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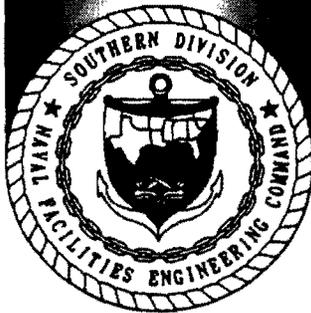
PHASE I INTERIM MEASURE WORK PLAN PRE-EXCAVATION SAMPLING AND ANALYSIS  
PLAN AREA OF CONCERN 620 (AOC 620) SOLID WASTE MANAGEMENT UNIT 36 (SWMU  
36) ZONE F WITH TRANSMITTAL CNC CHARLESTON SC  
9/21/2001  
CH2M HILL

# PHASE I INTERIM MEASURE WORK PLAN

## Pre-Excavation Sampling and Analysis Plan AOC 620/SWMU 36, Zone F



***Charleston Naval Complex  
North Charleston, South Carolina***



SUBMITTED TO  
***U.S. Navy Southern Division  
Naval Facilities Engineering Command***

PREPARED BY  
***CH2M-Jones***

*September 2001*

*Revision 0  
Contract N62467-99-C-0960  
158814.ZF.PR.07*

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September 21, 2001

Mr. David Scaturo  
Division of Hazardous and Infectious Wastes  
South Carolina Department of Health and  
Environmental Control  
Bureau of Land and Waste Management  
2600 Bull Street  
Columbia, SC 29201

Re: Phase I Interim Measure Work Plan (Revision 0) – AOC 620/SWMU 36, Zone F

Dear Mr. Scaturo:

Enclosed please find four copies of the Phase I Interim Measure Work Plan (Revision 0) for AOC 620/SWMU 36 in Zone F of the Charleston Naval Complex (CNC). This report has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this document is Louise Palmer. Please contact her at 704/329-0073, extension 296, if you have any questions or comments.

Sincerely,

CH2M HILL

A handwritten signature in cursive script that reads "Dean Williamson".

Dean Williamson, P.E.

cc: ✓ Rob Harrell/Navy, w/att  
Gary Foster/CH2M HILL, w/att

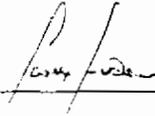
# Certification Page for Phase I Interim Measure Work Plan (Revision 0) – AOC 620/SWMU 36, Zone F

## Pre-Excavation Sampling and Analysis Plan

I, Casey Hudson, certify that this report has been prepared under my direct supervision. The data and information are, to the best of my knowledge, accurate and correct, and the report has been prepared in accordance with current standards of practice for engineering.

South Carolina

Temporary Permit No. T2000358



Casey Hudson, P.E.

09 20 01

Date



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# Acronyms and Abbreviations

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AOC	area of concern
CA	corrective action
CMS	corrective measures study
CNC	Charleston Naval Complex
COC	chemical of concern
DAF	dilution attenuation factor
EnSafe Inc.	EnSafe
EPA	U.S. Environmental Protection Agency
ft bls	feet below land surface
HHRA	human health risk assessment
IDW	investigation-derived waste
IM	interim measure
MCL	maximum contaminant level
MCS	media cleanup standard
µg/L	microgram per liter
mg/kg	milligram per kilogram
NAVFAC- ENGCOM	Southern Division Naval Facilities Engineering Command
PPE	personal protective equipment
QC	quality control
RBC	risk-based concentration
RCRA	Resource Conservation and Recovery Act
RFI	RCRA Facility Investigation
SSL	soil screening level
SWMU	solid waste management unit
UST	underground storage tank

**Section 1.0**

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# 1.0 Introduction

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## 1.1 Purpose of the Phase I Interim Measure Work Plan

An Interim Measure (IM) is proposed to remove soils contaminated with lead at Area of Concern (AOC) 620 and Solid Waste Management Unit (SWMU) 36 in Zone F of the Charleston Naval Complex (CNC). The IM will be conducted in the following three phases:

- Phase I —Pre-excavation sampling
- Phase II —Soil removal
- Phase III — Additional soil removal following demolition of Building 68, if necessary

After the Phase I pre-excavation sampling is completed, the areas for soil removal will be identified and the Phase II excavation will be conducted. This will occur before demolition of Building 68, which is located within AOC 620. Phase III of the IM will involve excavation under Building 68 in an area that is not readily accessible, and will occur after building demolition (by other contractors). Phase III soil removal will only occur if the soil under the building exceeds target cleanup levels.

This Phase I IM Work Plan presents the sampling and analysis plan that will serve to delineate the area required for IM remediation. The subsequent Phases II and III IM Work Plan will identify the media cleanup standards (MCSs), the target soil excavation areas, excavation and stockpiling details, waste disposal practices to be used for the soils, and the proposed content of the IM Completion Report.

