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SAMPLING AND ANALYSIS PLAN AREA OF CONCERN 546 (AOC 546) ZONE E WITH
TRANSMITTAL CNC CHARLESTON SC
11/25/2002
CH2M HILL

AOC 546 Zone E
SAMPLING and ANALYSIS PLAN (RO)



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November 25, 2002

Mr. David Scaturro
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 —AOC 546, Zone E

Dear Mr. Scaturro:

Enclosed please find four copies of the Sampling and Analysis Plan (SAP) for AOC 546 in Zone E of the Charleston Naval Complex (CNC). This SAP has been prepared to complete the RCRA Facility Investigation (RFI) activities and to provide information that can be used to make decisions regarding the need for corrective measures at the site.

The principal author of this document is Sam Naik. Please contact him at (770) 604-9095, extension 255, should you have any questions or comments.

Sincerely,

CH2M HILL

Dean Williamson, P.E.

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

Sampling and Analysis Plan

Area of Concern 546, Zone E

**Charleston Naval Complex
North Charleston, SC**

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

Prepared by
CH2M-Jones

November 2002

Contract N62467-99-C-0960

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1 Acronyms and Abbreviations

2	AOC	area of concern
3	CNC	Charleston Naval Complex
4	COC	chemical of concern
5	COPC	chemical of potential concern
6	CSAP	Comprehensive Sampling and Analysis Plan
7	EGIS	Environmental Geographic Information System
8	EnSafe	EnSafe Inc.
9	EPA	U.S. Environmental Protection Agency
10	ESDSOPQAM	<i>Environmental Services Division Standard Operating Procedures and</i>
11		<i>Quality Assurance Manual</i>
12	GPS	Global Positioning System
13	ft bls	feet below land surface
14	PCB	polychlorinated biphenyl
15	PPE	personal protective equipment
16	RCRA	Resource Conservation and Recovery Act
17	RFI	RCRA Facility Investigation
18	SAP	Sampling and Analysis Plan
19	SCDHEC	South Carolina Department of Health and Environmental Control
20	SVOC	semivolatile organic compound
21	SWMU	solid waste management unit
22	VOC	volatile organic compound

1 1.0 Introduction

2 1.1 Background

3 During a review of the RCRA Facility Investigation (RFI) Report Addendum for Solid Waste
4 Management Unit (SWMU) 67, it was discovered that the location of the former Building
5 1025 as indicated in the *Zone E RFI Report, Revision 0* (EnSafe Inc. [EnSafe], 1997), was
6 incorrectly identified in the RFI Report. The basis for verifying the correct location of
7 Building 1025 are the historic engineering drawings of the Charleston Naval Base, dated
8 1940 and earlier. These drawings can be viewed and printed from the CNC Geographical
9 Information System (GIS) database. Figure 10.6.1 from the *Zone E RFI Report, Revision 0*
10 shows the location of former Building 1025 in the eastern part of Building 3, but further
11 review shows that former Building 1025 was located west of this location and was removed
12 during an addition to Building 3, as indicated by Figures 1-1 and 1-2. Figure 1-2 also
13 includes an excerpt from the legend of the Public Works map of the Charleston Naval Base,
14 identifying Building 1025 as a galvanizing shed. The original location of Building 1025
15 appears to overlap the western portion of SWMU 67, as shown in the GIS.

16 The *Zone E RFI Report, Revision 0* indicated that sampling locations for former Building 1025
17 would be included as part of the SWMU 67 RFI investigation. However, the RFI for SWMU
18 67 targeted only mercury as a material of concern, and therefore included soil sampling only
19 for mercury.

20 Materials of concern for AOC 546, as identified in the *Final Zone E RFI Work Plan*
21 (EnSafe/Allen & Hoshall, 1995), included acids, lead and other metals, solvents and
22 petroleum hydrocarbons. In order to complete the RFI for AOC 546 at the previous Building
23 1025 location, soil sampling for volatile organic compounds (VOCs), semivolatile organic
24 compounds (SVOCs), and metals is proposed as part of this Sampling and Analysis Plan
25 (SAP).

26 Additionally, during a review of the RFI Report Addendum for SWMU 67, the South
27 Carolina Department of Health and Environmental Control (SCDHEC) suggested further
28 assessment of mercury around two Zone L RFI soil boring locations- E037SB006 and
29 E037SB010, where elevated concentrations of mercury were detected in surface soil. These
30 two RFI soil borings are located within the footprint of AOC 542. Additional soil boring

1 locations around RFI soil borings E537SB006 and E537SB010 are proposed as part of this
2 SAP to better assess the presence of mercury in these two areas.

3 Figure 1-3 illustrates the location of Zone E within the CNC. Figure 1-4 is an aerial
4 photograph of AOC 546 in Zone E.

