	No
NB01S1	Dibutyl phthalate	0.06	BJ	200000.00	no	7800.00	No
NB01S2	Fluoranthene	1.10		82000.00	no	3100.00	No
NB01S2	Fluorene	0.10	J	82000.00	no	3100.00	No
NB01S2	Indeno(1,2,3-cd)pyrene	0.20	J	7.80	no	0.88	No
NB01S2	Naphthalene	0.29	J	82000.00	no	3100.00	No
NB01S2	Phenanthrene	0.64		NA	no	NA	No
NB01S2	Pyrene	0.96		61000.00	no	2300.00	No
NB01S1	Aluminum	3870.00		1000000.00	no	78000.00	No
NB01S2	Arsenic	9.00		3.80	yes	0.43	Yes
NB01S2	Barium	67.00		140000.00	no	5500.00	No
NB01S1	Beryllium	1.00		1.30	no	0.15	Yes
NB01S2	Cadmium	1.00		1000.00	no	39.00	No
NB01S2	Calcium	36700.00		NA	no	NA	No
NB01S2	Chromium	16.00		10000.00	no	390.00	No
NB01S2	Cobalt	6.00		120000.00	no	4700.00	No
NB01S2	Copper	56.00		82000.00	no	3100.00	No
NB01S2	Iron	24900.00		610000.00	no	23000.00	Yes
NB01S2	Lead	83.00		NA	no	NA	No
NB01S2	Magnesium	22100.00		NA	no	NA	No
NB01S2	Manganese	278.00		47000.00	no	1800.00	No
NB01S1	Nickel	20.00		41000.00	no	1600.00	No
NB01S1	Selenium	1.00		10000.00	no	390.00	No
NB01S1	Vanadium	26.00		14000.00	no	550.00	No
NB01S2	Zinc	61.00		610000.00	no	23000.00	No

Table 2-2 Comparison of Constituents Exceeding RBCs To Background Levels

Sample	Parameter	Result	Industrial RBC (mg/kg)	Residential RBC (mg/kg)	Background Limit (mg/kg)
NB01S2	Benzo(a)pyrene	0.52	0.78	0.09	0.490
NB01S2	Benzo(b)fluoranthene	1.40	7.80	0.87	0.490
NB01S2	Arsenic	9.00	3.80	0.43	17.10
NB01S2	Iron	24900.00	610000.00	23000.00	24680

2.3.2 Human Health Risk Assessment

A qualitative assessment for human health indicates the site is not expected to pose an unacceptable risk to human health due to the low level of contamination and limited exposure pathways. Currently the site is being used as a parking area that is used primarily by deployed military personnel and is secured with limited access, significantly reducing the limited exposure pathway that exists.

2.3.3 Ecological Risk Assessment

A qualitative assessment for ecological risk indicates the site is not expected to pose an unacceptable ecological risk due to the low level of contamination and limited pathways by which receptors may be exposed. The migration of contamination to sediments or surface water through groundwater or runoff would be slow or unlikely to occur (Close-Out Report, 1997).

2.4 Conclusions and Recommendations

Based on the comparison of site data to the current RBC guidelines it is unlikely that Site 7 will pose an unacceptable risk to human health and the environment. Therefore, no further action is recommended for Site 7.

3.0 Site 8—Asbestos Landfill

This section supports the decision for no further action at Site 8, Asbestos Landfill. Existing information and data pertaining to the evaluation of the site's degree of contamination will be discussed.

3.1 Site Background

The following sections describe the previous site uses, investigations, and actions taken. The construction and geographical location of the landfill are also described.

3.1.1 Site History

The Asbestos Landfill was used for the disposal of asbestos generated during ship refitting operations. Six-thousand five-hundred bags of asbestos were buried at this site on June 27, 1979 with approval of the Solid and Hazardous Waste Management Division, Virginia SDH. The landfill was constructed with a 1-foot clay base and 6-foot clay side berms. The final landfill cover consists of 2-feet of soil capped with 1-foot of clay. The contents of the landfill were excavated and disposed of through a Navy PWC contract in 1982.

The DON initiated the NAICP Program in 1981. The NAICP Program utilized a three phase approach to site study and cleanup. The program encompassed an IAS, Confirmation and Characterization studies and Remedial Measures. The 1983 IAS was to identify and assess sites posing a potential threat to human health or the environment due to contamination from past hazardous materials operations. The Asbestos Landfill was one of the 18 possible areas of concern identified during this study.

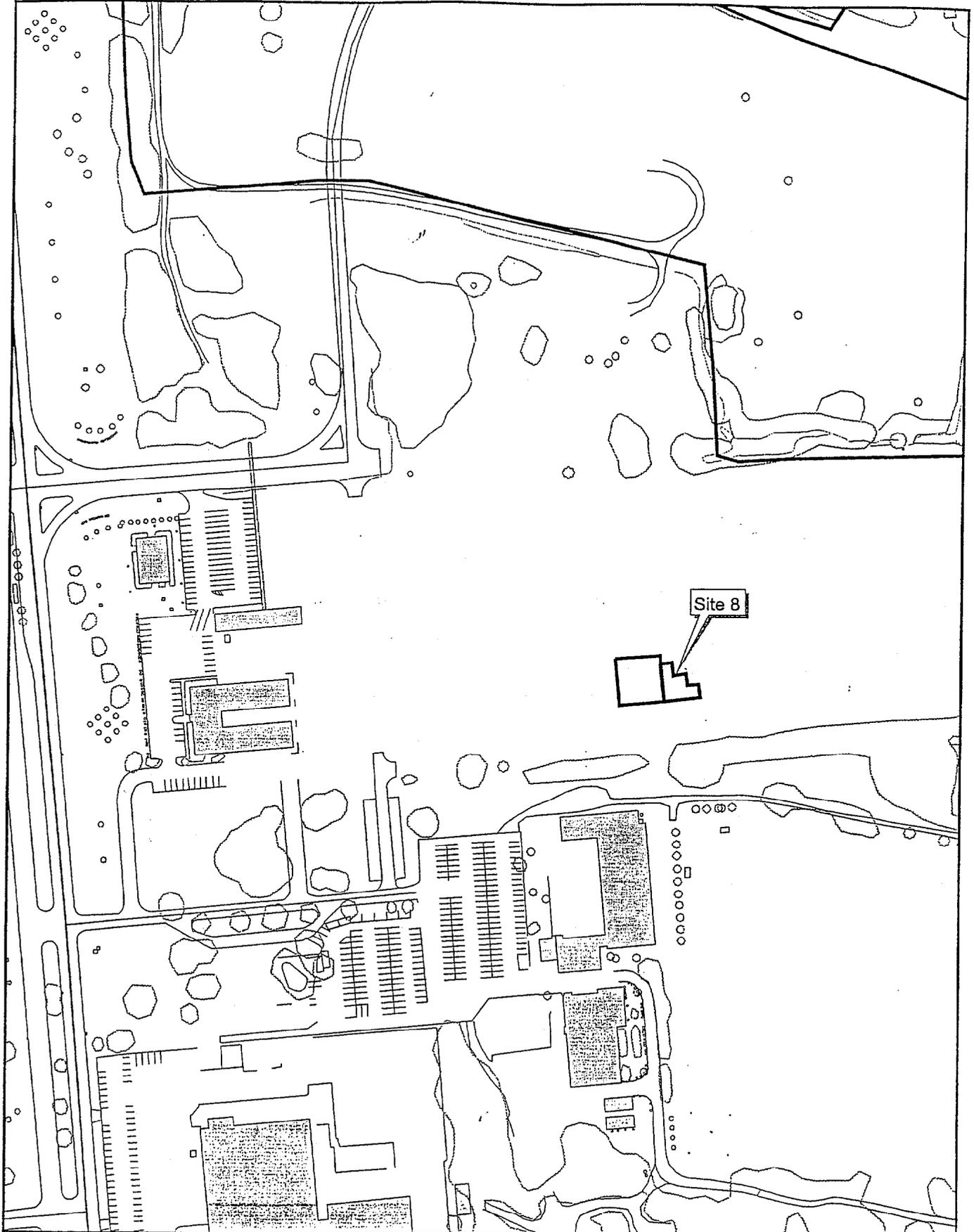
In 1996 the site was investigated as part of a RRRS Data Collection Sampling and Analysis Report (Baker, January 1996). Based on the results of the 1996 RRRS a Close-Out Report was completed in December 1997. CH2M HILL was later contracted to reevaluate the analytical results presented in the 1997 Close-Out Report.

