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SAMPLING AND ANALYSIS PLAN AREA OF CONCERN 590 (AOC 590) SOLID WASTE
MANAGEMENT UNIT 102 (SWMU 102) ZONE E WITH TRANSMITTAL CNC CHARLESTON
SC
7/9/2002
NAVAL FACILITIES ENGINEERING COMMAND

AOC 590 SWMU 102 Zone E
SAMPLING and ANALYSIS PLAN



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July 9, 2002

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

Re: Sampling and Analysis Plan (Revision 0) – AOC 590 and SWMU 102, Zone E

Dear Mr. Scaturo:

Enclosed are four copies of the Sampling and Analysis Plan (Revision 0) for AOC 590 and SWMU 102 in Zone E of the Charleston Naval Complex (CNC). This sampling plan has been prepared pursuant to agreements by the CNC BRAC Cleanup Team for completing the RCRA Corrective Action process.

The principal author of this sampling plan is Sam Naik. Please contact him at 770/604-9182, extension 255, if you have any questions or comments.

Sincerely,

CH2M HILL



Dean Williamson, P.E.

cc: Rob Harrell/Navy, w/att
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Sampling and Analysis Plan

**Area of Concern 590 and SWMU 102,
Zone E**

**Charleston Naval Complex
North Charleston, SC**

Prepared for
**U.S. Navy Southern Division
Naval Facilities Engineering Command**

Prepared by
CH2M-Jones

July 2002

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1 Acronyms and Abbreviations

2	AOC	Area of concern
3	BEQ	Benzo(a)pyrene equivalent
4	BTEX	Benzene, toluene, ethylbenzene, and xylene
5	CNC	Charleston Naval Complex
6	COC	Chemical of concern
7	COPC	Chemical of potential concern
8	CSAP	Comprehensive Sampling and Analysis Plan
9	DET	Environmental Detachment Charleston
10	EGIS	Environmental Geographic Information System
11	EnSafe	EnSafe Inc.
12	EPA	U.S. Environmental Protection Agency
13	ft bls	Feet below land surface
14	GPS	Global Positioning System
15	mg/kg	Milligram per kilogram
16	PAH	Polycyclic aromatic hydrocarbon
17	PCB	Polychlorinated biphenyl
18	PPE	Personal protective equipment
19	RBC	Risk-based concentration
20	RCRA	Resource Conservation and Recovery Act
21	RFA	RCRA Facility Assessment
22	RFI	RCRA Facility Investigation
23	SAP	Sampling and Analysis Plan
24	SCDHEC	South Carolina Department of Health and Environmental Control
25	SVOC	Semivolatile organic compound
26	SWMU	Solid Waste Management Unit
27	TDS	Total dissolved solids
28	VOC	Volatile organic compound

1 1.0 Introduction

2 This Sampling and Analysis Plan (SAP) has been developed for Area of Concern (AOC) 590
3 and Solid Waste Management Unit (SWMU) 102 in Zone E of the Charleston Naval
4 Complex (CNC). Both of these sites are included in this SAP as they are adjacent to each
5 other, and both require further sampling to define the nature and extent of constituents
6 previously detected in the surface and subsurface soils. Following completion of the field
7 activities, AOC 590 and SWMU 102 will be addressed separately under the RCRA Facility
8 Investigation (RFI) process.

9 1.1 Background

10 Previous investigations, contained in the *Zone E RFI Report, Revision 0* (EnSafe Inc [EnSafe],
11 1997), which were conducted in the vicinity of AOC 590 and SWMU 102, indicated the
12 presence of several chemicals of potential concern (COPCs). CH2M-Jones has prepared this
13 SAP to complete the RFI activities and to provide information that can be used to make
14 decisions regarding the need for corrective measures at the site.

15 Figure 1-1 illustrates the location of Zone E within the CNC. Figure 1-2 is an aerial
16 photograph of AOC 590 and SWMU 102 in Zone E.

