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FINAL REPORT GEOPHYSICAL/INTRUSIVE SURVEY COMBINED SOLID WASTE
MANAGEMENT UNIT 9 (SWMU9) CLOSED LANDFILL WITH TRANSMITTAL CNC
CHARLESTON SC
1/25/1999
CNC CHARLESTON



FINAL REPORT

**GEOPHYSICAL/INTRUSIVE SURVEY
COMBINED SWMU 9 CLOSED LANDFILL
NAVAL BASE CHARLESTON
CHARLESTON, SC**



Prepared for:

**DEPARTMENT OF THE NAVY
SOUTHERN DIVISION
NAVAL FACILITIES ENGINEERING COMMAND
CHARLESTON SC**



Prepared by:

**Supervisor of Shipbuilding, Conversion and Repair,
USN, (SUPSHIP) Portsmouth Va.,
Environmental Detachment Charleston, S.C.
1899 North Hobson Ave.
North Charleston, SC 29405-2106**

January 25, 1999

Thank you

Philip W. Marcum, E.I.T.
Civil

DAVIS & FLOYD Engineering
Architecture
Environmental & Laboratory Services



DEPARTMENT OF THE NAVY
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IN REPLY REFER TO:

Ser 077
25 Jan 1999

From: Director, Supervisor of Shipbuilding, Conversion and Repair, USN, Portsmouth. Va.
Environmental Detachment Charleston, SC (SPORTENVDETHASN)

To: Southern Division Naval Facilities Engineering Command (Code 1877, David Dodds)

Subj: SUBMITTAL OF FINAL REPORT FOR PROJECT NUMBER C98056; GEOPHYSICAL
SURVEYING SERVICES IN ZONE H AT SWMU 9, CHARLESTON NAVAL COMPLEX

Ref: (a) Enclosure (1) of SOUTHNAVFACENCOM Ltr. 5090, Ser: Code 18B4 dtd 19 May
1997, Request for PEP for SWMU 9 Geophysical Survey

Encl: (1) Final Report for Geophysical/Intrusive Surveying Services in Zone H, at SWMU 9

1. The enclosed investigation final report for Combined Solid Waste Management Unit (SWMU)
9 Closed Landfill is submitted in accordance with reference (a).

2. Questions should be addressed to Kevin Tunstall, Head Engineer, at 743-2821, ext. 227 or Jed
Heames at 743-2821, extension 123.

Sincerely,

E. R. Dearhart
Director

Encl:

(1) SWMU 9 Final Report

Copy to:

SCDHEC (Mr. Tapia & Mr. Bergstrand)

USEPA (Mr. Spariosu)

CSO Naval Base Charleston (LCDR Rose)

NAVFAC (Mr. Batten)

EA&H (Ms. Maddux)

FINAL REPORT

Geophysical/Intrusive Survey for Combined SWMU 9 Closed Landfill Charleston Naval Complex, Charleston, SC

Engineering Branch Head:

JMK Tansell

Date:

1-25-99

Prepared By:

David Morse

Date:

1-25-99

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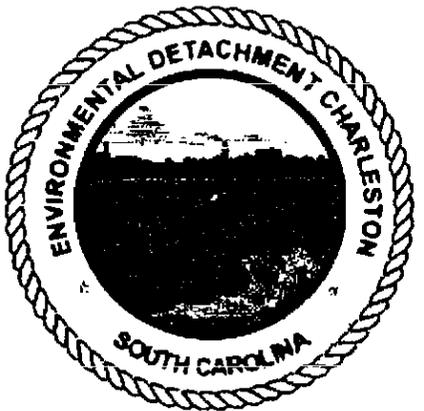
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1. BACKGROUND

In 1992, a geophysical and soil-gas survey was performed at the Combined Solid Waste Management Unit (SWMU) 9 landfill site to delineate the landfill boundary and identify containers and/or contaminant plumes present at the site. Following these surveys, exploratory trenches were excavated to identify the source of geophysical anomalies and soil-gas hot spots. The excavations allowed visual determination of the landfill contents as well as the extent of the landfill boundary at selected locations. However, the trenching was not conclusive enough to establish the entire perimeter boundary, particularly along the northern side of the landfill. According to the Zone H Corrective Measures Study (CMS) Work Plan dated 26 November 1997, completion of these trenches or "test pits" was necessary to confirm the results of the 1992 geophysical survey and to ascertain the actual landfill boundary in those areas where the boundary was only estimated.