## 1.2 Regulatory Background of AOC 620

CH2M-Jones has prepared this Phase I IM Work Plan on behalf of the Southern Division Naval Facilities Engineering Command (NAVFACENGCOM). A Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI), which included a human health risk assessment (HHRA), was conducted for the RFI sites within Zone F, including AOC 620. Following the issuance of the *Zone F RFI Report, Revision 0* (EnSafe Inc. [EnSafe], 1997) additional sampling was performed by EnSafe and by CH2M-Jones to further delineate chemicals of concern (COCs) identified in the HHRA. This additional sampling was described in the *Zone F RFI Work Plan Addendum* (CH2M-Jones, 2001).

1 The next step in the RCRA Corrective Action (CA) program for AOC 620/SWMU 36 will be  
2 to complete an RFI Report Addendum to the *Zone F RFI Report, Revision 0*. The report  
3 addendum will present an evaluation of the results from the additional samples collected,  
4 along with the earlier reported results, and determine if a Corrective Measures Study (CMS)  
5 is warranted for any potential COCs that may remain after the IM has been completed. The  
6 IM for excavation of soils that have lead concentrations exceeding the industrial use risk-  
7 based cleanup standard is proposed because CH2M-Jones considers this to be an  
8 appropriate action that will reduce long-term risk to potential receptors at the site, and  
9 because the CNC Redevelopment Authority is seeking to expedite remediation work in this  
10 area to accommodate a potential tenant.

### 11 **1.3 Description of the Site and Extent of Contamination** 12 **Targeted by the IM**

13 AOC 620/SWMU 36 is comprised of Building 68, the former Battery Shop, as well as the  
14 property which immediately surrounds all sides of the building. Building 68 is located in  
15 the industrial area of Zone F, east of Hobson Avenue. The building is composed of 58,000  
16 square feet of elevated concrete floor space, supported by piles and underlain by unpaved  
17 earth. The interior space includes an acid storage tank room near the south-central wall, and  
18 a wash basin area near the northeast corner.

19 SWMU 36 is the site of past sulfuric acid releases, where acid was discharged within the  
20 acid tank room to floor drains in which the piping had separated. The separated piping  
21 allowed acid to leak onto the underlying ground surface. Lead was measured at  
22 concentrations of up to 4,250 milligrams per kilogram (mg/kg) within the surface soil  
23 underlying the acid room and south of the building. Lead concentrations in surface soil in  
24 and around the site (AOC 620) are shown in Figure 1-1.

25 The northeastern portion of the building contained two shallow wash basins along the  
26 eastern wall. The basins drained to a former 6-inch drain line hung beneath the loading  
27 dock; the drain line led south to a sewer at the southeast corner of Building 68, and later to  
28 an underground storage tank (UST) located south of the building outside the acid tank  
29 room. According to a sign posted at the UST enclosure area, the tank was cleaned and  
30 decommissioned in 1995.

31 Additional soil sampling was conducted in June 2001 in accordance with the CH2M-Jones  
32 RFI Work Plan Addendum (2001). The samples collected revealed concentrations of lead as  
33 high as 18,400 mg/kg in surface soil beneath the loading dock opposite the wash basins.

1 Collection of subsurface soil samples (2 to 3 feet below land surface [ft bls]) in the wash  
2 basin area presented a maximum lead concentration of 1,350 mg/kg. Figure 1-2 presents  
3 concentrations of lead found in subsurface samples within AOC 620 and the surrounding  
4 area.

5 Mercury was also detected at elevated levels in the two soil samples collected beneath the  
6 loading dock, at concentrations of 3.8 and 5.1 mg/kg in surface soil, and 4.3 and 3.5 mg/kg  
7 in subsurface soil. These concentrations are well below the U.S. Environmental Protection  
8 Agency (EPA) Region III risk-based concentration (RBC) of 23 mg/kg for unrestricted land  
9 use, but are higher than the generic soil screening level (SSL) of 1 mg/kg, with a dilution  
10 attenuation factor (DAF) of 10. All other mercury concentrations measured in or around  
11 AOC 620 were approximately one order of magnitude lower than the concentrations  
12 measured in the loading dock area. Additional evaluation of mercury in soil is proposed as  
13 part of the Phase I IM pre-excavation sampling. The results will be used to determine  
14 whether excavation of mercury-containing soils should also be included as part of the IM.

15 Analytical results from groundwater samples collected from shallow monitoring wells at  
16 AOC 620 indicated lead concentrations in shallow groundwater below the maximum  
17 contaminant level (MCL). The one exception was at well F620GW004, where the first  
18 sampling event (out of a total of four sampling events) resulted in a lead concentration of  
19 30.7 micrograms per liter ( $\mu\text{g}/\text{L}$ ). Figure 1-3 presents the analytical results for lead, in  $\mu\text{g}/\text{L}$ .  
20 The data indicated that releases of lead to the soil have not resulted in groundwater  
21 contamination. In addition, mercury has not been detected in any of the AOC 620  
22 monitoring wells.

23 MCSs for surface and subsurface soil, and their derivations, will be presented in the Phases  
24 II and III IM Work Plan for this site, once the data from the Phase I samples become  
25 available. The IM will address the removal of surface and subsurface (above the water table)  
26 soil that exceeds the appropriate surface and subsurface soil MCSs for lead.