5 **1.2 Organization of the Sampling and Analysis Plan**

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

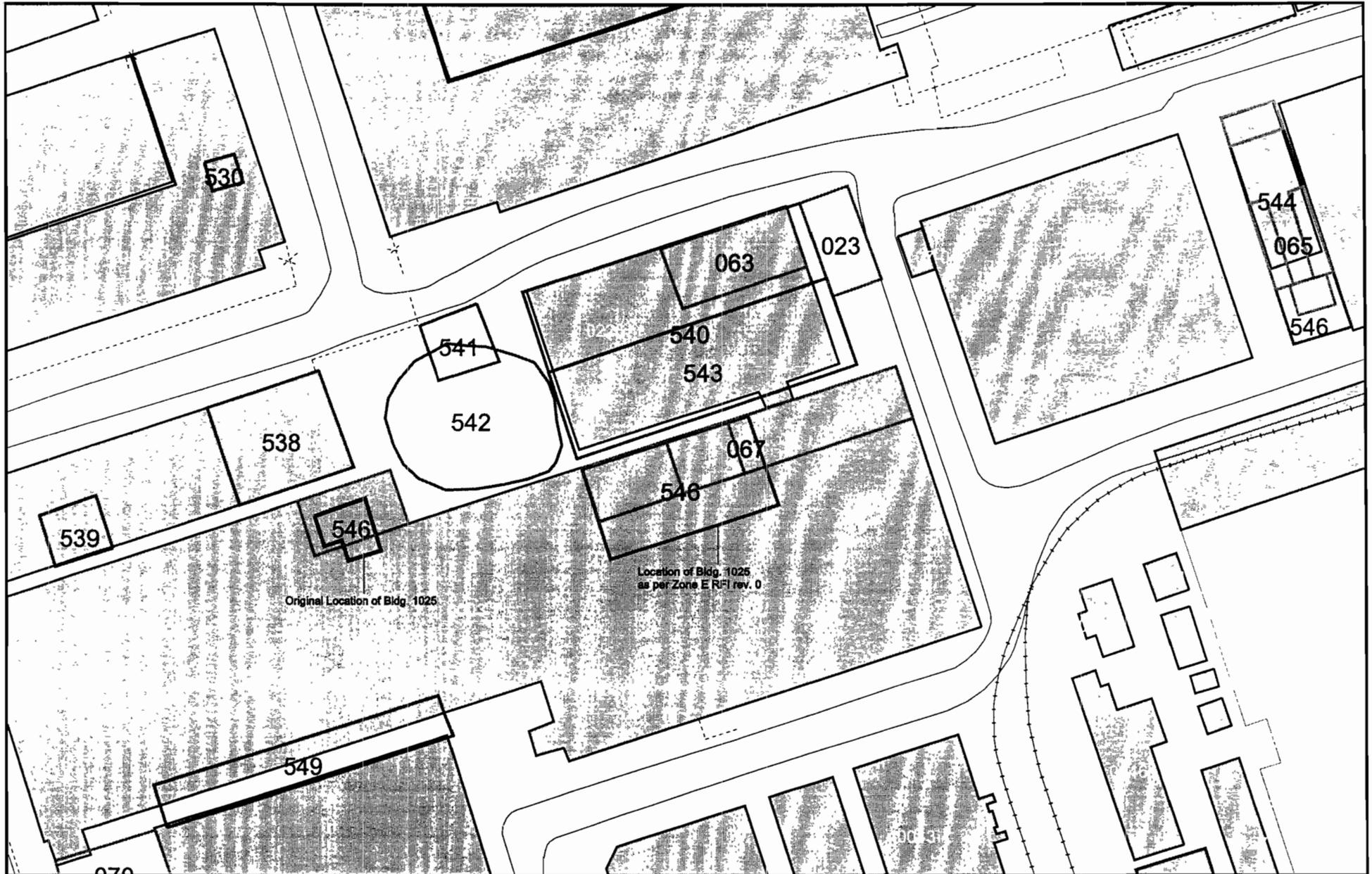
7 **1.0 Introduction** — Presents the purpose of the SAP and background information regarding
8 the site.

9 **2.0 Site Background and Conditions** — Provides a brief description of AOC 546 and the
10 findings from previous RFI activities.

11 **3.0 Proposed Sampling and Analysis** — Describes the investigative approach and program
12 for delineation of chemicals of potential concern (COPCs) for the RFI.

13 **4.0 References** —Lists the references used in this document.