3.1.2 Site Description

The Asbestos Landfill is located east of Hampton Boulevard and south of the CD Landfill, Figure 3-1. Figure 3-2 highlights the sample location. The landfill is approximately 1,600 square feet in size.

3.2 Field Activities

This section presents information related to the field activities associated with the sampling performed at Site 8. Details of sampling events are provided.



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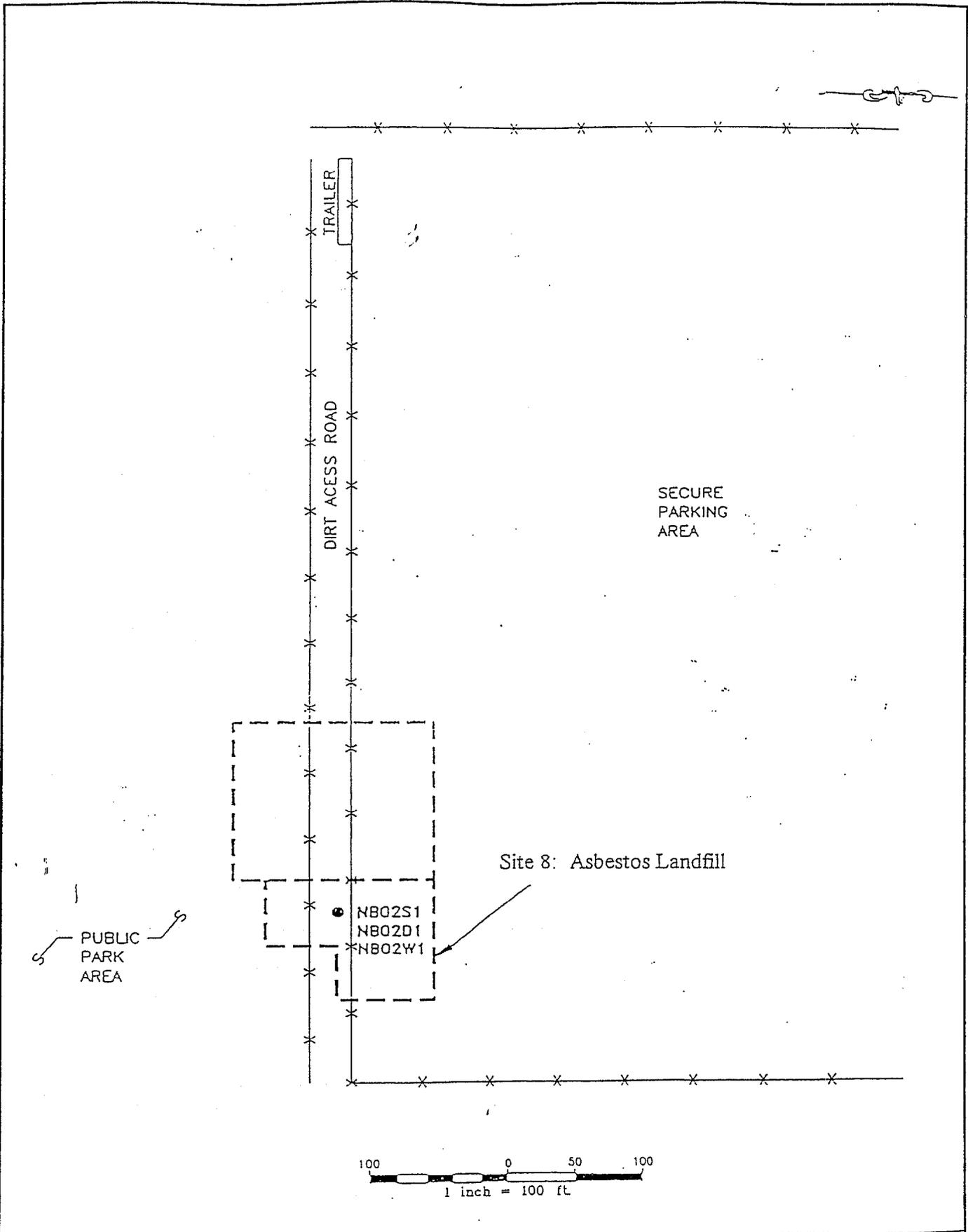
-  Buildings
-  Roads



0 200 400 Feet



Figure 3-1
Site Map
Site 8 Asbestos Landfill
NFA Sites
Naval Station Norfolk



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- NB02S1
● - Surface Soil Sampling Point
- NB02D1 - Subsurface Soil Sampling Point
- NB02W1 - Groundwater Sampling Point

Source: Lantdiv, 1994

Figure 3-2: Asbestos Landfill
Sampling Locations
Naval Base Norfolk
Norfolk, Virginia

3.2.1 Historical Sampling Activities

The Asbestos Landfill was investigated as part of the RRRS in 1996. The RRRS was conducted to determine the potential risk at NSN and establish a ranking of sites using the LANTDIV RRRS. The objects of the field investigation were to gather contaminant, pathway, and receptor information to be used in the Navy's RRRS and to collect samples for laboratory analysis where no data was available for use in the RRRS.