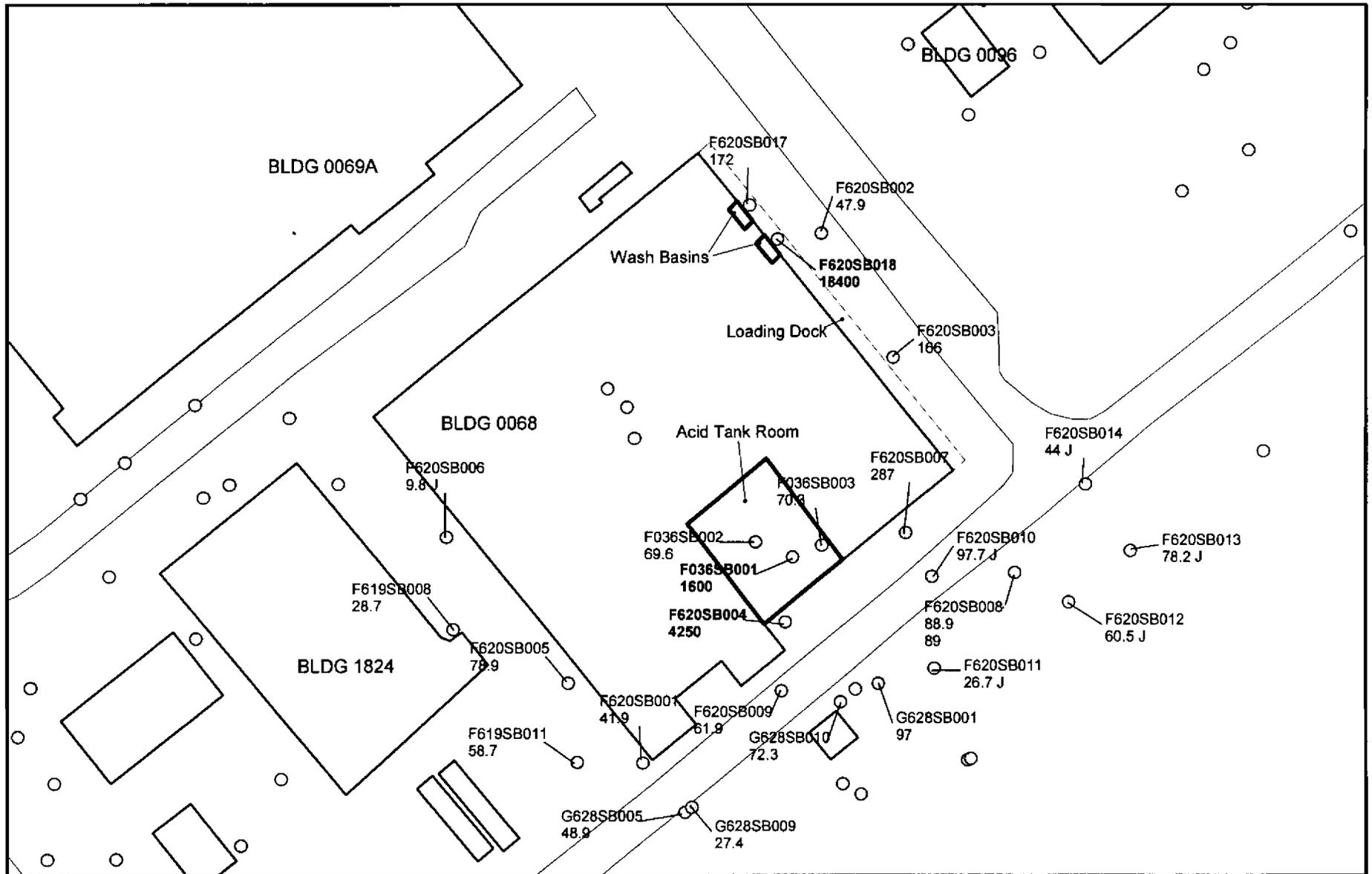
## 27 **1.4 Organization of the Phase I IM Work Plan**

28 This Phase I IM Work Plan consists of the following sections, including this introductory  
29 section:

30 **1.0 Introduction** — Presents the purpose of the Phase I IM Work Plan and background  
31 information regarding the site.

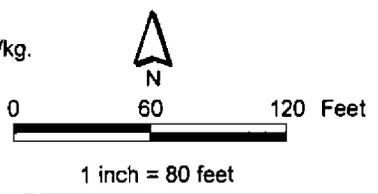
32 **2.0 Sampling and Analysis Plan** — Presents the plan for IM pre-excavation sampling.

- 1 **3.0 References** --- Lists the references used in this document.
- 2 All tables and figures are at the end of their respective sections.