17 1.2 Organization of the Sampling and Analysis Plan

18 This SAP consists of the following sections, including this introductory section:

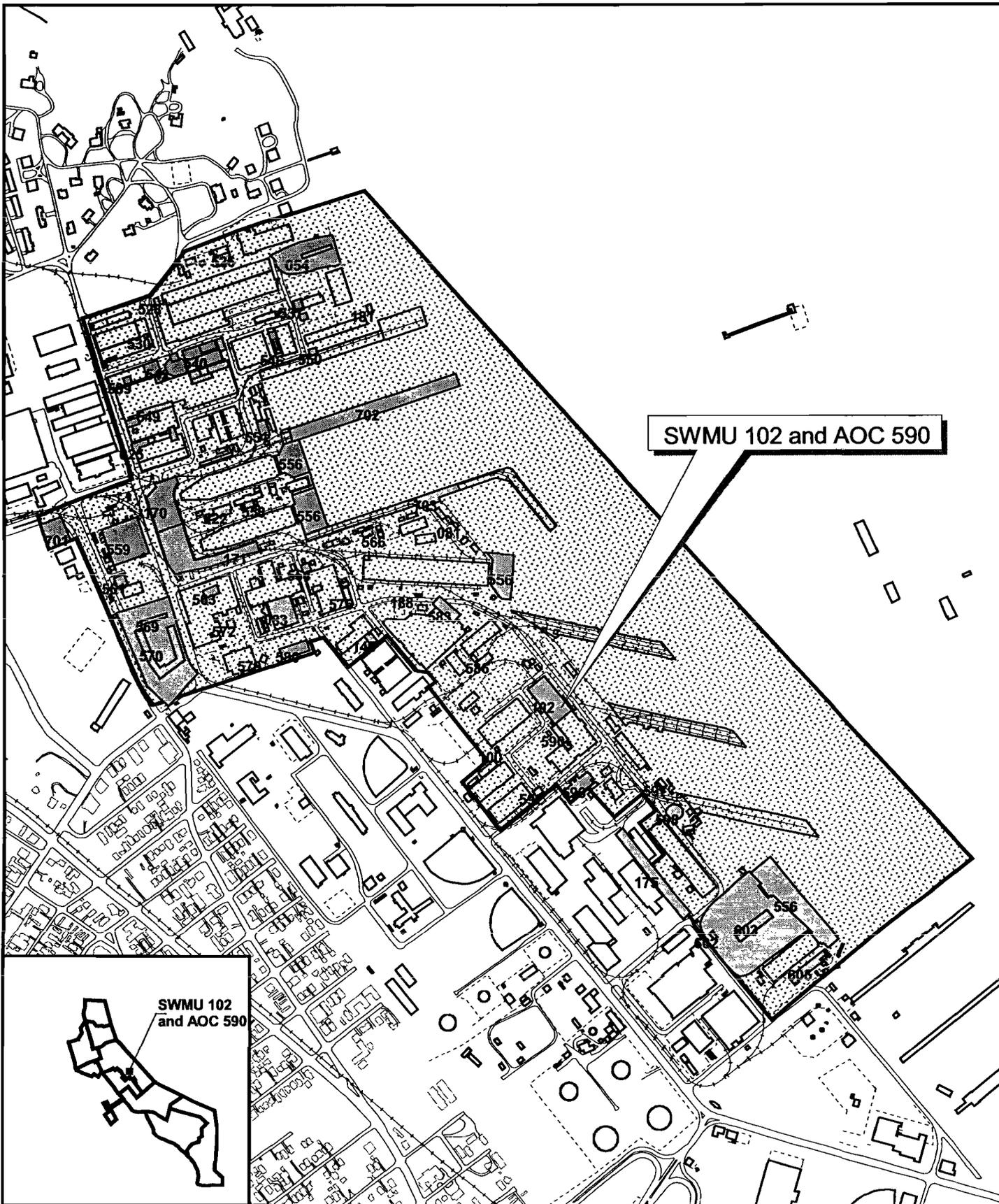
19 **1.0 Introduction** — Presents the purpose of the SAP and background information regarding
20 the site.

21 **2.0 Site Background and Conditions** — Provides a brief description of AOC 590 and
22 SWMU 102 and the findings from previous RFI activities.

23 **3.0 Proposed Sampling and Analysis** — Describes the investigative approach and program
24 for delineation of COPCs for the RFI.

25 **4.0 References** — Lists the references used in this document.

26 All tables and figures appear at the end of their respective sections.



SWMU 102 and AOC 590

SWMU 102 and AOC 590

-  Zone E Boundary
-  SWMU/AOC Within Zone E Boundary



0 800 1600 Feet

1 inch = 800 feet

Figure 1-1
 Zone E Within CNC
 SWMU 102 and AOC 590, Zone E
 Charleston Naval Complex

NOTE: Aerial Photo Date is 1997



-  Fence
-  Railroads
-  Roads
-  AOC/SWMU Boundary
-  Buildings
-  Zone Boundary

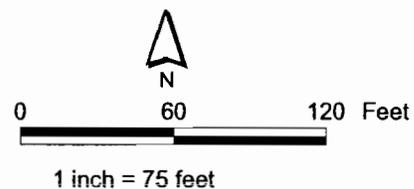


Figure 1-2
Site Map
SWMU 102 and AOC 590, Zone E
Charleston Naval Complex

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1 **2.0 Site Background and Conditions**

2 **2.1 Site Background and Setting**

3 **2.1.1 AOC 590 – Alley, Buildings 79 and 1760**

4 AOC 590 comprises the alley between Buildings 79 and 1760. This alley may have been the
5 site of past releases of acetone and cutting oil. No information was found regarding the
6 specific locations, volumes, or duration of the possibly discharged waste. Currently, the
7 alley is paved with asphalt. The area is zoned for industrial use (M-2).