3.2.2 Sample Collection

Sample location and selection of analyte parameters were determined during site reconnaissance performed prior to the field sampling event. Site reconnaissance was performed by Baker Environmental, LANTDIV, and NSN personnel. Sample locations and depths were based on the history and information available for the site and best engineering judgment.

One sample of each surface soil, subsurface soil, and groundwater were collected for analysis. The samples were analyzed for the parameters shown in Table 3-1.

3.3 Risk Characterization

This section presents the analytical data from the RRRS. A discussion of the data includes the identification of screening and regulatory exceedances and exceedances of background concentrations.

3.3.1 Analytical Results

Table 3-1 shows the maximum detected concentrations of various compounds and their comparison to the EPA's RBCs. Soil samples are compared to the industrial and residential RBCs and the groundwater sample is compared to the tap water RBCs.

Analytical results are discussed in the 1997 Close-Out Report. Asbestos was not detected in the subsurface or groundwater samples, and only at a fraction of a percentage in the soil sample. No organic compounds were detected in the soil exceeding the 1997 industrial RBCs. Arsenic, ubiquitous in the geographic region, was the only inorganic compound detected in the soil above the industrial RBC. At the time the 1997 Close-Out Report was prepared the no further action recommendation was appropriate.

The reevaluation of the Site 8 analytical results was completed using current residential RBC guidelines. Soils at Site 8 contained arsenic and benzo (a) pyrene in exceedance of current residential RBCs, but below background concentrations. Benzo (b) fluoranthene, which is ubiquitous to the area, only slightly exceeded the residential RBCs. Table 3-2 shows the samples that exceeded RBCs, parameter concentrations, the current RBC values, and background limits.

3.3.2 Human Health Risk Assessment

A qualitative assessment for human health indicates the site is not expected to pose an unacceptable risk to human health due to the low level of contamination and limited exposure pathways. Currently the site is being used as a gravel parking area that is used primarily by deployed military personnel and is secured with limited access. Future plans are to pave the parking area, which will significantly reduce the limited exposure pathway that exists (Close-Out Report, 1997).

Table 3-1 Comparison of Maximum Detected Site Constituents With RBCs

Sample Number	Parameter	Result (mg/kg)	Qualifier	Industrial RBC (mg/kg)	Residential RBC (mg/kg)	Exceed Residential RBC ?
NB02S1	2-methylnaphthalene	0.60		NA	NA	no
NB02S1	Acenaphthene	0.10	J	120000.00	4700.00	no
NB02S1	Acenaphthylene	0.06	J	NA	NA	no
NB02S1	Anthracene	0.25	J	610000.00	23000.00	no
NB02S1	benzo(a)anthracene	0.44		NA	NA	no
NB02S1	benzo(a)pyrene	0.41		0.78	0.09	yes
NB02S1	benzo(b)fluoranthene	1.30		7.80	0.88	yes
NB02S1	benzo(k)fluoranthene	0.57		78.00	8.80	no
NB02S1	bis(2-ethylhexyl)phthalate(DEHP)	0.11	J	410.00	46.00	no
NB02S1	Carbazole	0.07	J	290.00	32.00	no
NB02S1	Chrysene	0.88		780.00	88.00	no
NB02S1	dibenzo(a,h)anthracene	0.05	J	NA	NA	no
NB02S1	Dibenzofuran	0.32	J	8200.00	310.00	no
NB02S1	dibutyl phthalate	0.09	BJ	200000.00	7800.00	no
NB02S1	Fluoranthene	1.10		82000.00	3100.00	no
NB02S1	Fluorene	0.07	J	82000.00	3100.00	no
NB02S1	indeno(1,2,3-CD)pyrene	0.20	J	7.80	0.88	no
NB02S1	n-nitrosodiphenylamine	0.13	J	1200.00	130.00	no
NB02S1	Naphthalene	0.44		82000.00	3100.00	no
NB02S1	Phenanthrene	1.10		NA	NA	no
NB02S1	Pyrene	0.92		61000.00	2300.00	no
NB02S1	Aluminum	1520.00		1000000.00	78000.00	no
NB02S1	Arsenic	12.00		3.80	0.43	yes
NB02S1	Barium	124.00		140000.00	5500.00	no
NB02S1	Beryllium	1.00		1.30	0.15	yes
NB02S1	Calcium	6040.00		NA	NA	no
NB02S1	Chromium	16.00		10000.00	390.00	no
NB02S1	Cobalt	7.00		120000.00	4700.00	no
NB02S1	Copper	50.00		82000.00	3100.00	no
NB02S1	Iron	20800.00		610000.00	23000.00	no
NB02S1	Lead	79.00		NA	NA	no
NB02S1	Magnesium	3210.00		NA	NA	no
NB02S1	Manganese	120.00		47000.00	1800.00	no

Table 3-1 Comparison of Maximum Detected Site Constituents With RBCs (cont.)

NB02S1	Mercury	0.00		610.00	23.00	no
NB02S1	Nickel	17.00		41000.00	1600.00	no
NB02S1	Selenium	2.00		10000.00	390.00	no
NB02S1	Vanadium	16.00		14000.00	550.00	no
NB02S1	Zinc	9.80		610000.00	23000.00	no

Table 3-2 Comparison of Site 8 RBC Exceedances With Background Levels

Sample	Parameter	Result (mg/kg)	Industrial RBC (mg/kg)	Residential RBC (mg/kg)	Background Limit (mg/kg)
NB02S1	benzo(a)pyrene	0.41	0.78	0.09	0.490
NB02S1	benzo(b)fluoranthene	1.30	7.80	0.87	0.490
NB02S1	Arsenic	12.00	3.80	0.43	17.1

3.3.3 Ecological Risk Assessment

A qualitative assessment for ecological risk indicates the site is not expected to pose an unacceptable ecological risk due to the low level of contamination and limited pathways by which receptors may be exposed. The migration of contamination to sediments or surface water through groundwater or runoff would be slow or unlikely to occur (Close-Out Report, 1997).

3.4 Conclusions and Recommendations

Based on the reevaluation of the Site 8 data the site does not likely present a unacceptable risk to human health and the environment. Existing land use of the site will further minimize the limited exposure pathways. Therefore, no further action is recommended for Site 8.

4.0 Site 12—Mercury Disposal Site

This section supports the no further action decision at the Mercury Disposal Site, Site 12. The existing information and data for Site 12 is summarized in the following sections as is the rationale for determining this site as requiring no further action.

4.1 Site Background

The following sections describe previous site uses, investigations, and actions taken. The physical setting and geographical location of the site are also described.