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



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

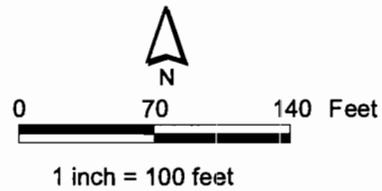
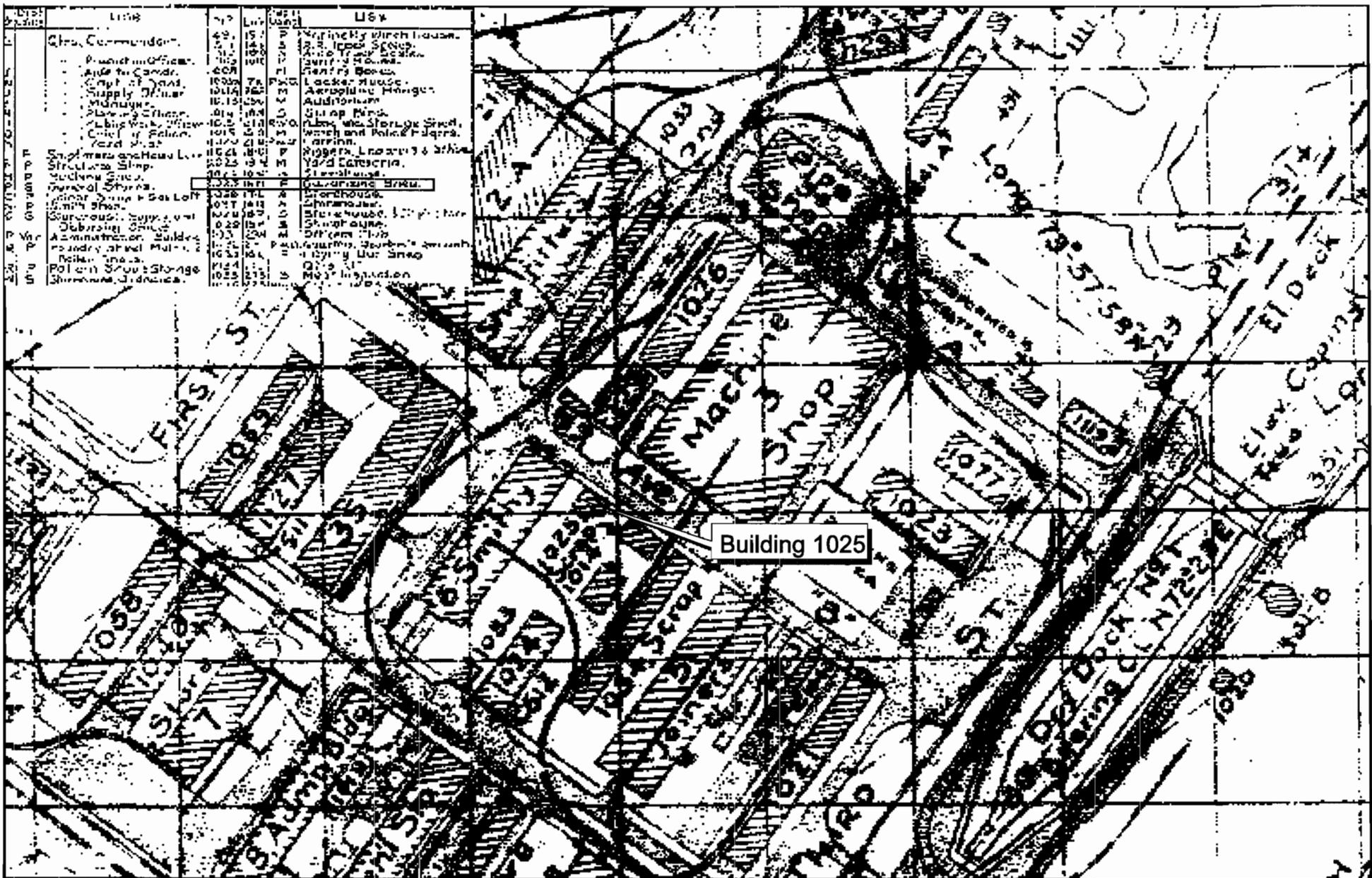