8 As identified in RCRA Facility Assessment (RFA) documentation, the materials of concern
9 for AOC 590 include heavy metals, benzene, toluene, ethylbenzene, and xylene (BTEX),
10 polycyclic aromatic hydrocarbons (PAHs), volatile organic compounds (VOCs), and
11 petroleum hydrocarbons.

12 **2.1.2 SWMU 102 – Mercury Spill, Building 79**

13 Several incidents involving hazardous material spills, as well as cleanup activities, have
14 been documented since 1976. The most noteworthy was the discovery of a pool of mercury
15 under the floor inside the central portion of the building. Mercury was reported to have
16 been spilled and had seeped under the floor, forming an approximately 10-foot diameter
17 pool. The mercury release was reportedly discovered in 1969.

18 According to the 1970 Incident Report #CNS-12-70, five pounds of mercury was recovered
19 by vacuum cleaner and disposed of properly. The exposed area was scrubbed with HgX to
20 remove any traces of remaining mercury, and the floor was replaced. The mercury was
21 reported as having been used in gyroscopes before World War II. This area is zoned for
22 industrial use (M-2).

23 As identified in RFA documentation, the materials of concern for SWMU 102 include metals,
24 mercury, silver, VOCs, and petroleum hydrocarbons.

2.2 RFI Results

2.2.1 AOC 590 RFI

Soil Investigation

As part of the RFI field investigation, surface soil samples (0 to 1 foot below land surface [ft bls]) and co-located subsurface soil samples (3 to 5 ft bls) were collected in two sampling events. Figure 2-1 presents the historical sample locations. Samples from the first sampling event were analyzed for VOCs, semivolatile organic compounds (SVOCs), and metals.

Samples from the second sampling event were analyzed for SVOCs and metals. No duplicate samples were collected at AOC 590.

Surface Soil. In the *Zone E RFI Report, Revision 0* (EnSafe, 1997), benzo(a)pyrene equivalents (BEQs) were identified as surface soil chemicals of concern (COCs) based on exceedances of the industrial land use RBC of 0.78 milligrams per kilogram (mg/kg) at two sample locations. These sample locations also exceeded the base-wide anthropogenic background value of 1.3 mg/kg for surface soils. The samples were collected from the 0 to 1-ft bls interval, beneath the asphalt cover.

Antimony, chromium, lead, and mercury were also identified as COCs based on exceedances of their respective residential land use risk-based concentrations (RBCs) in at least one sample location. All samples were collected from the 0 to 1-ft bls interval, beneath the asphalt cover.

Subsurface Soil. No COCs were identified for subsurface soil .

Groundwater Investigation

One shallow monitoring well and one deep monitoring well were installed and sampled as part of the RFI. Figure 2-2 presents the locations of these wells. The groundwater samples were analyzed for VOCs, SVOCs, metals, chlorides, sulfates, and total dissolved solids (TDS). Groundwater was sampled during four sampling events. Beryllium was identified as a COC in deep groundwater.

Sediment Investigation

One sediment sample was collected and sampled as part of the RFI investigation. The sediment sample was collected from what appears to be a drop culvert catch basin and analyzed for VOCs, SVOCs, and metals. Constituents detected in the sediment sample were evaluated relative to industrial RBCs for soil. No constituents exceeded their respective

1 criteria, or were carried forward in the risk assessment presented in the *Zone E RFI Report*,
2 *Revision 0*.

3 Subsequent to the RFI field investigation, the sediments that were present in catch basins at
4 AOC 590 were addressed in the interim measure (IM) for AOC 699 conducted by the
5 Environmental Detachment Charleston (DET) in 1999. As a result, these sediments are no
6 longer present at this site.

7 **2.2.2 SWMU 102 RFI**

8 **Soil Investigation**

9 As part of the RFI field investigation, surface soil samples (0 to 1 ft bls) and co-located
10 subsurface soil samples (3 to 5 ft bls) were collected in three sampling events (see Figure 2-1
11 for historical sample locations).

12 **Surface Soil.** In the *Zone E RFI Report, Revision 0*, BEQs were identified as surface soil COCs
13 based on exceedances of the industrial land use RBC of 0.78 mg/kg at 12 sample locations.
14 Eight of the sample locations exceeded the base-wide anthropogenic background value of
15 1.3 mg/kg for surface soils. All of the samples were collected from the 0 to 1-ft bls interval
16 beneath the asphalt cover.

17 Arsenic, lead, and mercury were also identified as COCs based on exceedances of their
18 respective residential land use RBCs at multiple sample locations.

