12/1/97-01446

NAVAL BASE, NORFOLK
NORFOLK, VIRGINIA

Close-out Report

Site 12
Mercury Disposal Site

December 1997

SITE NAME AND LOCATION
Site 12
Mercury Disposal Site
Naval Base, Norfolk
Norfolk, Virginia

STATEMENT OF BASIS
This No Further Response Action Plan (NFRAP) decision is based on the results of previous investigations the Initial Assessment Study (IAS) (NEESA, 1983), the Relative Risk Ranking Data Collection Sampling and Analysis Report (Baker, January 1996), the Relative Risk Ranking Data Collection Sampling and Analysis Report Phase II (Baker, December, 1996), and the Site Management Plan Naval Base, Norfolk (CH2MHill, March 1997).

DECLARATION
Based on the information and results provided, it has been determined that no significant risk or threat to public health or the environment exists. No further action under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended, is required.

In the event contamination posing an unacceptable risk to human health or the environment is discovered after execution of this site close-out document, the Partnership agrees that additional investigation to characterize this contamination will be undertaken and further agrees to remediate the contamination if deemed necessary.

We the undersigned hereby acknowledge our approval and acceptance of the above declaration on this 3rd day of December, 1997.

Harry Harbold
Michael Hilin
Darlin Hanna
Timothy A. Rusch
Randy M Jackson

DECISION SUMMARY

1.0 INTRODUCTION

This Close-out Report supports the No Further Response Action Plan (NFRAP) decision at the Mercury Disposal Site, Site 12. The purpose of this report is to summarize the existing information and data for the site and describe the Naval Base Partnering Team's rational for determining this site as requiring no further action.

1.1 Site History.

The Department of the Navy (DON) initiated the Navy Assessment and Control of Installation Pollutants (NACIP) Program in 1981. The NACIP Program utilized a three-phased 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 Mercury Disposal Site was one of the 18 possible areas of concern identified during this study.

1.2 Site Description.

The Mercury Disposal Site is located on Naval Base, Norfolk (NBN) along the Willoughby Bay seawall near Building V-88, Figures 1 and 2. The site is located in an Logistics/Industrial zone of the Naval Base. The alleged mercury spill occurred in the late 1960s when approximately 150 ten-pound glass bottles of elemental mercury were reported to have been dumped off the seawall into Willoughby Bay. The source of the mercury was a laboratory located within Building V-88.

The IAS reports that bottom sediment samples were collected from Willoughby Bay at the alleged dump site for mercury analysis in 1976. In addition, divers probed the sediments for the glass containers. No evidence of mercury or the glass containers was found. The site was recommended no further action in the IAS.

2.0 FIELD INVESTIGATION ACTIVITIES

The Mercury Disposal Site was investigated as part of the Relative Risk Ranking System Data Collection Sampling and Analysis Report (Baker, January 1996), and the Relative Risk Ranking System Data Collection Sampling and Analysis Report, Phase II (Baker, December 1996). These reports were conducted to determine the potential risk at NBN sites and establish a ranking of these sites using the Naval Facilities Engineering Command, Atlantic Division (LANTDIV) Relative Risk Ranking (RRR) System. The objects of this field investigation were to:

- Gather contaminant, pathway and receptor information to be used in the Navy's RRR system.
- Collect samples for laboratory analysis where no data was available for use in the RRR system.

2.1 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 NBN 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 RRR sampling. Two additional sediment samples were collected during the RRR Phase II to supplement the initial data. The locations of these four sediment samples are depicted in Figure 2. Water in this area of the alleged mercury spill is approximately five feet deep during high tide. Samples were submitted to analyses for mercury and other potential inorganic and organic contaminants, Table 1. Surface water samples were not collected due to the large area of Willoughby Bay and the fact that the spill was historic in nature.