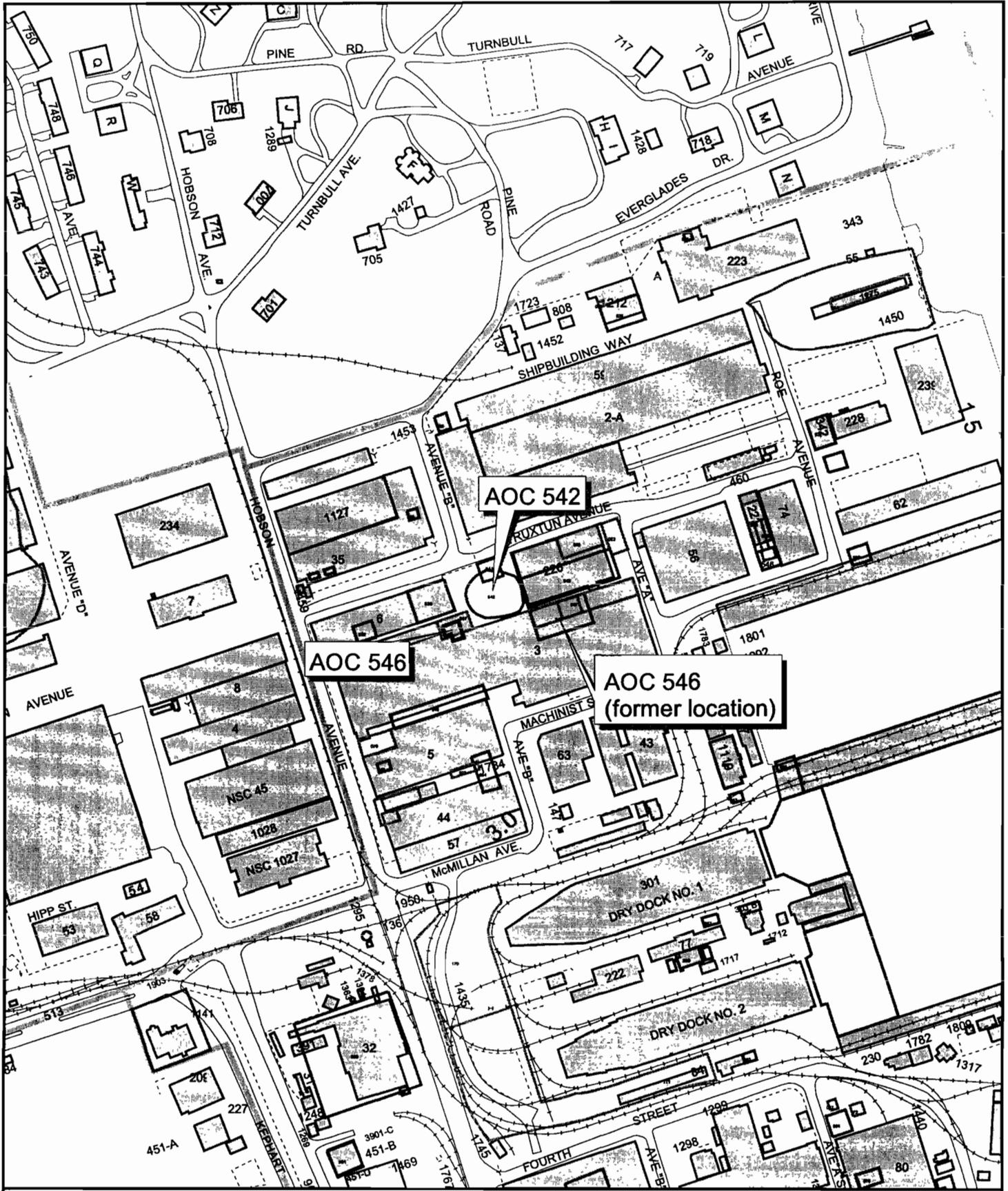
Figure 1-1
 Previous Location of Building 1025, Zone E
 Charleston Naval Complex



Layout from Public Works Map, June 30, 1937 h606-39



Figure 1-2
Original Location of Building 1025
AOC 546, Zone E
Charleston Naval Complex



- Fence
- Railroad
- Roads
- AOC Boundary
- SWMU Boundary
- Buildings and Other Structures
- Zone Boundary