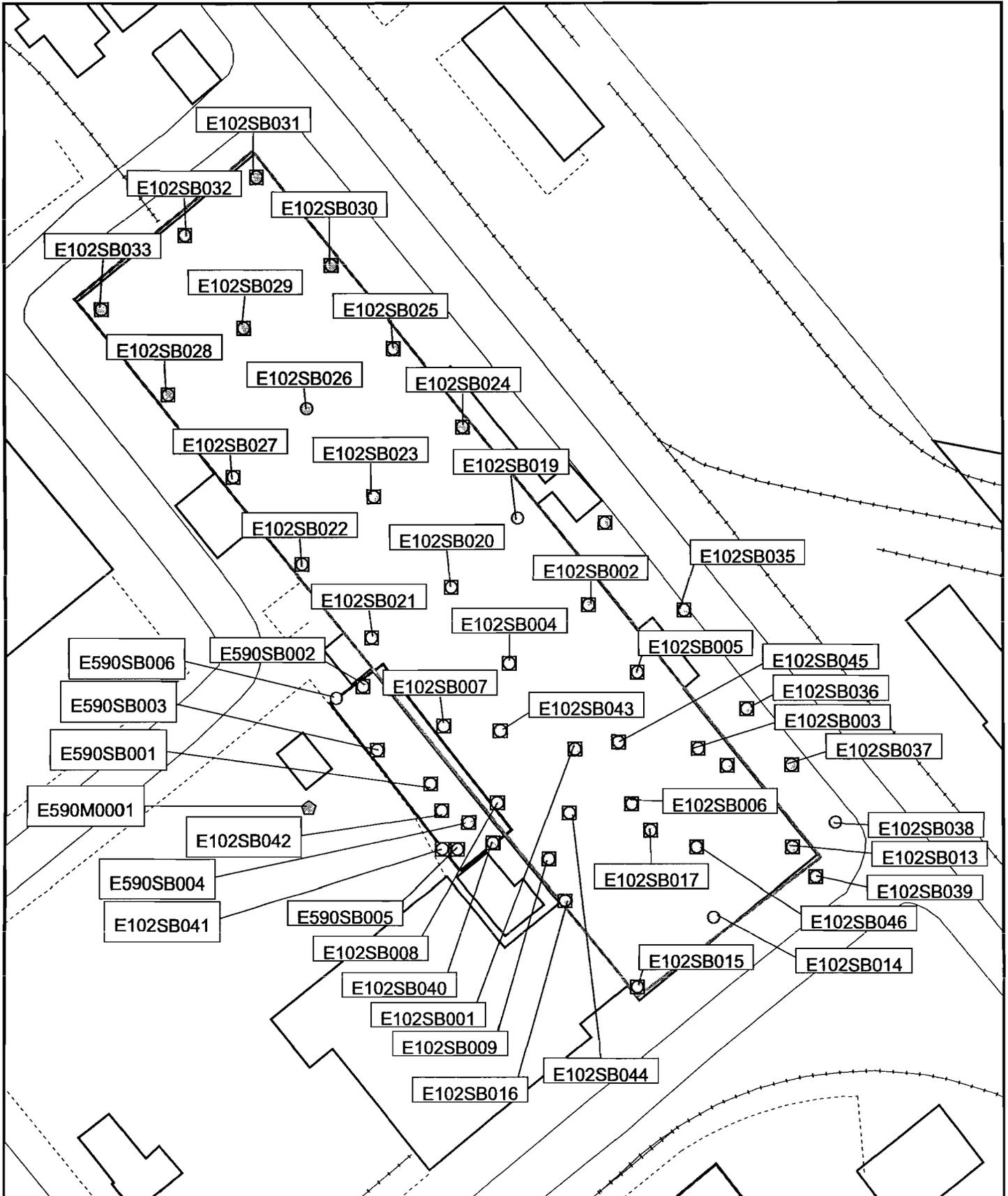
19 **Subsurface Soil.** No subsurface soil COCs were identified for this site.

20 **Groundwater Investigation**

21 One shallow monitoring well was installed and sampled as part of the RFI (see Figure 2-2).
22 The groundwater samples were analyzed for VOCs, SVOCs, metals,
23 pesticides/polychlorinated biphenyls (PCBs), cyanide, chlorides, sulfates, TDS, and
24 organotins. Groundwater was sampled during four sampling events. No COCs were
25 identified for groundwater at this site.

26 **2.3 Summary**

27 Based on review of the pattern of exceedances presented in the *Zone E RFI Report, Revision 0*,
28 CH2M Jones proposes to collect surface and subsurface soil samples to further delineate for
29 BEQs, lead, and mercury exceedances in the surface soil. The sampling and analysis
30 requirements are discussed in Section 3.0.