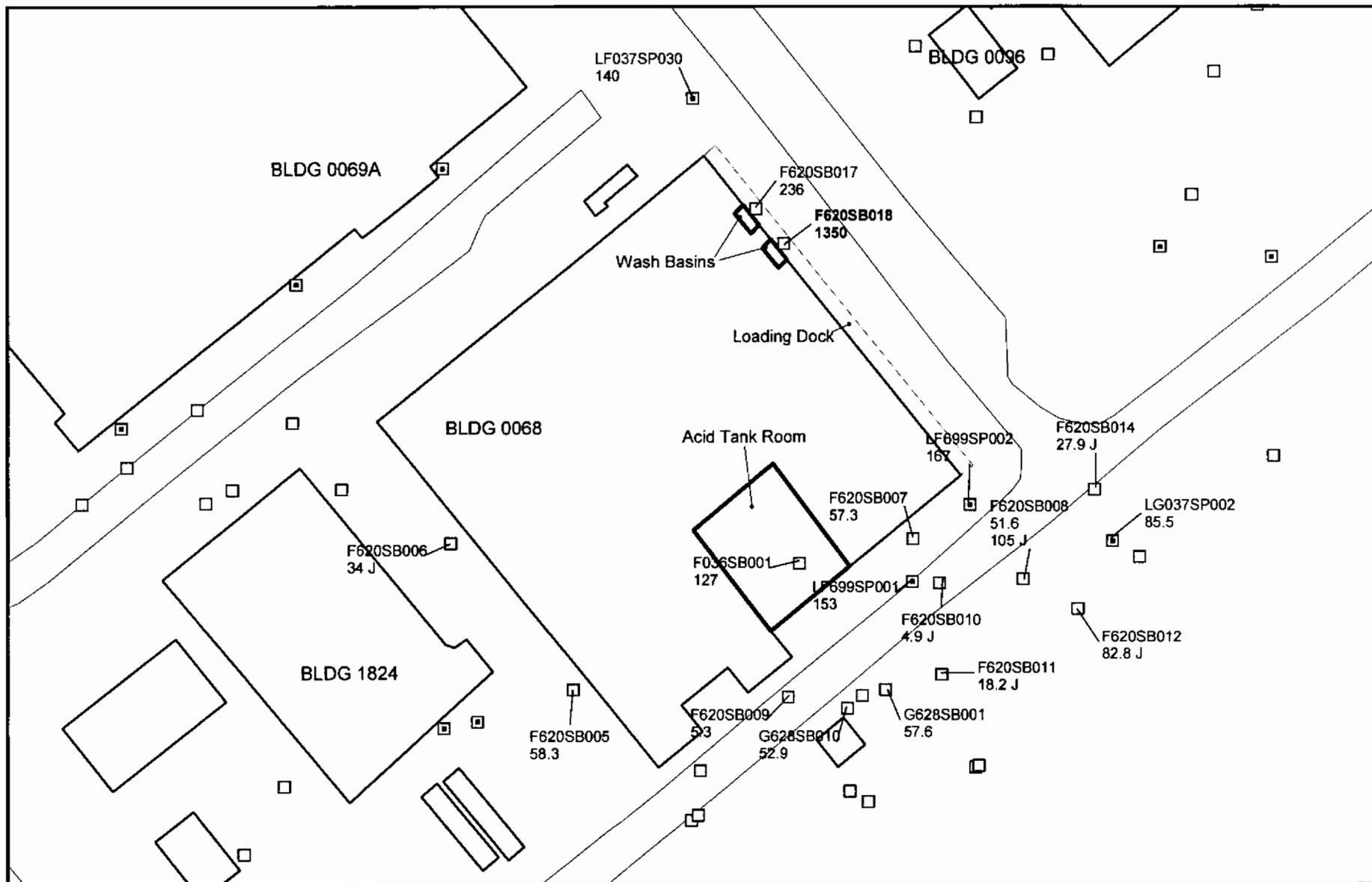
- Surface Soil
- ∧ Roads - Lines
- ▭ Buildings

**NOTE:**  
 1) Industrial Land Use Screening Value = 1000 mg/kg.  
 2) Lead in mg/kg.



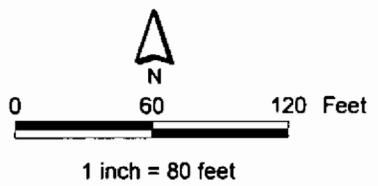
**Figure 1-1**  
 Lead in Surface Soil  
 AOC 620 IM Work Plan - Phase I  
 Zone F  
 Charleston Naval Complex