TABLE 1: Site Sampling Summary

RRR Site ID	Sample Type	Sample ID	Analytical Parameters			
			VOC	SVOC	Metals	Pesticide PCB
NB24	Sediment	NB24H1			X	X
	Sediment	NB24H2			X	X
	Sediment	NB24H3	X	X	X	
	Sediment	NB24H4	X	X	X	

2.2 Analytical Results.
Mercury was not detected in three samples and detected at a concentration of 7 mg/kg in the remaining sediment sample. Heavy metals were detected in all the samples. Organic contaminants either were not detected or were present at very low concentrations. Currently only mercury is identified as a contaminant of concern since other sources of organic and inorganic contamination enter the Bay and only mercury was identified in the dumping incident. The maximum concentration of detected compounds is summarized and compared to the EPA's Industrial Risk Based Concentration (RBCs) in Table 2. All detected compounds are presented in Table 3.

3.0 *RISK CHARACTERIZATION*
Since the mercury disposal was an isolated event and circumstances surrounding the disposal have not been well documented, a qualitative risk assessment has been conducted using sampling data collected in 1995-1996 and the available weight-of-evidence.

Tidal action has likely caused mixing of sediment in the area of the alleged spill with sediment from adjacent portions of Willoughby Bay which may be contaminated from other sources in the area. The process of intermixing or combining sediments from these areas would be expected to

result in the dispersal of any contaminants that may have been present in sediment at the spill area since the incident occurred over 20 years ago. The potential also exists for mixing and for adverse impact on sediment and water quality from other contaminant sources which enter Willoughby Bay, both from the Naval Base Norfolk and other industrial sources in the area

3.1 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.

3.2 Ecological Risk Assessment

Mercury has been documented as having an adverse effect on aquatic receptors and aquatic biota at low concentrations. Neither EPA or the Commonwealth of Virginia have regulatory standards for mercury in sediment. For comparison purposes, a nonregulatory criteria is used for mercury. The mercury sediment chronic toxicity value derived from the literature (Long and Morgan, 1990) is 0.15 mg/kg for the lower 10th percentile of the available toxicity data, and 0.71 mg/kg for the median available toxicity data.

The surface waters and bottom sediments associated with the general area including Willoughby Bay, the Elizabeth River, and nearby Chesapeake Bay provide extensive nursery and adult forage habitat for numerous species. The Bay's tidal exchange and proximity to the Chesapeake Bay suggests that abundant populations of species occur regularly near the Naval Base.

Surface water runoff in the area of Building V-88 is controlled by man-made structures. Specifically, the area along the sea wall receives surface water from an adjacent parking lot and surface runoff from the Naval Base is directed through at least one open storm drain pipe into the alleged spill area.

Ecological risk assessment is an iterative process requiring extensive site specific screening and data collection. Due to the known history of the site and factors and conditions of Willoughby Bay previously addressed, it would be difficult to link a particular contaminant to specific ecological impacts without conducting a comprehensive environmental risk assessment for Willoughby Bay. It would also be difficult to conclude that the isolated hot-spot concentration of mercury in sediment at 7 mg/kg is a result of the dumping incident since no other elevated levels of mercury were detected.

4.0 CONCLUSION AND RECOMMENDATION

Based on this evaluation, no further action is recommended for this site. It should be noted that additional sampling and ecological evaluation of Willoughby Bay will be required in the future to determine if a significant risk to the environment exists.