- ⊙ Historical Sediment Sample
- Historical Surface Soil Sample
- Historical Subsurface Soil Sample
- - - Fence
- ≡ Railroads
- ≡ Roads
- ▭ AOC Boundary
- ▭ SWMU Boundary
- ▭ Buildings

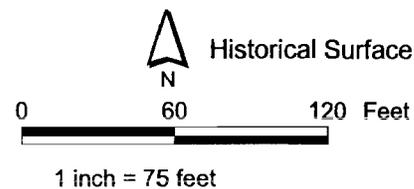
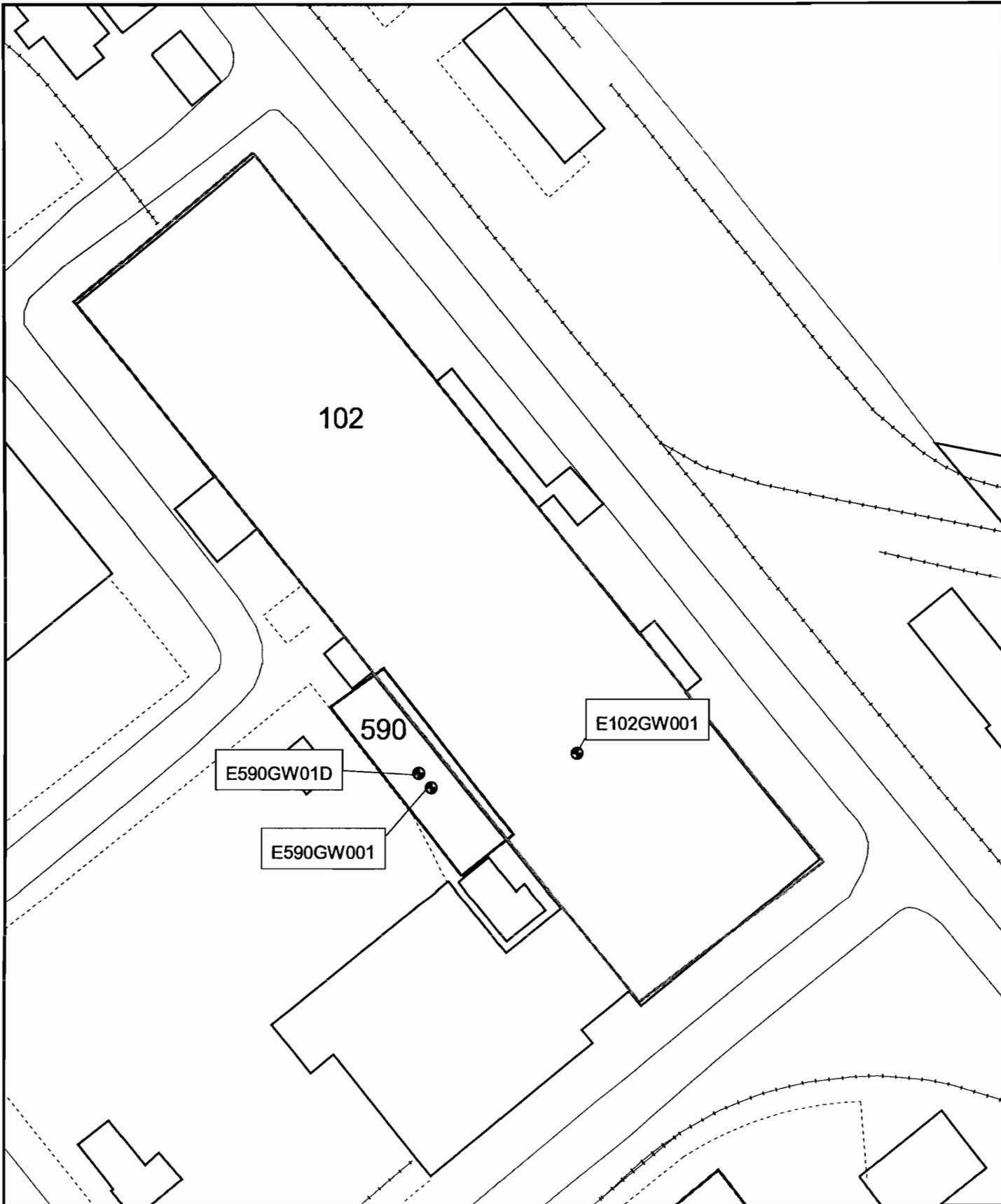


Figure 2-1
 Historical Surface and Subsurface Soil Sample Locations
 SWMU 102 and AOC 590, Zone E
 Charleston Naval Complex



<p>Groundwater Well</p> <ul style="list-style-type: none"> Fence Railroads Roads Shoreline AOC Boundary 		<p> SWMU Boundary</p> <p> Buildings</p> <p> Zone Boundary</p>		<p> N</p> <p>0 60 120 Feet</p> <p>1 inch = 75 feet</p>		<p>Figure 2-2 Historical Groundwater Sample Locations SWMU 102 and AOC 590, Zone E Charleston Naval Complex</p>
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1 **3.0 Proposed Sampling and Analysis**

2 **3.1 Sampling Scope Summary**

3 **3.1.1 AOC 590**

4 Based on an evaluation of the data collected during the RFI, three constituents in surface soil
5 require further delineation (antimony, lead, and mercury), and one subsurface soil
6 constituent requires further delineation (mercury). Thus, the additional delineation
7 sampling will focus on these parameters. All other COCs identified in the *Zone E RFI Report*,
8 *Revision 0* are either below current criteria or are considered to be adequately delineated.