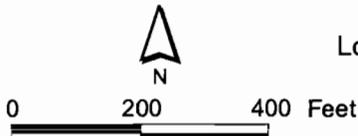
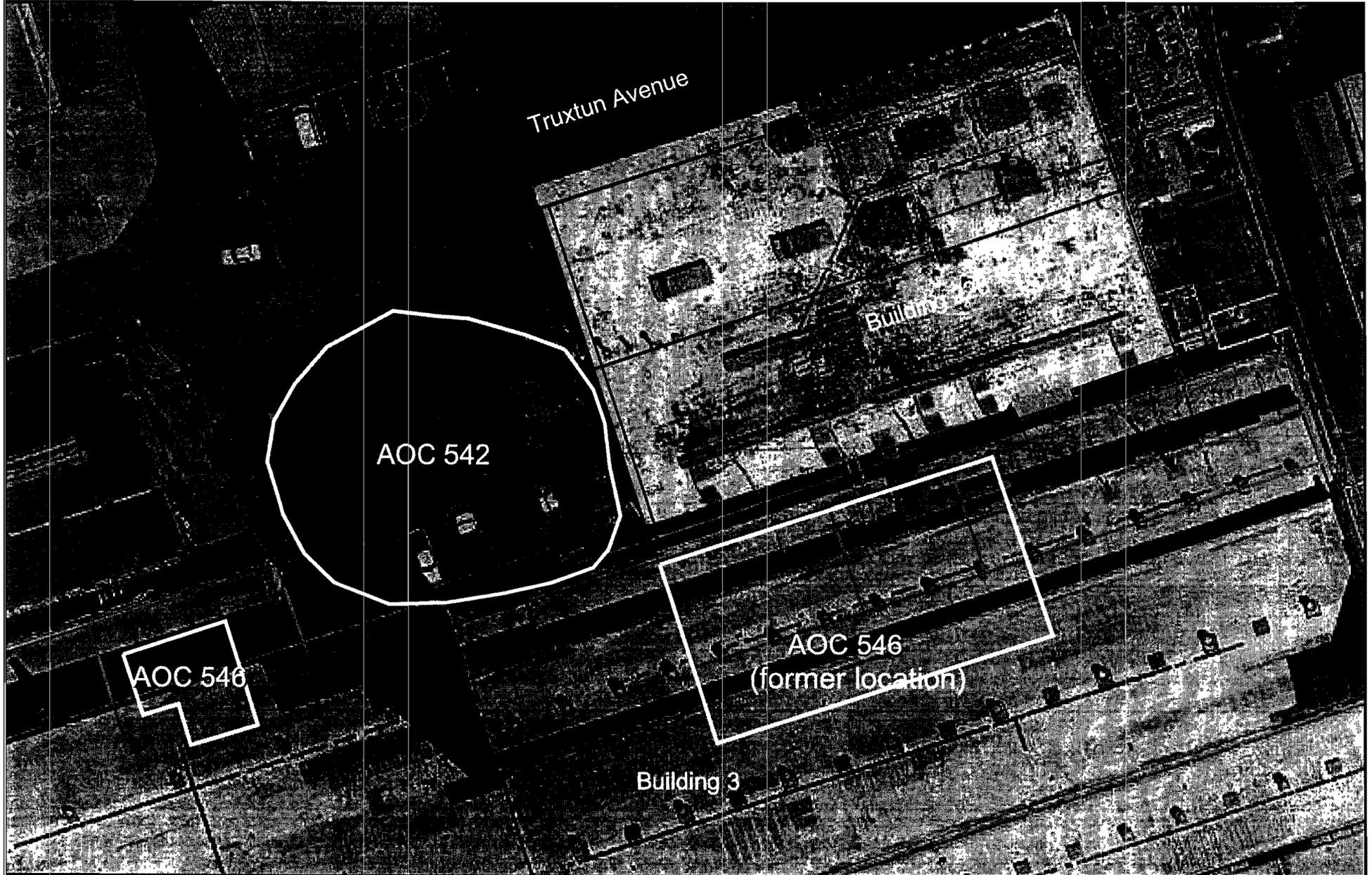


Figure 1-3
Location of AOC 546 and AOC 542 in Zone E
Charleston Naval Complex



- AOC 546 and AOC 542 Boundaries
- Fence
- Railroads
- Roads
- AOC Boundary
- Buildings
- SWMU Boundary
- Zone Boundary

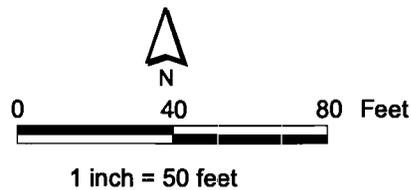


Figure 1-4
Aerial Photograph of AOC 546 and AOC 542
Zone E
Charleston Naval Complex

1 **2.0 Site Background and Conditions**

2 **2.1 Site Background and Setting**

3 **2.1.1 AOC 546 – Former Galvanizing/Pickling Shop, South of Building 221**

4 The portion of AOC 546 of interest for this investigation is the location of the former
5 galvanizing/pickling shop that operated within Building 1025 from the early 1920s until
6 approximately 1940. Building 1025 was formerly located southeast of Building 6 until
7 approximately 1942, when it was relocated south of Building 221. No information was
8 found regarding its operational processes. Currently both sites are now covered with
9 pavement or structures. This area of Zone E is zoned M-2 (industrial land use).

10 As identified in the RCRA Facility Assessment (RFA) documentation, the materials of
11 concern for AOC 546 include VOCs, inorganic acids, and heavy metals. The AOC 546 area is
12 zoned M-2 (industrial). The CNC RCRA Permit identified AOC 546 as requiring a
13 Confirmatory Sampling Investigation (CSI).

14 The soil in the vicinity of the original location of Building 1025 has not been sampled for
15 VOCs, SVOCs, or metals, except for mercury. The focus of this SAP is to further delineate
16 and verify current concentrations of these VOCs, SVOCs, and metals in soil at these sites.
17 This SAP does not include any groundwater investigations.

18 **2.2 Summary**

19 CH2M-Jones proposes to collect soil samples to evaluate concentrations of VOCs, SVOCs,
20 and metals in soil at AOC 546 at the original location of the former Building 1025, and
21 mercury in soil in the eastern portion of AOC 542. The sampling and analysis approach is
22 discussed in Section 3.0.

23 A full evaluation and presentation of the COPC screening against current criteria, as well as
24 a COPC/chemical of concern (COC) refinement analysis, will be provided in the RFI Report
25 Addendum after collection and analyses of the samples proposed herein.