Notes

1. Sample number designation: Base-RRR Site Number-Media-Sample Number

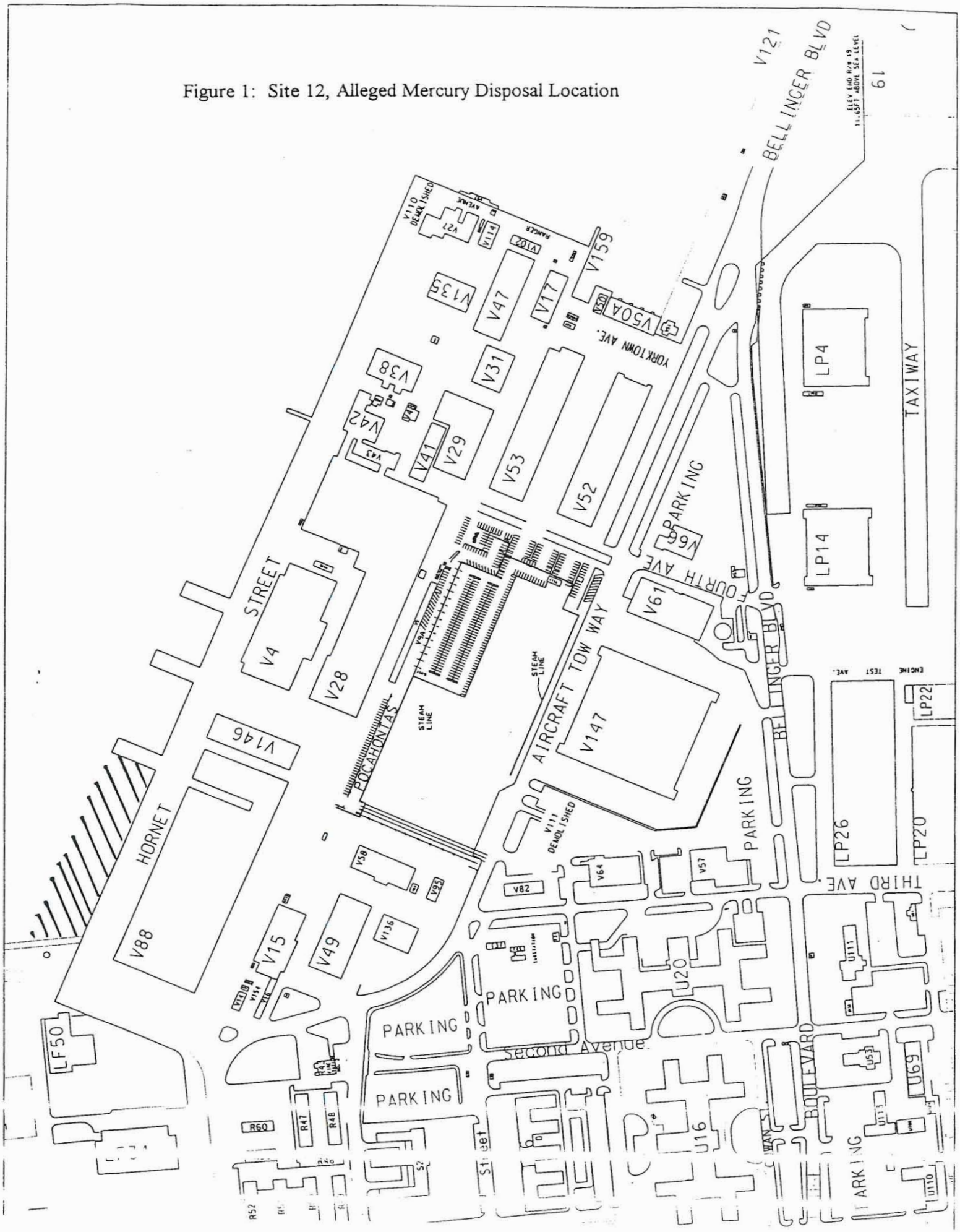
   Base - NB (Naval Base)
   Site Number - ## (i.e. 01, Inert Chemical Landfill)
   Media -
   - S - Surface Soil
   - D - Subsurface Soil
   - H - Sediment
   - C - Concrete
   - W - Groundwater