9 **3.1.2 SWMU 102**

10 Based on an evaluation of the data collected during the RFI, three constituents in surface soil
11 require further delineation (lead, mercury, and BEQs), and two subsurface soil constituents
12 require further delineation (lead, and mercury). Thus, the additional delineation sampling
13 will focus on these parameters. All other COCs identified in the RFI report are either below
14 current criteria or are considered to be adequately delineated.

15 **3.2 Soil Sampling**

16 Surface and subsurface soil samples will be collected for laboratory evaluation at the
17 locations shown in Figure 3-1 and 3-2, respectively. The analyses to be performed on these
18 samples are also presented in the figures. If any of the delineation samples exceed the
19 screening criteria, additional soil samples may be collected farther out to complete the
20 delineation.

21 The samples will be collected using hand augers and the sampling will be performed in
22 accordance with the *Environmental Services Division Standard Operating Procedures and Quality*
23 *Assurance Manual* (ESDSOPQAM) (EPA, 1996).

24 For all nature and extent sample locations, samples will be collected from 0 to 1 ft bls (below
25 any pavement or foundation) for surface samples, and from 3 to 5 ft bls for subsurface soil
26 samples.

1 **3.3 Nature and Extent of Contamination of Groundwater**

2 No further delineation of constituents detected in groundwater is necessary to complete the
3 RFI. Therefore, no groundwater sampling events are included in this SAP.

4 **3.4 Sampling and Analysis Plan**

5 All investigative work will be performed in accordance with the Comprehensive Sampling
6 and Analysis Plan (CSAP) portion of the *Final Zone E RFI Work Plan, Revision 1*
7 (EnSafe/Allen & Hoshall, 1995). All samples will be analyzed for the chemicals identified by
8 media as listed in Table 3-1.

9 **3.5 Health and Safety**

10 CH2M-Jones places significant emphasis on the health and safety of our personnel, our
11 subcontractors, and the local community. Once all personnel have arrived on site as part of
12 the mobilization phase of the SAP, a project briefing and health and safety orientation meet-
13 ing will be held. All work completed as part of this SAP will be performed in accordance
14 with the *CH2M-Jones Site-Specific Health and Safety Plan* (CH2M-Jones, 2000).

15 Personnel working at the site will be required to comply with Level D personal protective
16 equipment (PPE) requirements and additional mercury protection requirements, as
17 specified in the Health and Safety Plan.

18 **3.6 Site Clearance**

19 Soil boring locations will be marked or staked in the field using coordinates derived from
20 the CNC Environmental Geographic Information System (EGIS) tool and utilizing Global
21 Positioning System (GPS) equipment.

22 To prepare for the start of onsite operations, CH2M-Jones will notify the necessary agencies
23 and departments regarding planned activities at the project site.

24 CH2M-Jones will examine the site for existing water, electrical, natural gas, telephone, and
25 other utility lines that are potential hazards at the site. Utilities will be clearly marked and
26 identified.

1 **3.7 Waste Management and Disposal**

2 Four waste streams will be generated as part of this SAP: pavement debris, soil cuttings,
3 decontamination wastes, and used PPE. Soil cuttings will be drummed and characterized in
4 accordance with South Carolina Hazardous Waste Management Regulations (South
5 Carolina Department of Health and Environmental Control [SCDHEC] R.61-79.261) and
6 disposed of in accordance with all applicable regulations and permits. Decontamination
7 wastes and used PPE will also be disposed of in accordance with applicable regulations.