4.1.1 Site History

In the late 1960s, approximately 150 ten-pound glass bottles of elemental mercury were allegedly dumped off the seawall near building V-88 into Willoughby Bay. The source of the mercury was a laboratory located within building V-88. Several concrete ramps still remain along the seawall. Surrounding areas were used to perform minor repairs and major maintenance and inspections of aircraft. The aircraft maintenance activities ceased in 1996.

The DON initiated the NAICP Program in 1981. The NAICP Program utilized a three phase approach to site study and cleanup. The program encompassed an IAS, Confirmation and Characterization studies and Remedial Measures. The 1983 IAS reported that bottom sediment samples were collected at the alleged dump site in 1976 for mercury analysis. No indication of mercury contamination was evident. In addition, divers probed the sediments for the glass containers and nothing was found.

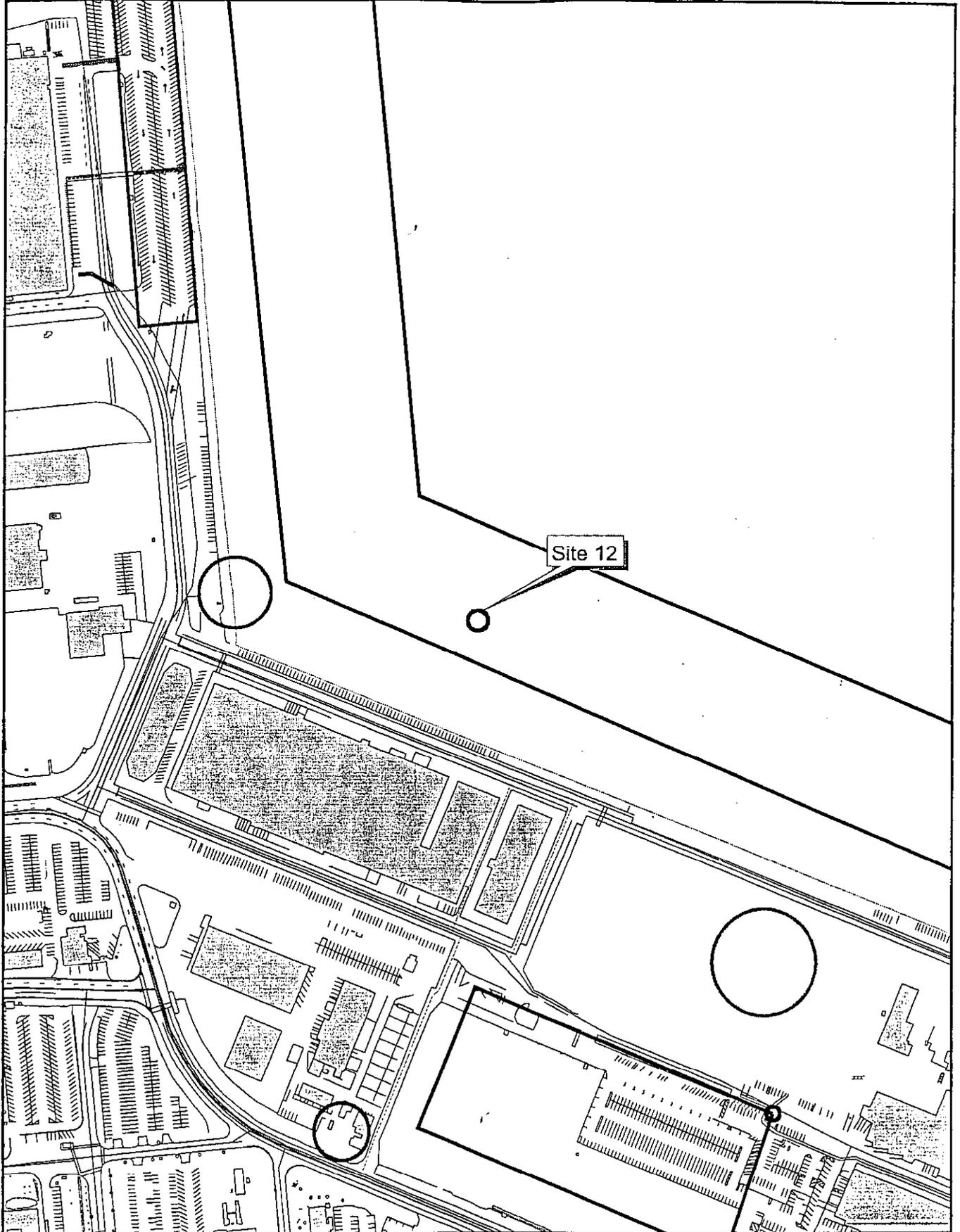
In 1996 the site was investigated as part of a RRRS Data Collection Sampling and Analysis Report (Baker, January 1996). Based on the results of the 1996 RRRS a Close-Out Report was completed in December 1997. CH2M HILL was later contracted to reevaluate the analytical results presented in the 1997 Close-Out Report.

4.1.2 Site Description

The Mercury Disposal Site is located on NSN along the Willoughby Bay seawall near building V-88, Figure 4-1. Figure 4-2 highlights the sample location. The site is located in a Logistics/Industrial zone of the Naval Station. Most of the area in the immediate vicinity of the site is relatively flat and paved with concrete or asphalt. Water in this area is approximately five feet deep during high tide.

4.2 Field Activities

This section presents information related to the field activities associated with the sampling performed at Site 12. Details of sampling events are provided.