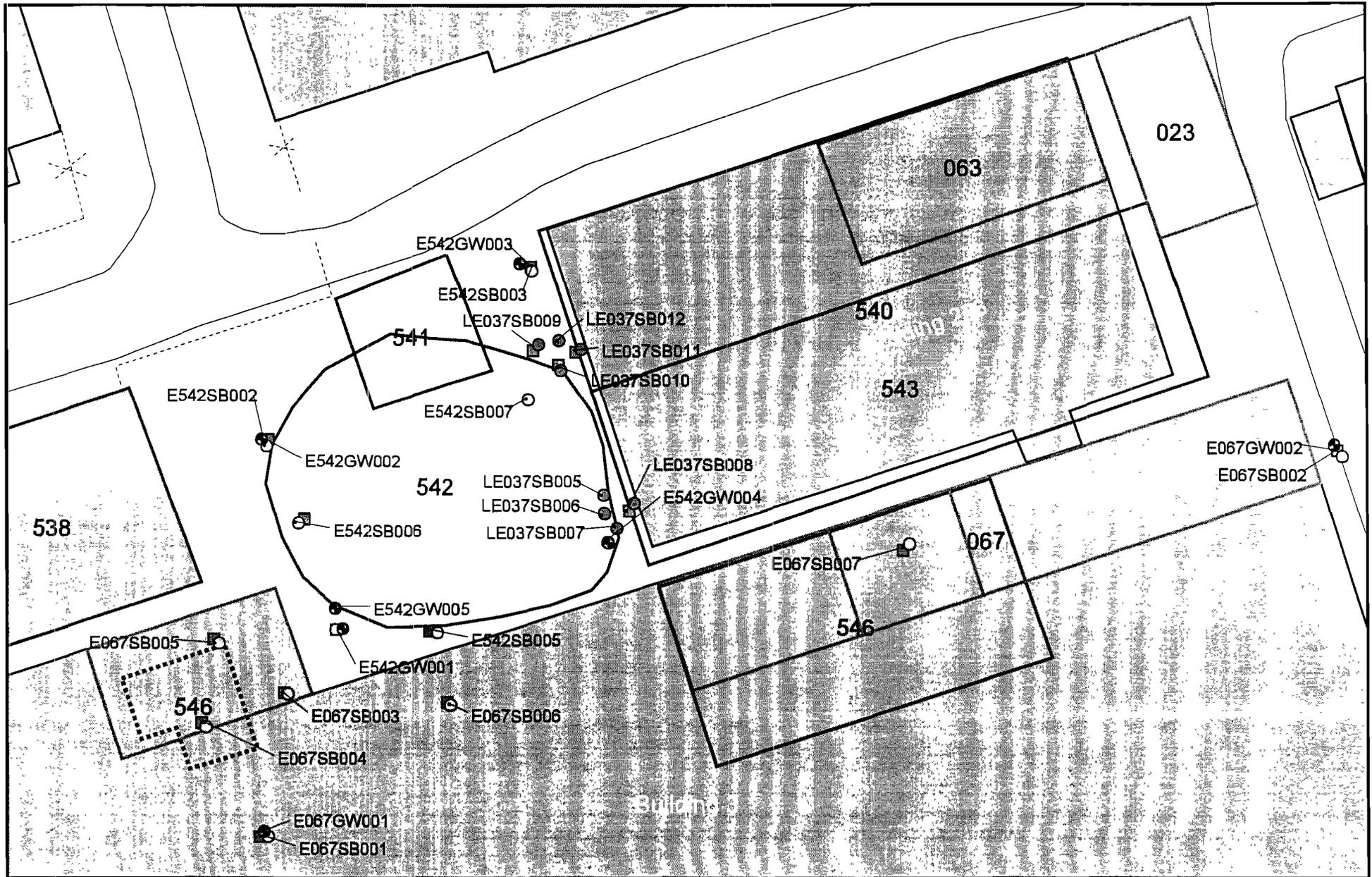
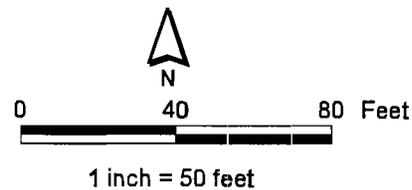


Figure 2-1
 RFI Sampling Locations
 AOC 546 and AOC 542, Zone E
 and SWMU 37, Zone L
 Charleston Naval Complex

- | | |
|-------------------------------|-----------------|
| ○ Groundwater Monitoring Well | ▭ Roads |
| ○ Surface Soil Boring | ▭ AOC Boundary |
| ▣ Subsurface Soil Boring | ▭ SWMU Boundary |
| ▭ New AOC 546 location | ▭ Buildings |
| ⋯ Fence | ▭ Zone Boundary |
| ⋯ Railroads | |



1 **3.0 Proposed Sampling and Analysis**

2 **3.1 Sampling Scope Summary**

3 **3.1.1 AOC 546**

4 Based on an evaluation of the data collected during the RFI, further soil characterization is
5 necessary at the original location of the former Building 1025. Thus, the additional sampling
6 will focus on VOCs, SVOCs, and metals.