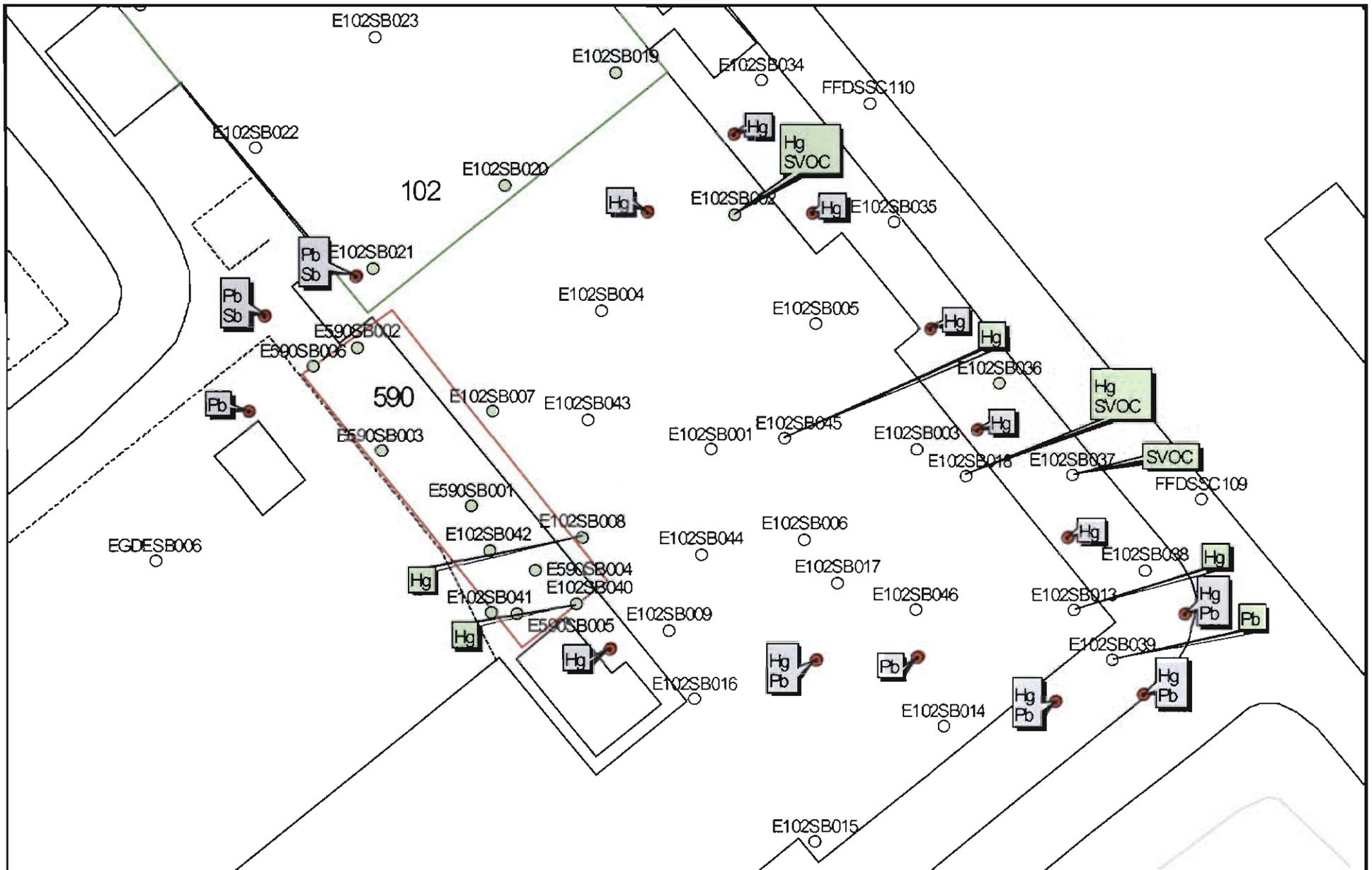
8 Pavement debris will be transported offsite for disposal either by asphalt recycling or
9 landfilled as demolition debris. Offsite transportation and disposal will be performed by
10 properly permitted and licensed subcontractors.

11 **3.8 Equipment Decontamination**

12 Decontamination of personnel, sampling and removal equipment, and materials will be in
13 accordance with the *CH2M-Jones Site-Specific Project Health and Safety Plan*.

TABLE 3-1
 Analytical Summary for Supplemental Sampling Activities
Sampling and Analysis Plan, AOC 590 and SWMU 102, Zone E, Charleston Naval Complex

Constituent	Media	Number of Sample Points	Analytes	Analytical Methods
Lead	Soil	9 Surface 6 Subsurface	Lead	SW-846 6010
Antimony	Soil	2 Surface	Antimony	SW-846 6010
Mercury	Soil	17 Surface 17 Subsurface	Mercury	SW-846 245.1, 245.5
BEQs	Soil	3 Surface	SVOCs	SW-846 8270



- Previous surface soil sampling location
- Proposed additional surface soil sampling location
- +++ Railroads
- ▭ AOC Boundary
- ▭ SWMU Boundary
- ▭ Buildings