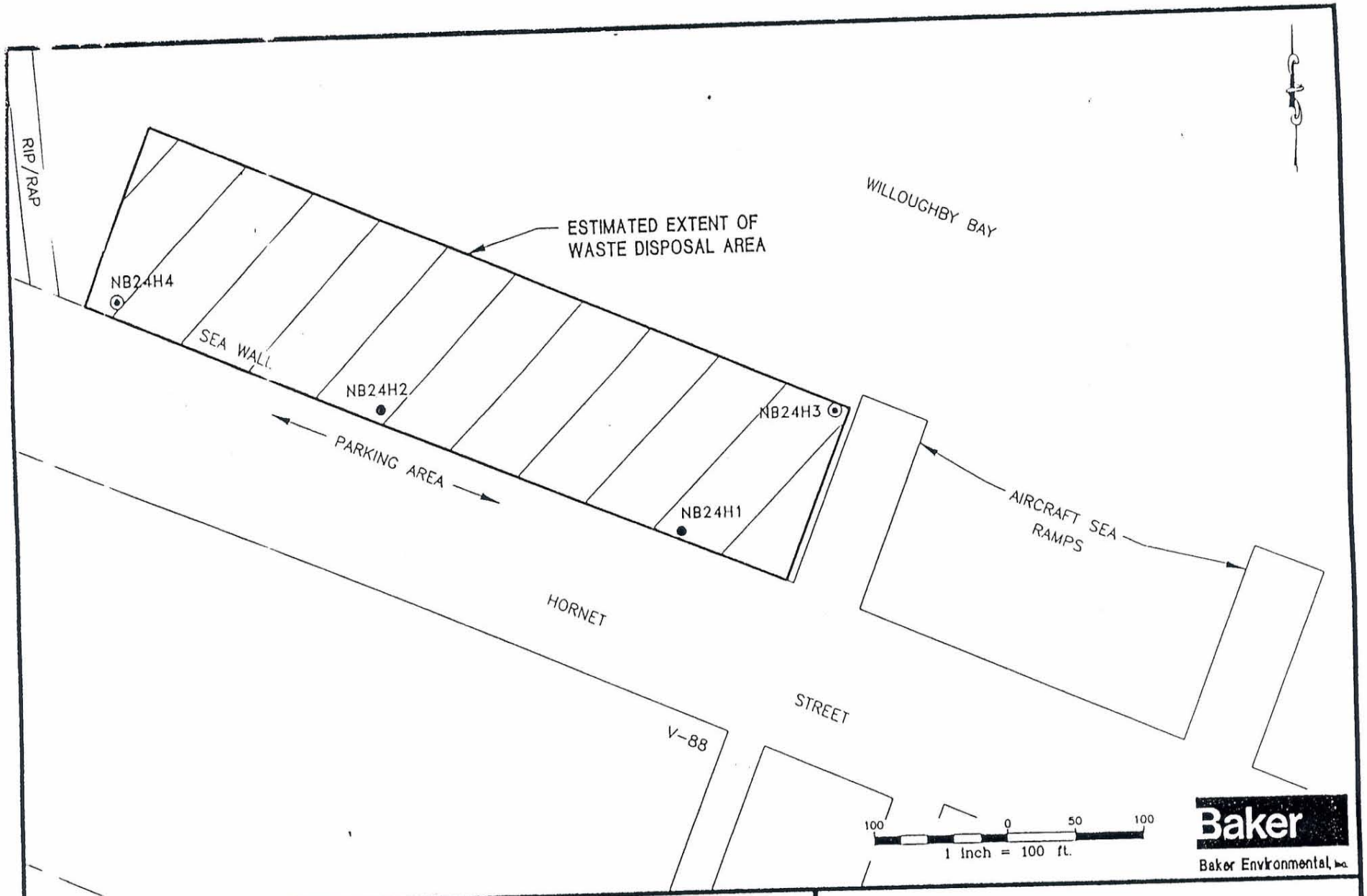
2. Sample Analysis
   - VOC - Volatile organic compound, analyzed by Method SW846-8240.
   - SVOC - Semivolatile organic compound, analyzed by Method SW846-8270.
   - Metals analyzed by Method SW846-6010 (various) and 7471.
   - Cn - Cyanide, analyzed by Method SW846-9012.
   - PCB - Polychlorinated Biphenyl. PCBs and pesticide analyzed by Method SW846-8080.
   - Asbestos - Analyzed by 40 CFR, Part 73, Subpart F, Appendix A.

3. Qualifiers
   - B - Detected in Blank
   - J - Estimated Value

4. RBC Basis
   - C - carcinogenic effects
   - N - noncarcinogenic effects

Figure 1: Site 12, Alleged Mercury Disposal Location





LEGEND

NB24H1 – SEDIMENT SAMPLING POINT OCTOBER, 1995

NB24H3 – SEDIMENT SAMPLING POINT SEPTEMBER, 1996

SOURCE: LANTDIV, 1994.