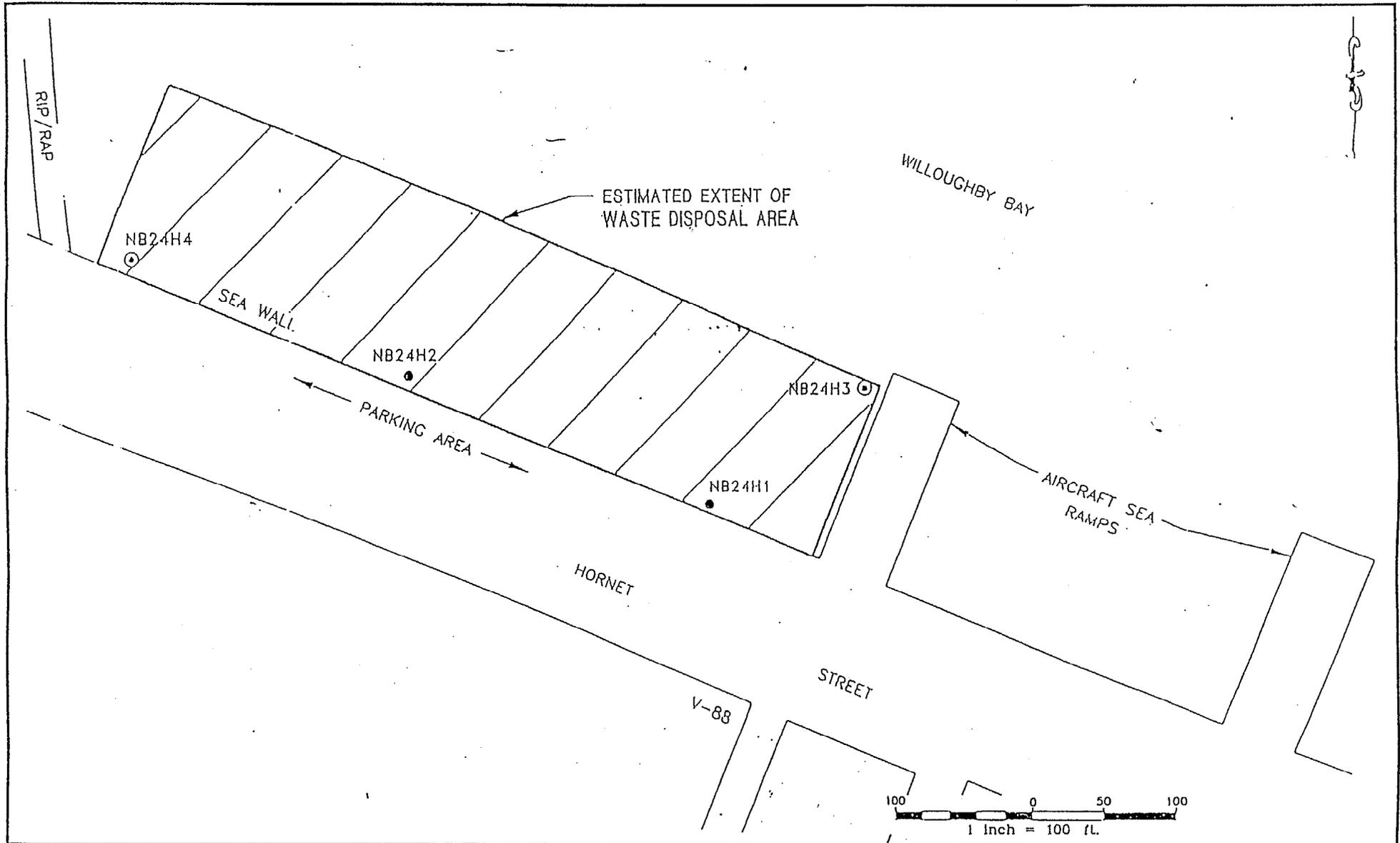
LEGEND

-  Buildings
-  Roads



0 300 600 Feet

Figure 4-1
Site Map
Site 12 Mercury Disposal Site
NFA Site
Naval Station Norfolk



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NB24H1 ● - Sediment Sampling Point
October, 1995

NB24H3 ⊙ - Sediment Sampling Point
September, 1996

Source: Lantdiv, 1994

Figure 4-2: Alleged Mercury Disposal
Sampling Locations
Naval Base Norfolk
Norfolk, Virginia

4.2.1 Historical Sampling Activities

The Mercury Disposal Site was investigated as part of the RRRS in 1996, and the RRRS Phase II. These studies were conducted to determine the potential risk at NSN sites and establish a ranking of sites using the LANTRDIV RRRS. The objectives of the field investigations were to gather contaminant, pathway, and receptor information to be used in the Navy's RRR system and to collect samples for laboratory analysis where no data was available for use in the RRRS.

4.2.2 Sample Collection

Sample location and selection of analyte parameters were determined during site reconnaissance performed prior to the field sampling event. Site reconnaissance was performed by Baker Environmental, LANTRDIV, and NSN personnel. Sample locations and depths were based on the history and information available for the site and best engineering judgment.

Two sediment samples in the reported spill area were collected for analysis as part of the initial RRRS sampling. Two additional sediment samples were collected during the RRRS Phase II to supplement the data. Samples were submitted for the analysis of mercury and other potential inorganic and organic contaminants. No surface water samples were collected because of the large area of Willoughby Bay and the lapse in time between the alleged dumping and the investigation.

4.3 Risk Characterization

This section presents the analytical data from the RRRS. A discussion of the data includes the identification of screening and regulatory exceedances and exceedances of background concentrations.

4.3.1 Analytical Results

Table 4-1 shows the maximum detected concentrations of various compounds and their comparison to the EPA's RBCs. The sediment samples are compared to the industrial and residential soil RBCs.

Analytical results are discussed in the 1997 Close-Out Report. In the report, results were compared with industrial RBCs in order to assess impacts to the site. However, it is stated in the report that mercury was the only contaminant of concern, so other results were treated as insignificant. Industrial screening criteria were consistent with the land-use at the time the Close-Out Report was prepared. Arsenic, which is ubiquitous to the region, was the only inorganic compound exceeding industrial RBCs. Mercury was found in one sample, but the concentration did not exceed the 1997 Region III RBC.

The reevaluation of the Site 12 analytical results was completed using current residential RBC guidelines. Arsenic was the only inorganic compound found that exceeded residential RBCs but the levels detected were within background concentrations detected in the area.

The only organic compound in exceedance of either of the Residential RBCs is benzo (a) pyrene, but the concentration is below background. Table 4-2 shows the samples that exceeded RBCs, parameter concentrations, the current RBC values, and background limits.

Table 4-1 Comparison of Site 12 Maximum Site Concentrations to RBCs

Sample Number	Parameter	Result (mg/kg)	Qualifier	Industrial RBC (mg/kg)	Exceed Industrial RBC?
NB24H3	Anthracene	0.06	J	610000.00	No
NB24H3	Benzo(a)anthracene	0.28	J	NA	no
NB24H3	Benzo(a)pyrene	0.30	J	0.78	no
NB24H3	Benzo(b)fluoranthene	0.39	J	7.80	no
NB24H3	benzo(g,h,i)perylene	0.19	J	NA	no
NB24H3	benzo(k)fluoranthene	0.17	J	78.00	no
NB24H3	bis(2-ethylhexyl)phthalate	0.41		NA	no
NB24H3	Butylbenzylphthalate	0.11	J	NA	no
NB24H3	Carbazole	0.05	J	290.00	no
NB24H3	Chrysene	0.29	J	780.00	no
NB24H3	dibenzo(a,h)anthracene	0.04	J	NA	no
NB24H3	Fluoranthene	0.50		82000.00	no
NB24H3	indeno(1,2,3-cd)pyrene	0.22	J	7.80	no
NB24H3	Phenanthrene	0.24	J	NA	no
NB24H3	Pyrene	0.56		61000.00	no
NB24H1	Aluminum	5520.00		1000000.00	no
NB24H1	Arsenic	7.00		3.80	yes
NB24H4	Barium	70.80		140000.00	no
NB24H4	Beryllium	0.17		1.30	no
NB24H2	Cadmium	1.00		1000.00	no
NB24H2	Calcium	21600.00		NA	no
NB24H1	Chromium	22.00		10000.00	no
NB24H3	Cobalt	0.81		120000.00	no
NB24H2	Copper	40.00		82000.00	no
NB24H1	Cyanide	28.00		41000.00	no
NB24H1	Iron	8850.00		610000.00	no
NB24H3	Lead	33.30		NA	no
NB24H1	Magnesium	3450.00		NA	no
NB24H1	Manganese	99.00		47000.00	no
NB24H3	Mercury	7.00		610.00	no
NB24H3	Nickel	3.90		41000.00	no
NB24H1	Potassium	1330.00		NA	no
NB24H1	Sodium	6500.00		NA	no
NB24H1	Vanadium	17.00		14000.00	no
NB24H1	Zinc	68.00		610000.00	no