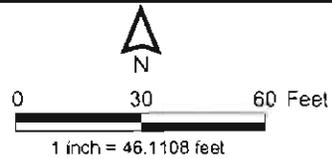
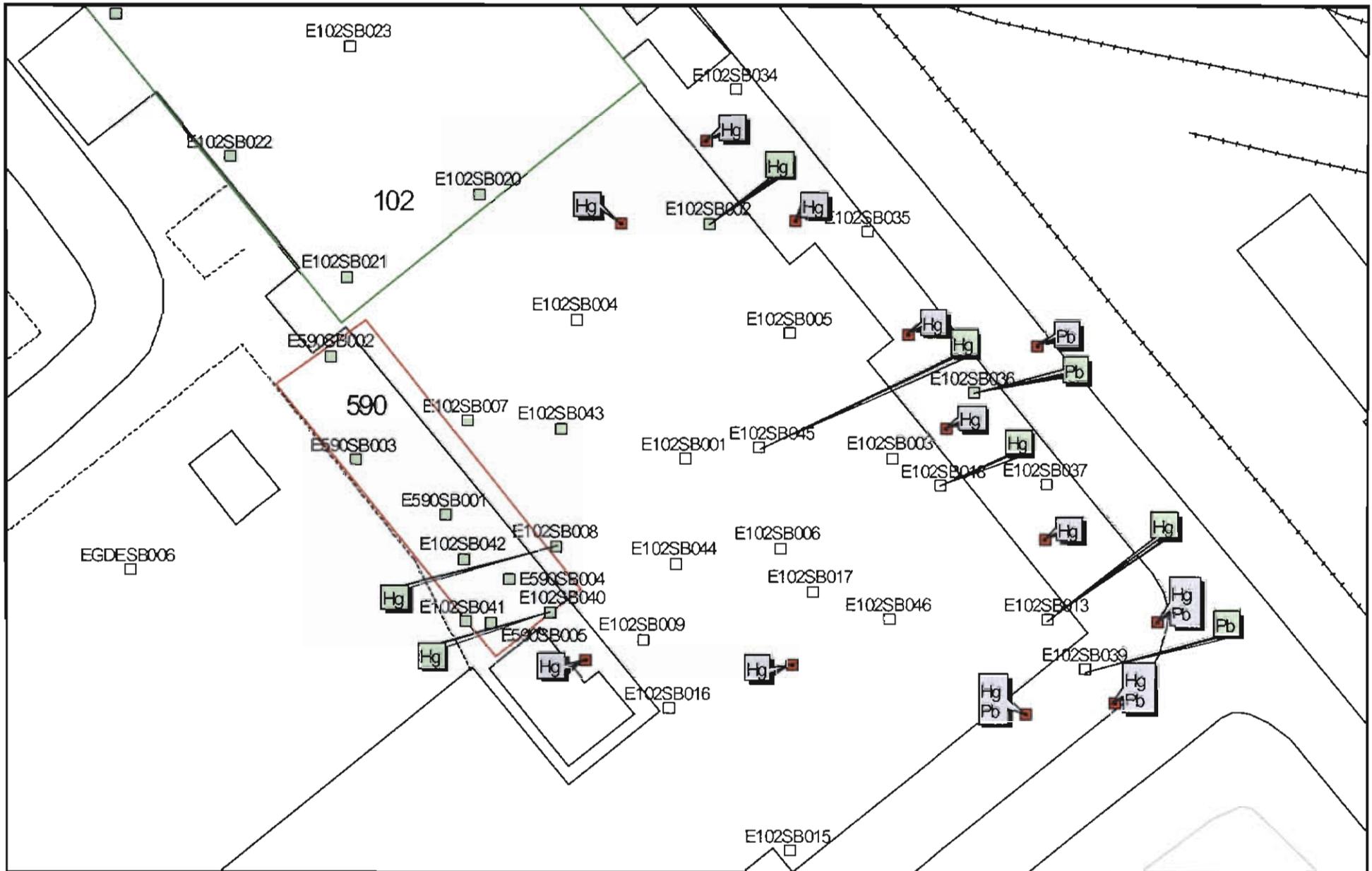


Figure 3-1
 Proposed Sampling Locations for Surface Soils
 SWMU 102 / AOC 590
 Charleston Naval Complex

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- Previous subsurface soil sampling location
- Proposed additional subsurface soil sampling location
- Railroads
- AOC Boundary
- SWMU Boundary
- Buildings



Figure 3-2
Proposed Sampling Locations for Subsurface Soils
SWMU 102 / AOC 590
Charleston Naval Complex

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1 4.0 References

- 2 CH2M-Jones. *CH2M-Jones Site-Specific Health and Safety Plan*. 2000.
- 3 EnSafe Inc. *Zone E RFI Report, Revision 0, NAVBASE Charleston*. November 1997.
- 4 EnSafe Inc./Allen & Hoshall. *Final RCRA Facility Assessment, Naval Base Charleston*. June
5 1995.
- 6 EnSafe Inc./Allen & Hoshall. *Final Zone E RFI Work Plan, Naval Base Charleston. Revision 1*.
7 June 1995.
- 8 EnSafe Inc. *Resource Conservation and Recovery Act (RCRA) Facility Assessment (RFA) Report*.
9 July 1995.
- 10 Incident Report #CNS-12-70 (Classified). 1970.
- 11 U.S. Environmental Protection Agency (EPA). *Environmental Services Division Standard*
12 *Operating Procedures and Quality Assurance Manual (ESDSOPQAM)*. 1996.
- 13 U.S. Naval Detachment. *Interim Measure Completion Report for AOC 699 Storm Drain Cleaning*.
14 March 1999.