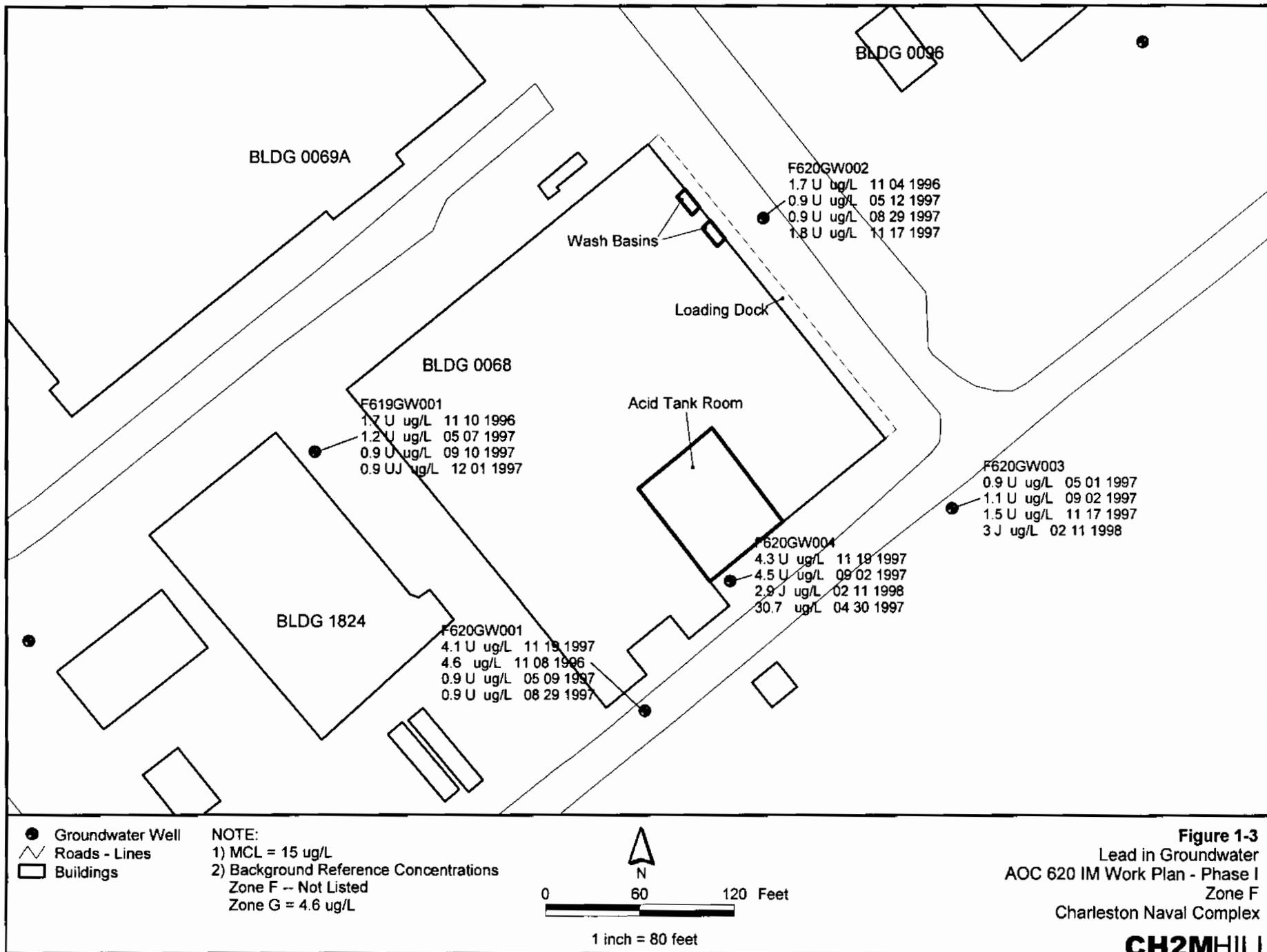
- Soil Boring
- ▣ Soil Probe
- Roads - Lines
- ▭ Buildings

NOTE:  
 1) Screening SSL assumed at 400 mg/kg.  
 2) Lead in mg/kg.



**Figure 1-2**  
 Lead in Subsurface Soil  
 AOC 620 IM Work Plan - Phase I  
 Zone F  
 Charleston Naval Complex

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**Figure 1-3**  
Lead in Groundwater  
AOC 620 IM Work Plan - Phase I  
Zone F  
Charleston Naval Complex

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## 2.0 Pre-Excavation Sampling and Analysis Plan

This section outlines the technical approach for the delineation of lead-contaminated soil in the acid tank room area and the wash basin area of AOC 620, where lead concentrations were detected above a conservative industrial use screening value of 1,000 mg/kg. Other areas within the site contain lead at or below the background reference concentration range for combined Zones F and G of 3.5 to 275 mg/kg, and less than the unrestricted land use screening value of 400 mg/kg. Before the IM excavation, the extent of contamination in the two areas will be identified to delineate the area for soil removal. Pre-excavation samples will be collected as described in the following subsections, and are listed in Table 2-1.

### 2.1 Acid Tank Area (Southern Portion of Building 68)

Surface soil (0 to 1 ft bls) and subsurface soil (2 to 3 ft bls) samples will be collected beneath the floor slab in the acid tank room and to the west and south of the room, as shown in Figure 2-1. Inside the acid tank room, three sample stations will be located outside of the acid storage tanks, and will be between floor support beams. One sample location will be in the ventilation room south of the acid tank room, and one sample location will be in the main building west of the acid tank room. All of these indoor samples will be collected using a hand-auger tool through a hole cored through the floor slab.