Table 4-2 Comparison of Site 12 RBC Exceedances to Background Levels

Sample	Parameter	Result (mg/kg)	Industrial RBC (mg/kg)	Residential RBC (mg/kg)	Background Limit (mg/kg)
NB24H3	Benzo(a)pyrene	0.30	0.78	0.09	0.490
NB24H1	arsenic	7.00	3.80	0.43	17.1

4.3.2 Human Health Risk Assessment

A qualitative assessment for human health indicates the site is not expected to pose an unacceptable risk to human health due to the low level of contamination and limited exposure pathways (Close-Out Report, 1997).

4.3.3 Ecological Risk Assessment

Due to the known history of the site and factors and conditions of Willoughby Bay, it would be difficult to link a particular contaminant to specific ecological impacts without conducting a comprehensive environmental risk assessment (Close-Out Report, 1997).

4.4 Conclusions and Recommendations

Based on the reevaluation of the Site 12 data it is unlikely that the site will pose an unacceptable risk to human health or the environment. Therefore, no further action is recommended for Site 12.

5.0 Site 17 – Chemical Fire, Bldg SDA-215

This section supports the no further action decision at Site 17. The existing information and data for Site 17 is summarized in the following sections as is the rational for determining this site as requiring no further action.

5.1 Site Background

The following sections describe previous site uses, investigation, and actions taken. The physical setting and geographical location of the site are also described.

5.1.1 Site History

On August 12, 1981 a fire occurred in cell 6 of Building SDA-215. The fire was a result of incompatible chemical storage, predominantly calcium hypochlorite and acids. Considerable contamination occurred as a result of the fire and fire-fighting operations. The site was cleaned up by removing the remaining hazardous chemicals and residues, as well as contaminated soil adjacent to the building. The materials were contract hauled offsite to an EPA approved hazardous waste disposal facility.

The DON initiated the NAICP Program in 1981. The NAICP Program utilized a three phase approach to site study and cleanup. The program encompassed an IAS, Confirmation and Characterization studies and Remedial Measures. The 1983 IAS was used to identify and assess sites presenting a possible threat to human health or the environment due to contamination. Inspection of the chemical fire site during the 1983 IAS indicated that the site has been adequately decontaminated. Consequently, the site was recommended for no further action in the IAS summary report.

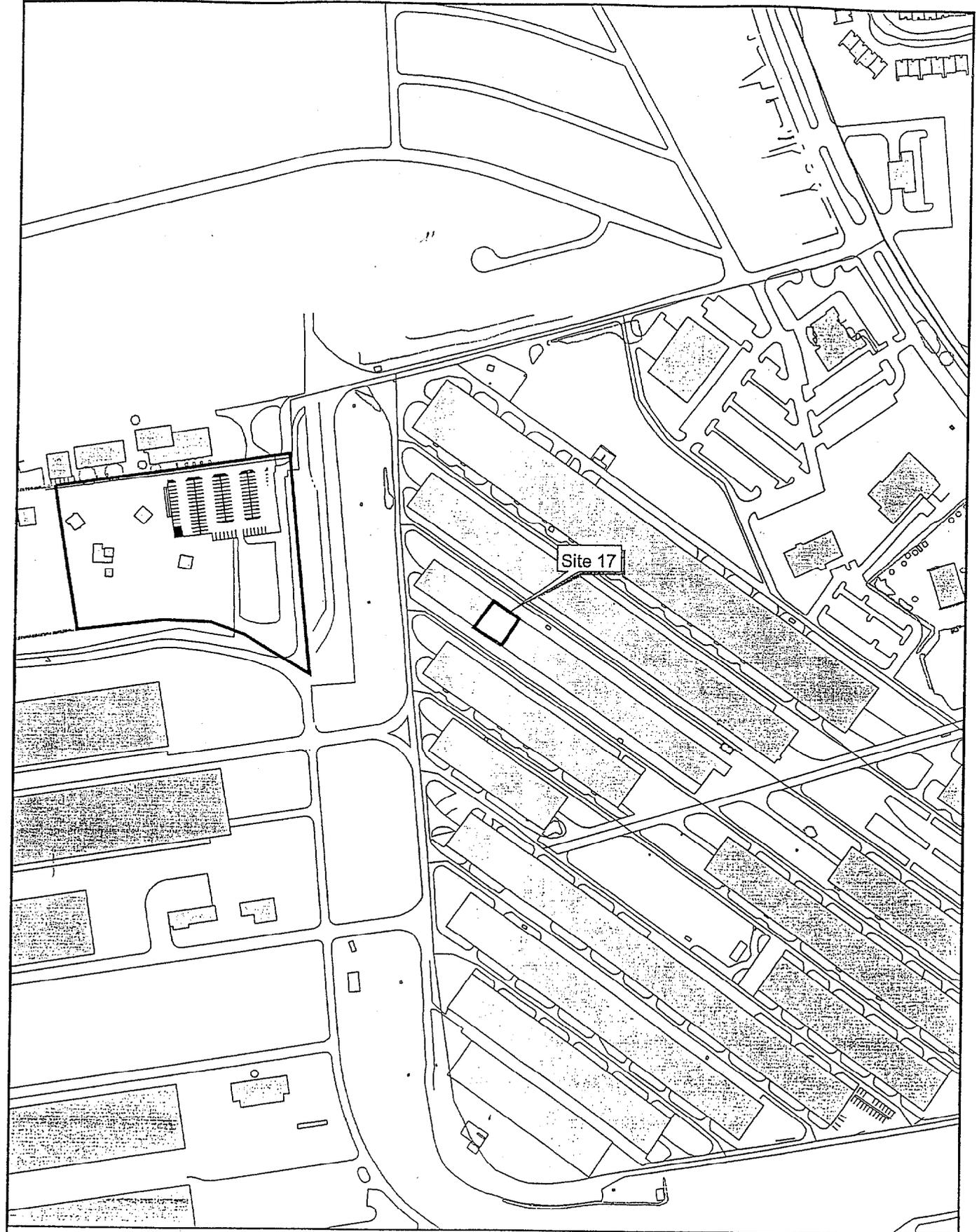
In 1996 Site 17 was again investigated as part of the RRRS Data Collection and Analysis Report (Baker, January 1996) and the RRRS Phase II (Baker, December 1996). CH2M HILL was later contracted to reevaluate the analytical results presented in the 1997 Close-Out Report using current RBCs.