Figure 2: Alleged Mercury Disposal Sampling Locations

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NORFOLK, VIRGINIA

35-105RR

TABLE 2: Maximum Concentration of Detected Compounds, Site 12 - Mercury Disposal Site

SAMPLE_NO	PARAMETER	RESULT (mg/kg)	QUALIFIER	Frequency	Industrial RBC (mg/kg)	Basis	Exceed Industrial RBC
NB24H3	Anthracene	6.30E-02	J	1/2	6.10E+05	N	NO
NB24H3	Benzo(a)anthracene	2.80E-01	J	2/2	#N/A	#N/A	#N/A
NB24H3	Benzo(A)pyrene	3.00E-01	J	2/2	7.80E-01	C	NO
NB24H3	Benzo(b)fluoranthene	3.90E-01	J	2/2	7.80E+00	C	NO
NB24H3	Benzo(g,h,i)perylene	1.90E-01	J	2/2	#N/A	#N/A	#N/A
NB24H3	Benzo(k)fluoranthene	1.70E-01	J	2/2	7.80E+01	C	NO
NB24H3	Bis(2-ethylhexyl)phthalate	4.10E-01		2/2	#N/A	#N/A	#N/A
NB24H3	Butylbenzylphthalate	1.10E-01	J	1/2	#N/A	#N/A	#N/A
NB24H3	Carbazole	4.60E-02	J	1/2	2.90E+02	C	NO
NB24H3	Chrysene	2.90E-01	J	2/2	7.80E+02	C	NO
NB24H3	Dibenzo(a,h)anthracene	4.40E-02	J	1/2	#N/A	#N/A	#N/A
NB24H3	Fluoranthene	5.00E-01		2/2	8.20E+04	N	NO
NB24H3	Indeno(1,2,3-cd)pyrene	2.20E-01	J	2/2	7.80E+00	C	NO
NB24H3	Phenanthrene	2.40E-01	J	2/2	#N/A	#N/A	#N/A
NB24H3	Pyrene	5.60E-01		2/2	6.10E+04	N	NO
NB24H1	Aluminum	5.52E+03		4/4	1.00E+06	N	NO
NB24H1	Arsenic	7.00E+00		4/4	3.80E+00	C	YES
NB24H4	Barium	7.08E+01		2/4	1.40E+05	N	NO
NB24H4	Beryllium	1.70E-01		1/4	1.30E+00	C	NO
NB24H2	Cadmium	1.00E+00		1/4	1.00E+03	N	NO
NB24H2	Calcium	2.16E+04		4/4	#N/A	#N/A	Human Nutrient
NB24H1	Chromium	2.20E+01		4/4	1.00E+04	N	NO
NB24H3	Cobalt	8.10E-01		1/4	1.20E+05	N	NO
NB24H2	Copper	4.00E+01		4/4	8.20E+04	N	NO
NB24H1	Cyanide	2.80E+01		1/4	4.10E+04	N	NO
NB24H1	Iron	8.85E+03		4/4	6.10E+05	N	NO
NB24H3	Lead	3.33E+01		4/4	#N/A	#N/A	#N/A
NB24H1	Magnesium	3.45E+03		4/4	#N/A	#N/A	Human Nutrient
NB24H1	Manganese	9.90E+01		4/4	4.70E+04	N	NO
NB24H3	Mercury	7.00E+00		1/4	6.10E+02	N	NO
NB24H3	Nickel	3.90E+00		1/4	4.10E+04	N	NO
NB24H1	Potassium	1.33E+03		4/4	#N/A	#N/A	Human Nutrient
NB24H1	Sodium	6.50E+03		4/4	#N/A	#N/A	Human Nutrient
NB24H1	Vanadium	1.70E+01		4/4	1.40E+04	N	NO
NB24H1	Zinc	6.80E+01		4/4	6.10E+05	N	NO