Outside the building, surface and subsurface soil samples will be collected at the approximate location of boring F620SB004 (refer to Figure 2-1) to confirm the elevated lead concentration that was previously reported. A monitoring well has been constructed at the exact location of F620SB004, and the confirmation samples will be collected adjacent to the concrete pad surrounding the well. In addition, three sample locations will be placed in the vicinity of the acid collection UST, including one location beneath an aboveground acid pipe discharge port. Two sample locations are planned south and east of the acid collection UST to locate the extent of elevated lead concentrations south of Building 68.

All of the sample locations in the acid tank area will have both surface and subsurface soil collected. Subsurface soil will be collected at 2 to 3 ft bls, as the water table depths were reported at around 3 to 4 ft bls. If any of these delineation samples exceeds the industrial screening value of 1,000 mg/kg, an additional soil sample(s) will be collected 10 ft farther out from the area with elevated lead concentrations to complete Phase I of the IM. The final excavation limits will be determined based on these analytical results.

1 The soil samples will be analyzed for lead in an offsite laboratory following the procedures  
2 provided in the approved Comprehensive Sampling and Analysis Plan (CSAP) portion of  
3 the *Final Comprehensive RFI Work Plan* (EnSafe/Allen & Hoshall, 1994). If none of the  
4 samples collected beneath the acid tank room area or outside of the acid tank room presents  
5 lead concentrations greater than the MCSs, then the need for an IM in this area will be re-  
6 evaluated.

## 7 **2.2 Wash Basin Area (Eastern Wall of Building 68)**

8 Seven additional surface and subsurface (2 to 3 ft bls) soil samples will be collected beneath  
9 the floor slab and wash basins within the northeast building corner, as well as seven  
10 locations outside the building that are under and to the side of the loading dock. Figure 2-2  
11 presents these soil-sampling locations.

12 The samples collected will be analyzed for lead by an offsite laboratory using the protocol  
13 described above. If any of these delineation samples exceed the screening level of 1,000  
14 mg/kg, additional soil samples will be collected 10 ft farther out to complete the  
15 delineation. The final excavation limits will be determined based on these analytical results.  
16 In addition, five of the pre-excavation samples located closest to the samples which  
17 exhibited elevated levels of mercury will be analyzed to confirm the concentrations that  
18 were detected in June 2001.

## 19 **2.3 Groundwater Sampling**

20 Groundwater data from 1996 and 1997 indicate that there are no consistently elevated  
21 metals concentrations in the groundwater at AOC 620. However, to confirm the reported  
22 groundwater characteristics, one sample will be collected from the monitoring well closest  
23 to the wash basin area (F620GW002) and analyzed for mercury and lead. In addition, one  
24 sample will be collected from the monitoring well at the acid tank area (F620GW004) and  
25 analyzed for lead. These samples will be collected using low-flow techniques and will not be  
26 filtered. Otherwise, all sampling and analyses will be conducted using the protocol  
27 presented in the Comprehensive Sampling and Analysis Plan (CSAP) portion of the *Final*  
28 *Comprehensive RFI Work Plan* (EnSafe/Allen & Hoshall, 1994).

## 29 **2.4 Investigation-Derived Waste**

30 The investigation-derived waste (IDW) generated during the sample collection associated  
31 with this IM will include concrete cores, drill cuttings, and purge water. Drill cuttings will  
32 be characterized in accordance with South Carolina Hazardous Waste Management

- 1 Regulations (Section SCDHEC R.61-79.261) and disposed of in accordance with all
- 2 applicable regulations and permits. Decontamination wastes and personnel protective
- 3 equipment (PPE) will also be disposed of in accordance with regulations.

**TABLE 2-1**  
 Pre-Excavation Soil and Groundwater Sample Descriptions  
 Phase I IM Work Plan, AOC 620/SWMU 36, Zone F, Charleston Naval Complex