5.1.2 Site Description

Building SDA-215 is located in the South Annex area of the NSN, Figure 5-1. Figure 5-2 highlights the sample location.

5.2 Field Activities

This section presents information related to the field activities associated with the sampling performed at Site 17. Details of the sampling event are provided.



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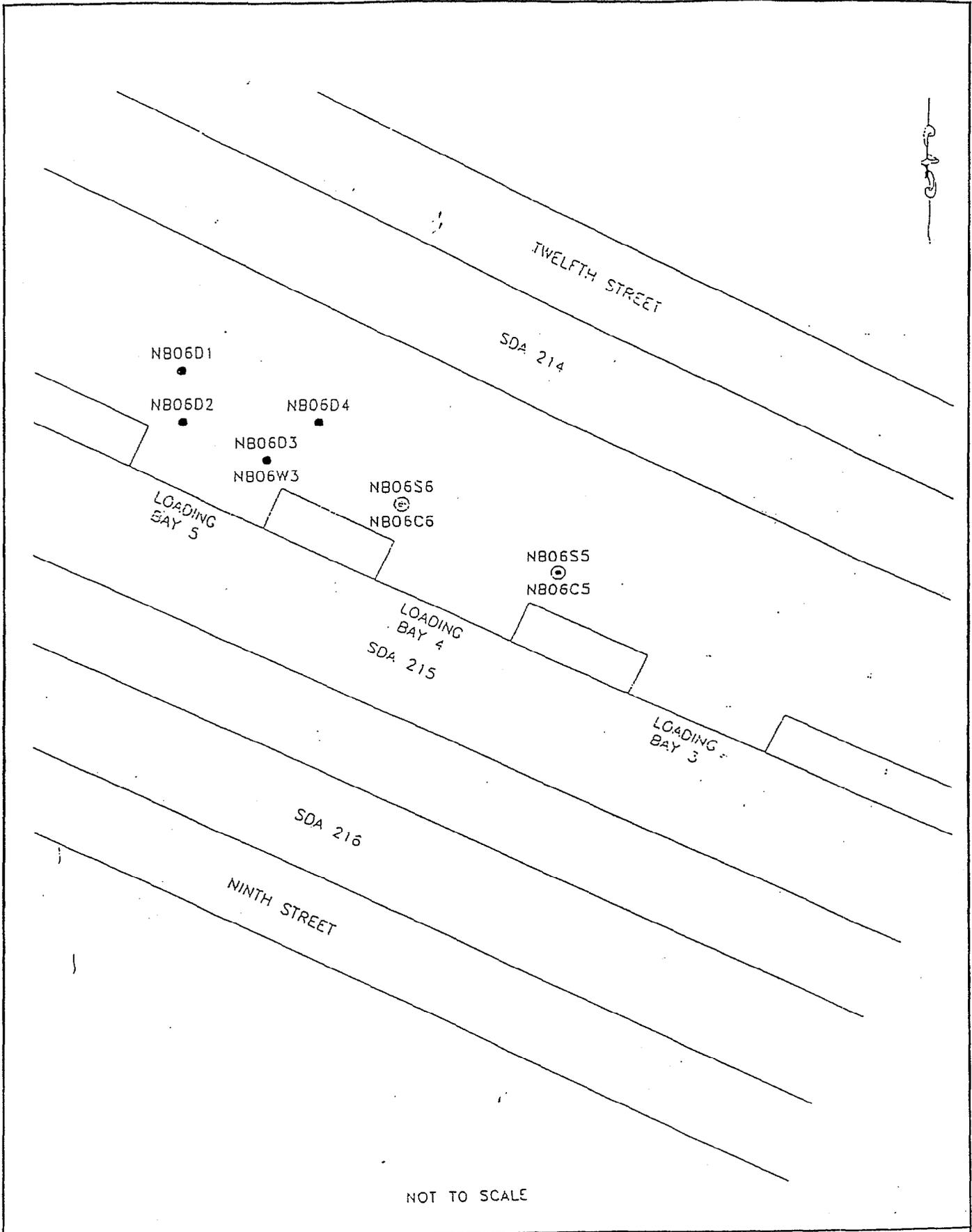
-  Buildings
-  Roads



0 200 400 Feet



Figure 5-1
Site Map
Site 17 Chemical Fire Bldg SDA-215
NFA Sites
Naval Station Norfolk



NOT TO SCALE

LEGEND

- | | | | |
|--------|--|--------|---|
| NB06D3 | ● - Subsurface Soil Sampling Point
Octorber, 1995 | NB06S6 | ⊙ - Subsurface Soil Sampling Point
September, 1996 |
| NB06W3 | - Groundwater Sampling Point
Octorber, 1995 | NB06C6 | - Concrete Sampling Point
September, 1996 |

Figure 5-2: Chemical Fire, Bldg. SDA-215
Sampling Locations
Naval Base Norfolk
Norfolk, Virginia

Source: Lantdiv, 1994

5.2.1 Historical Sampling Activities

Site 17 was investigated as part of the RRRS and RRRS Phase II in 1996. These reports were conducted to determine the potential risk at NSN sites and establish a ranking of these sites using the LANTDIV RRRS. The objectives of the field investigation were to gather contaminant, pathway, and receptor information to be used in the RRRS and to collect samples for laboratory analysis where no data was available for use in the RRRS.

5.2.2 Sample Collection

Sample location and selection of analyte parameters were determined during site reconnaissance performed prior to the field sampling event. Site reconnaissance was performed by Baker Environmental, LANTDIV, and NSN personnel. Sample locations and depths were based on the history and information available for the site and best engineering judgment.

One groundwater and four subsurface soil samples were collected for analysis during the initial RRR sampling. Two surface soil and two concrete samples were collected during the RRR Phase II to supplement the initial data.

5.3 Risk Characterization

This section presents the analytical data from the RRRS. A discussion of the data includes the identification of screening and regulatory exceedances and exceedances of background concentrations.

5.3.1 Analytical Results

Table 5-1 shows the maximum detected concentrations of various compounds and their comparison to the EPA's RBCs. Soil and concrete samples are compared to the industrial and residential RBCs and the groundwater sample is compared to the tap water RBCs.