7 **3.1.2 Mercury Delineation Sampling near AOC 542**

8 Based on an evaluation of the data collected during the RFI at SWMU 37, elevated
9 detections of mercury in surface soils at E037SB006, and surface and subsurface soils at
10 E037SB010 near AOC 542, require further delineation. Thus, the additional delineation
11 sampling will focus only on mercury.

12 **3.2 Soil Sampling and Analysis Plan**

13 **3.2.1 Surface and Subsurface Soils**

14 Surface and subsurface soil samples will be collected for laboratory analyses at the locations
15 shown in Figure 3-1 to delineate the nature and extent of contamination. The analyses to be
16 performed on these samples are also presented in Table 3-1. Table 3-2 presents the
17 coordinates for the proposed sampling locations.

18 The soil samples will be collected using hand augers and the sampling will be performed in
19 accordance with the procedures outlined in the document *Environmental Services Division*
20 *Standard Operating Procedures and Quality Assurance Manual (ESDSOPQAM)* (U.S.
21 Environmental Protection Agency [EPA], 1996).

22 For new sample locations E546SB001, E546SB002, and E546SB003, samples will be collected
23 from the following depths:

- 24 • 0 to 1 feet below land surface (ft bls) (below any pavement present)
- 25 • 3 to 5 ft bls

26 For new sample locations E542SB008 through E542SB012, samples will be collected from the
27 following depths:

- 1 • 0 to 1 ft bls (below any pavement present)
- 2 • 1 to 3 ft bls
- 3 • 3 to 5 ft bls

4 Soil samples will be collected using a hand auger after any existing pavement has been
5 penetrated. The sampling will be performed in accordance with the procedures outlined in
6 the document *Environmental Services Division Standard Operating Procedures and Quality*
7 *Assurance Manual* (ESDSOPQAM) (EPA, 1996).

8 **3.3 Health and Safety**

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

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

17 **3.4 Site Clearance**

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

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

23 CH2M-Jones will examine the site for existing water, electrical, natural gas, telephone, and
24 other utility lines that are potential hazards at the site. Utilities will be clearly marked and
25 identified. Sample locations may be moved slightly in the field to avoid damaging utility
26 lines and for the safety of field personnel.

27 **3.5 Waste Management and Disposal**

28 Four waste streams will be generated as part of this SAP: pavement debris, soil cuttings,
29 decontamination wastes, and used PPE. Soil cuttings will be drummed and characterized in
30 accordance with South Carolina Hazardous Waste Management Regulations (South

1 Carolina Department of Health and Environmental Control [SCDHEC] R.61-79.261) and
2 disposed of in accordance with all applicable regulations and permits. Decontamination
3 wastes and used PPE will also be disposed of in accordance with applicable regulations.
4 Pavement debris will be transported offsite for disposal either by asphalt recycling or
5 landfilled as demolition debris. Offsite transportation and disposal will be performed by
6 properly permitted and licensed subcontractors.