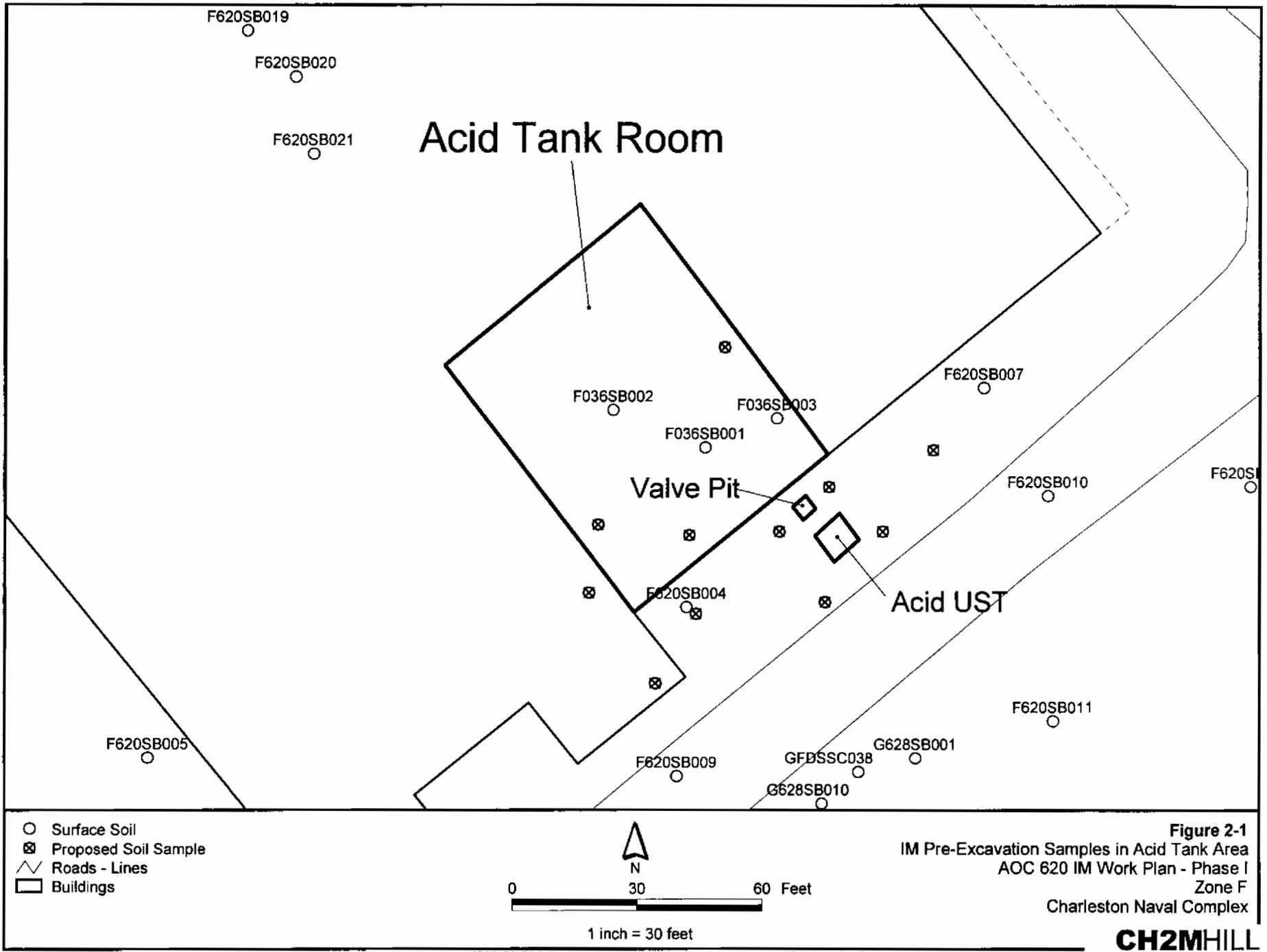
<b>Soil Samples</b>		
<b>Boring ID</b>	<b>Sampling Parameters</b>	<b>Notes</b>
620SB022	Lead, Mercury	Beneath wash basin
620SB023	Lead, Mercury	Beneath wash basin
620SB024	Lead	Inside Building 68 Wash Basin Area
620SB025	Lead	Inside Building 68 Wash Basin Area
620SB026	Lead	Inside Building 68 Wash Basin Area
620SB027	Lead	Inside Building 68 Wash Basin Area
620SB028	Lead	Inside Building 68 Wash Basin Area
620SB029	Lead, Mercury	Outside loading dock
620SB030	Lead, Mercury	Outside loading dock
620SB031	Lead	Outside loading dock
620SB032	Lead	Beneath loading dock
620SB033	Lead	Beneath loading dock
620SB034	Lead, Mercury	Beneath loading dock
620SB035	Lead	Beneath loading dock
620SB036	Lead	Inside Acid Tank Room
620SB037	Lead	Inside Acid Tank Room
620SB038	Lead	Inside Acid Tank Room
620SB039	Lead	Inside Main Building
620SB040	Lead	Inside Ventilation Room
620SB041	Lead	Adjacent to Monitoring Well (F620GW004)
620SB042	Lead	Near valve box in front of Acid Tank Room
620SB043	Lead	Near valve box in front of Acid Tank Room
620SB044	Lead	In acid discharge pipe containment area at UST
620SB045	Lead	South of UST near road
620SB046	Lead	East of UST

All soil borings will be sampled at 0-1 foot below surface (ft bls) and 2-3 ft bls.