Analytical results are discussed in the 1997 Close-Out Report. Comparisons of the sample parameter concentrations the 1997 RBC values are made. No organic or inorganic contaminants were detected in any of the media exceeding industrial RBCs. Due to industrial land use at the time, no further action was recommended for the site.

The reevaluation of the 1997 Site 17 analytical results was completed using current RBCs. Arsenic was the only constituent detected that exceeded residential RBCs. However, the arsenic levels were within the range of background concentrations. Table 5-2 shows the samples that exceeded RBCs, parameter concentrations, the current RBC values, and background limits.

5.3.2 Human Health Risk Assessment

A qualitative assessment for human health indicates the site is not expected to pose an unacceptable risk to human health due to the low level of contamination and limited exposure pathways (Close-Out Report, 1997).

Table 5-1 Comparison of Site 17 Maximum Constituents to RBCs

Surface Soil Sample Number	Constituent	Result (mg/kg)	Qualifier	'97 Industrial RBC (mg/kg)	Exceed Industrial RBC?	Residential RBC (mg/kg)	Exceed Residential RBC?
NB06S5	Acetone	0.02		200000.00	no	7800.00	No
NB06S6	Aluminum	14900.00		1000000.00	no	78000.00	No
NB06S6	Arsenic	0.77		3.80	no	0.43	Yes
NB06S6	Barium	55.10		140000.00	no	5500.00	No
NB06S6	Beryllium	0.25		1.30	no	0.15	Yes
NB06S5	Calcium	1780.00		NA	no	NA	No
NB06S6	Chromium	14.10		10000.00	no	390.00	No
NB06S6	Cobalt	2.50		120000.00	no	4700.00	No
NB06S5	Copper	3.50		82000.00	no	3100.00	No
NB06S6	Iron	6070.00		610000.00	no	23000.00	No
NB06S5	Lead	17.70		NA	no	NA	No
NB06S6	Magnesium	729.00		NA	no	NA	No
NB06S6	Manganese	21.40		47000.00	no	1800.00	No
NB06S6	Nickel	4.70		41000.00	no	1600.00	No
NB06S6	Potassium	670.00		NA	no	NA	No
NB06S5	Sodium	49.80		NA	no	NA	No
NB06S6	Vanadium	22.20		14000.00	no	550.00	No
NB06S6	Zinc	9.00		610000.00	no	23000.00	No
Subsurface Soil Sample Number	Constituent	Result (mg/kg)	Qualifier	Industrial RBC (mg/kg)	Exceed Industrial RBC?	Residential RBC (mg/kg)	Exceed Residential RBC?
NB06D4	Aluminum	4690.00		1000000.00	no	78000.00	No
NB06D1	Arsenic	3.00		3.80	no	0.43	Yes
NB06D4	Calcium	858.00		NA	no	NA	No
NB06D1	Chromium	10.00		10000.00	no	390.00	No
NB06D4	Iron	3170.00		610000.00	no	23000.00	No
NB06D4	Lead	5.00		NA	no	NA	No
NB06D3	Manganese	5.00		47000.00	no	1800.00	No
NB06D4	Potassium	797.00		NA	no	NA	No
NB06D4	Vanadium	11.00		14000.00	no	550.00	No
NB06D4	Zinc	7.00		610000.00	no	23000.00	No

Table 5-1 Comparison of Site 17 Maximum Site Constituents to RBCs (cont.)

Concrete Sample Number	Constituent	Result (mg/kg)	Qualifier	'97 Industrial RBC (mg/kg)	Exceed Industrial RBC?	Residential RBC (mg/kg)	Exceed Residential RBC?
NB06C6	Bis(2-ethylhexyl)phthalate(DEHP)	0.05	J	410.00	no	46.00	No
NB06C6	DDE	0.00		17.00	no	1.90	No
NB06C6	DDT	0.00	J	17.00	no	1.90	No
NB06C5	Aluminum	9110.00		1000000.00	no	78000.00	No
NB06C5	Arsenic	0.84		3.80	no	0.43	Yes
NB06C6	Barium	91.20		140000.00	no	5500.00	No
NB06C5	Beryllium	0.49		1.30	no	0.15	Yes
NB06C6	Calcium	112000.00		NA	no	NA	No
NB06C6	Chromium	30.80		10000.00	no	390.00	No
NB06C5	Cobalt	10.30		120000.00	no	4700.00	No
NB06C6	Copper	9.70		82000.00	no	3100.00	No
NB06C5	Iron	6180.00		610000.00	no	23000.00	No
NB06C6	Lead	50.30		NA	no	NA	No
NB06C5	Magnesium	3530.00		NA	no	NA	No
NB06C5	Manganese	269.00		47000.00	no	1800.00	No
NB06C5	Nickel	5.60		41000.00	no	1600.00	No
NB06C6	Potassium	1600.00		NA	no	NA	No
NB06C6	Sodium	262.00		NA	no	NA	No
NB06C5	Vanadium	11.70		14000.00	no	550.00	No
NB06C6	Zinc	26.70		610000.00	no	23000.00	No
Groundwater Sample Number	Constituent	Result (ug/L)	Qualifier	' Tap Water RBC (ug/L)	Exceed Tap Water RBC?	Tap Water MCL/RBC (mg/L)	Exceed MCL/RBC?
NB06W1	Dibutyl phthalate	2.00	J	3700.00	no	3700.00	No
NB06W1	Aluminum	2430.00		37000.00	no	37000.00	No
NB06W1	Calcium	8360.00		NA	no	NA	No
NB06W1	Cyanide	0.00		730.00	no	200.00	No
NB06W1	Iron	2760.00		11000.00	no	11000.00	No
NB06W1	Manganese	112.00		840.00	no	730.00	No
NB06W1	Sodium	7850.00		NA	no	NA	No
NB06W1	Zinc	32.00		11000.00	no	11000.00	No

Table 5-2 Comparison of Site 17 RBC Exceedances to background levels.

Surface Soil Sample	Parameter	Result (mg/kg)	Industrial RBC (mg/kg)	Residential RBC (mg/kg)	Background Limit (mg/kg)
NB06S6	Arsenic	0.77	3.80	0.43	17.1
Subsurface Soil Sample					
NB06D1	Arsenic	3.00	3.80	0.43	17.1
Concrete Sample					
NB06C5	Arsenic	0.84	3.80	0.43	17.1

5.3.3 Ecological Risk Assessment

A qualitative assessment for ecological risk indicates the site is not expected to pose an unacceptable ecological risk due to the low level of contamination and limited pathways by which receptors may be exposed (Close-Out Report, 1997).

5.4 Conclusions and Recommendations

Based on the reevaluation of the 1997 Site 17 data it is unlikely that the site will pose an unacceptable risk to human health or the environment. Therefore, no further action is recommended for Site 17.