7 **3.6 Equipment Decontamination**

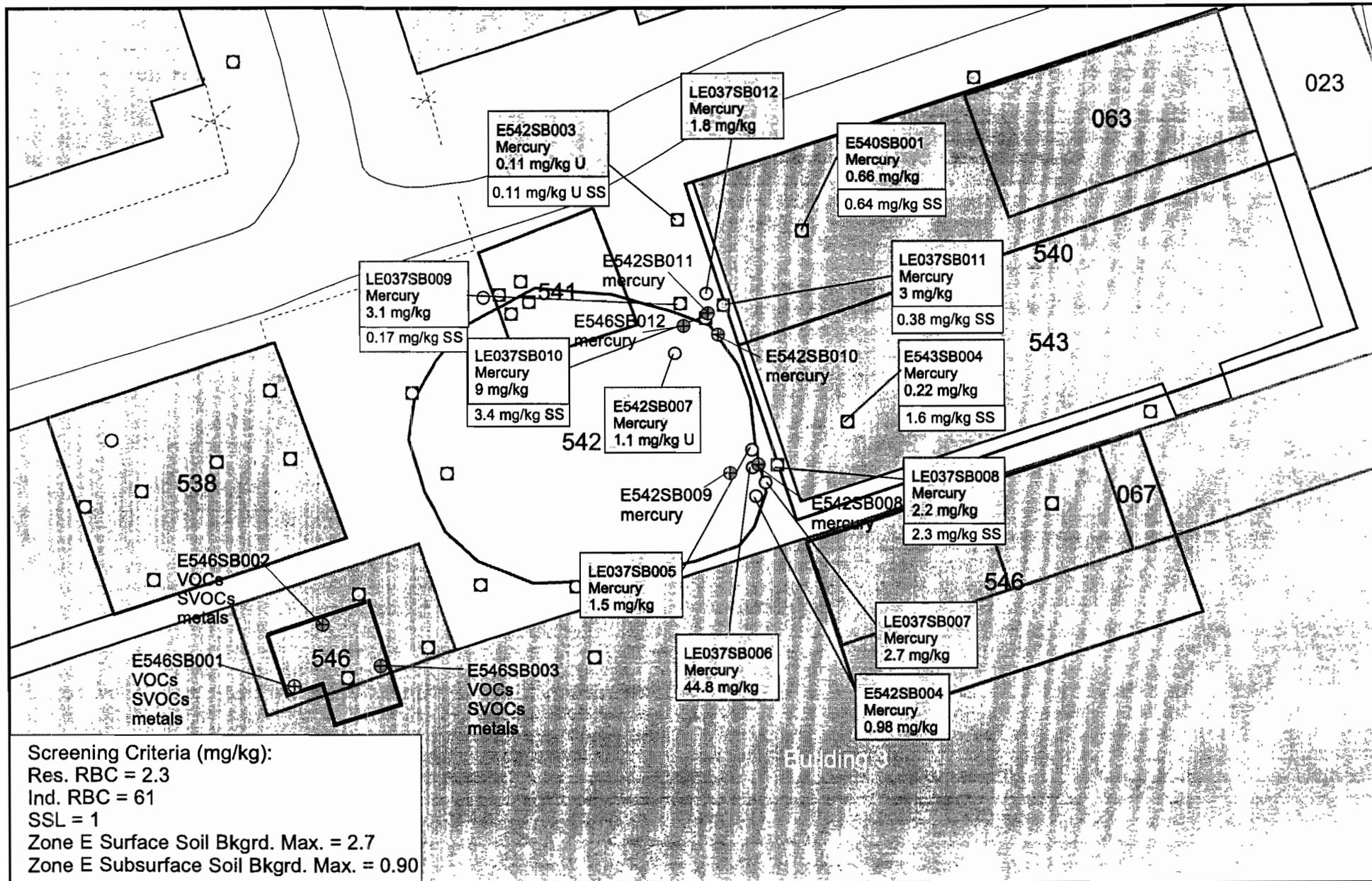
8 Decontamination of personnel, sampling and removal equipment, and materials will be in
9 accordance with the *CH2M-Jones Site-Specific Project Health and Safety Plan* and the *AOC 546*
10 *Health and Safety Plan Addendum*.

TABLE 3-1
 Analytical Summary for Supplemental Sampling Activities
 Sampling and Analysis Plan, AOC 546 and AOC 542, Zone E, Charleston Naval Complex

Sample ID	Number of Sample Locations	Analytes
Surface and Subsurface Soils		
E546SB001	3 locations, with 2 depth intervals (0 - 1 ft bls and 3 - 5 ft bls)	VOCs, SVOCs, metals
E546SB002		VOCs, SVOCs, metals
E546SB003		VOCs, SVOCs, metals
E542SB008	5 locations, with 3 depth intervals (0 - 1 ft bls, 1-3 ft bls, and 3 - 5 ft bls)	mercury
E542SB009		mercury
E542SB010		mercury
E542SB011		mercury
E542SB012		mercury

TABLE 3-2
 Coordinates for Proposed Sampling Locations
Sampling and Analysis Plan, AOC 546 and AOC 542, Zone E, Charleston Naval Complex

New Sample ID	Northing	Easting
New Surface and Subsurface Soil Boring Locations		
E546SB001	376,902	2,316,736
E546SB002	376,938	2,316,754
E546SB003	376,915	2,316,774
E542SB008 (resample of LE037SB006)	377,002	2,317,906
E542SB009	376,979	2,316,897
E542SB010	377,031	2,316,900
E542SB011 (resample of LE037SB010)	377,056	2,316,889
E542SB012	377,038	2,316,892



- Surface Soil Boring
 - Subsurface Soil Boring
 - ⊕ Proposed Soil Boring
 - Fence
 - Railroads
 - Roads
 - ▭ AOC Boundary
 - ▭ SWMU Boundary
 - ▭ Buildings
 - ▭ Zone Boundary
- SS = Subsurface Soil Sample Result

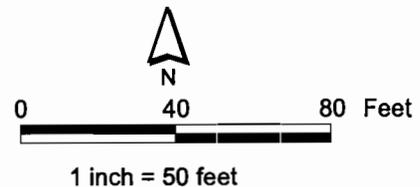


Figure 3-1
 Proposed Soil Sampling Locations and Mercury Detections at Eastern Side of AOC 542 Zone E Charleston Naval Complex

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 U.S. Environmental Protection Agency (EPA). *Environmental Services Division Standard*
11 *Operating Procedures and Quality Assurance Manual (ESDSOPQAM)*. 1996.