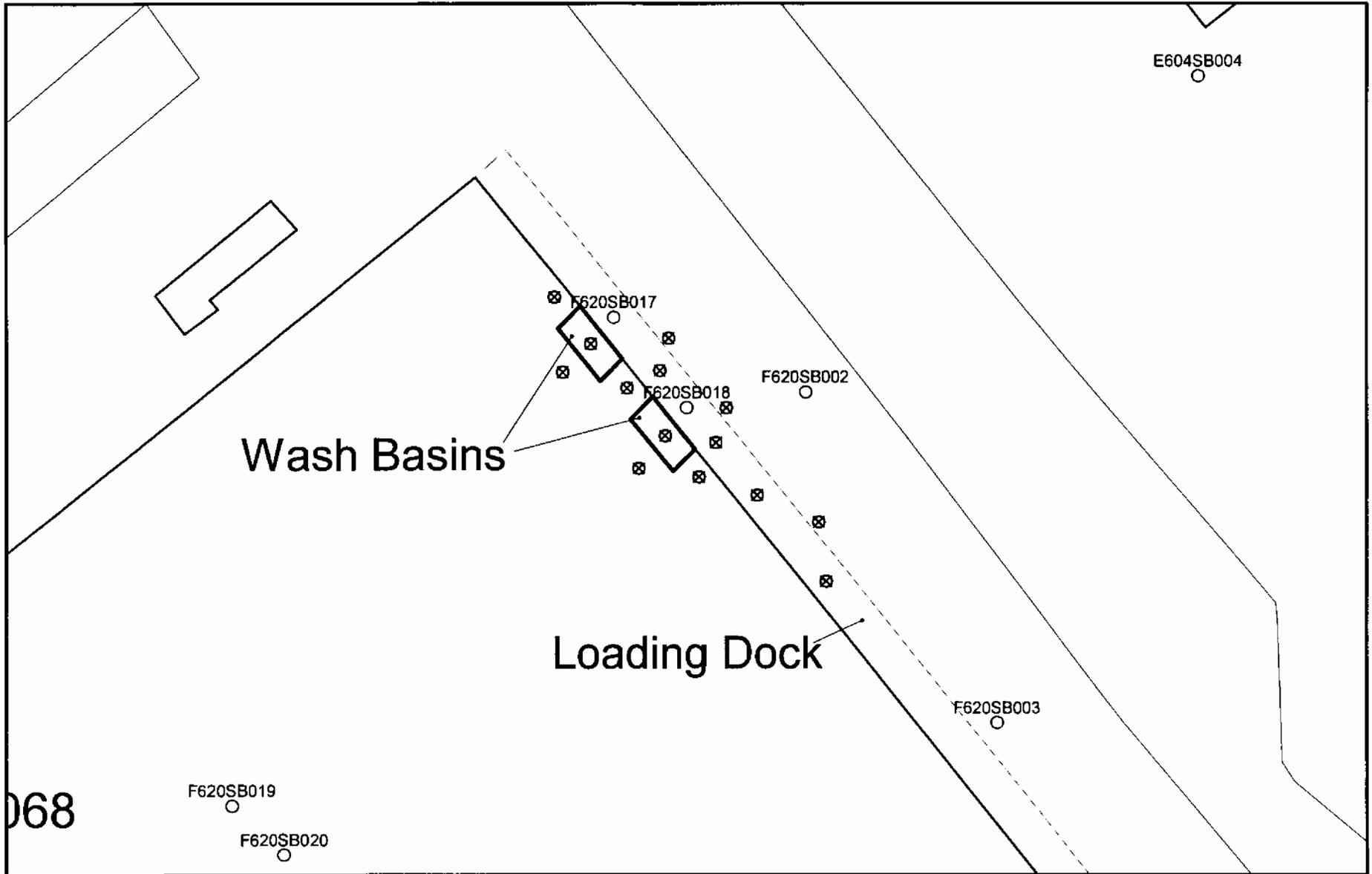
Additional soil borings may be sampled if lead data exceed the Media Cleanup Standard (MCS).

UST    Underground storage tank

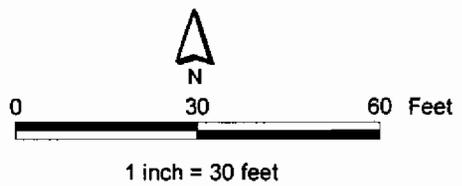
<b>Groundwater Samples</b>	
<b>Monitoring Well</b>	<b>Sampling Parameters</b>
F620GW002 (existing)	Lead, mercury
F620GW004 (existing)	Lead



**Figure 2-1**  
 IM Pre-Excavation Samples in Acid Tank Area  
 AOC 620 IM Work Plan - Phase I  
 Zone F  
 Charleston Naval Complex



- Surface Soil
- ⊗ Proposed Soil Sample
- ∧ Roads - Lines
- Buildings



**Figure 2-2**  
 IM Pre-Excavation Samples in Wash Basin Area  
 AOC 620 IM Work Plan - Phase I  
 Zone F  
 Charleston Naval Complex

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**Section 3.0**

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## 1 **3.0 References**

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- 2 CH2M-Jones. *Zone F RFI Work Plan Addendum*. Revision 0. 2001.
- 3 EnSafe Inc./Allen & Hoshall. *Final Comprehensive RFI Work Plan*. 1994.
- 4 EnSafe Inc. *Zone F RFI Report, NAVBASE Charleston*. Revision 0. 1997.