TABLE 3: Detected Compounds, Site 12 - Mercury Disposal Site

SAMPLE_NO	PARAMETER	RESULT (mg/kg)	QUALIFIER
NB24H3	Anthracene	6.30E-02	J
NB24H3	Benzo(a)anthracene	2.80E-01	J
NB24H4	Benzo(A)Anthracene	1.40E-01	J
NB24H3	Benzo(A)pyrene	3.00E-01	J
NB24H4	Benzo(A)Pyrene	1.40E-01	J
NB24H3	Benzo(b)fluoranthene	3.90E-01	J
NB24H4	Benzo(B)Fluoranthene	2.00E-01	J
NB24H3	Benzo(g,h,i)perylene	1.90E-01	J
NB24H4	Benzo(G,H,I)Perylene	7.10E-02	J
NB24H3	Benzo(k)fluoranthene	1.70E-01	J
NB24H4	Benzo(K)Fluoranthene	6.80E-02	J
NB24H3	Bis(2-ethylhexyl)phthalate	4.10E-01	
NB24H4	Bis(2-Ethylhexyl)Phthalate	8.50E-02	J
NB24H3	Butylbenzylphthalate	1.10E-01	J
NB24H3	Carbazole	4.60E-02	J
NB24H3	Chrysene	2.90E-01	J
NB24H4	Chrysene	1.40E-01	J
NB24H3	Dibenzo(a,h)anthracene	4.40E-02	J
NB24H3	Fluoranthene	5.00E-01	
NB24H4	Fluoranthene	2.00E-01	J
NB24H3	Indeno(1,2,3-cd)pyrene	2.20E-01	J
NB24H4	Indeno(1,2,3-Cd)Pyrene	8.40E-02	J
NB24H3	Phenanthrene	2.40E-01	J
NB24H4	Phenanthrene	6.20E-02	J
NB24H3	Pyrene	5.60E-01	
NB24H4	Pyrene	2.40E-01	J
NB24H1	Aluminum	5.52E+03	
NB24H2	Aluminum	4.44E+03	
NB24H3	Aluminum	1.26E+03	
NB24H4	Aluminum	8.21E+02	
NB24H1	Arsenic	7.00E+00	
NB24H2	Arsenic	7.00E+00	
NB24H3	Arsenic	2.00E+00	
NB24H4	Arsenic	1.40E+00	
NB24H4	Barium	7.08E+01	
NB24H3	Barium	9.80E+00	
NB24H4	Beryllium	1.70E-01	
NB24H2	Cadmium	1.00E+00	
NB24H2	Calcium	2.16E+04	
NB24H1	Calcium	2.13E+04	
NB24H3	Calcium	6.28E+03	
NB24H4	Calcium	2.64E+03	
NB24H1	Chromium	2.20E+01	
NB24H2	Chromium	2.20E+01	
NB24H3	Chromium	1.66E+01	
NB24H4	Chromium	7.60E+00	
NB24H3	Cobalt	8.10E-01	
NB24H2	Copper	4.00E+01	
NB24H1	Copper	3.20E+01	
NB24H3	Copper	1.51E+01	
NB24H4	Copper	7.30E+00	
NB24H1	Cyanide	2.80E+01	
NB24H1	Iron	8.85E+03	
NB24H2	Iron	7.57E+03	
NB24H3	Iron	3.20E+03	
NB24H4	Iron	1.88E+03	
NB24H3	Lead	3.33E+01	
NB24H1	Lead	2.20E+01	
NB24H2	Lead	2.10E+01	
NB24H4	Lead	9.20E+00	
NB24H1	Magnesium	3.45E+03	
NB24H2	Magnesium	2.96E+03	

Basis: C=carcinogenic effects, N=noncarcinogenic effects

TABLE 3: Detected Compounds, Site 12 - Mercury Disposal Site

SAMPLE_NO	PARAMETER	RESULT (mg/kg)	QUALIFIER
NB24H3	Magnesium	1.11E+03	
NB24H4	Magnesium	4.84E+02	
NB24H1	Manganese	9.90E+01	
NB24H2	Manganese	9.50E+01	
NB24H3	Manganese	3.32E+01	
NB24H4	Manganese	1.92E+01	
NB24H3	Mercury	7.00E+00	
NB24H3	Nickel	3.90E+00	
NB24H1	Potassium	1.33E+03	
NB24H2	Potassium	1.07E+03	
NB24H3	Potassium	3.55E+02	
NB24H4	Potassium	3.00E+02	
NB24H1	Sodium	6.50E+03	
NB24H2	Sodium	4.93E+03	
NB24H3	Sodium	1.42E+03	
NB24H4	Sodium	1.28E+03	
NB24H1	Vanadium	1.70E+01	
NB24H2	Vanadium	1.50E+01	
NB24H3	Vanadium	5.40E+00	
NB24H4	Vanadium	4.50E+00	
NB24H1	Zinc	6.80E+01	
NB24H2	Zinc	6.20E+01	
NB24H3	Zinc	4.81E+01	
NB24H4	Zinc	3.64E+01	

Basis: C=carcinogenic effects, N=noncarcinogenic effects