The Zone H CMS Work Plan also suggests source containment as a presumptive remedy for this landfill which involves containment of the landfill mass via an earthen cap. To provide a baseline for construction of a landfill cap, for enhancing drainage and to prevent surface water infiltration, a topographic map of the Combined SWMU 9 site is also necessary.

On 29 April 1998 the Environmental Detachment Charleston (DET) submitted Project Execution Packages (PEP's) for conducting geophysical/intrusive and topographic surveys of the Combined SWMU 9 site. As expected, the results of the geophysical survey will influence the extent of the topographic survey. It was for this reason that the geophysical survey was conducted first.

2. SITE DESCRIPTION

Combined SWMU 9, a closed landfill located at the southern end of NAVBASE, is generally bounded by Shipyard Creek to the southwest, Bainbridge Avenue to the northeast, and Holland Street to the southeast. Several associated SWMU and Area of Concern (AOC) sites (SWMUs 19, 20 & 121 and AOCs 649, 650, 651 & 654) are located within the SWMU 9 estimated perimeter and

thus the term Combined SWMU 9. Although Combined SWMU 9 was a military-use landfill used for industrial and domestic solid waste from the 1930s until the early 1970s, Combined SWMU 9 is considered a low-level risk municipal-type landfill because it contains primarily municipal-type wastes. Samples collected from SWMU 9 and associated sites during the Resource Conservation and Recovery Act (RCRA) Facility Investigation (RFI) process identified several Constituents of Potential Concern (COPCs) including pesticides, herbicides, volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), metals, petroleum hydrocarbons and dioxins.

3. GEOPHYSICAL/INTRUSIVE SURVEY OBJECTIVES

The primary objective of this investigation was to conduct an intrusive geophysical survey in combination with aerial photo interpretation to identify the extent of the northern boundary of the Combined SWMU 9 landfill at NAVBASE Charleston.

4. PROJECT EXECUTION

In addition to researching facility files, aerial photographs, RFI data and Interim Measure documentation, intrusive surveys were conducted to determine the extent of the northern portion of the landfill boundary. These intrusive surveys consisted of numerous small excavations called test pits. All test pits were excavated using a backhoe and were approximately 6 feet long by 2 feet wide and from 1 to 7 feet deep.

The initial test pits were staked out along the existing estimated northern boundary (from the north side of Bainbridge Avenue near Building 1785 to the north side of Bainbridge Avenue near Building 246) and were spaced approximately every 50 feet. The location for all initial test pits was determined by surveying to existing estimated boundary coordinates extracted from the state plane coordinate drawing for this area of NAVBASE. All surveying was performed using conventional surveying equipment including electronic theodolite with data collector, electronic distance meter (EDM) and reflector prism.

Following excavation, each test pit was visually inspected for the presence of landfill debris which, if observed, necessitated excavation of another test pit approximately 25 to 100 feet outward from the initial test pit. Likewise, if no landfill debris was observed at an initial test pit, a subsequent test pit was excavated inward of the initial location. This process continued until the actual extent of the landfill boundary in the area north of Bainbridge Avenue was determined. Following visual inspection, each test pit was backfilled with the same material that was removed during excavation then groomed to appear as undisturbed as practical.

Figure 1 of this report illustrates the changes to the northern portion of the landfill boundary based on the results of a sufficient number of test pits. Using this new northern boundary, the total area of Combined SWMU 9 is now estimated to be approximately 99.01 acres, increased from approximately 84.67 acres estimated prior to the geophysical survey. **Table A** of this report summarizes the intrusive survey results of all 116 excavated test pits. It should be noted that **Table A** reflects varying excavation depths. This is due to the fact that excavation was generally terminated at the water table or at the positive presence of landfill debris. Also, in locations where landfill debris was not present, excavation was generally deeper to ensure against premature termination. A total of 56 test pits were photographed prior to backfilling to document the types of landfill debris observed during excavation. Based on the best representation of the types of soil and landfill debris observed during excavation, several of these photographs are included on pages 12 through 17 of this report.

TABLE A
SWMU 9 GEOPHYSICAL/INTRUSIVE SURVEY
Investigation Results Summary for
SWMU 9 Test Pit Excavations in the Area North of Bainbridge Avenue
(Refer to Figure 1 for test pit locations)

Test Pit Location	Excavation Date	Excavation Depth (Ft.)	Foreign Material	Remarks
1	-	-	-	Not excavated, located south of Bainbridge Avenue
Refer to Figure 1 and note the distance between test pits #1 & #2. This was necessary to avoid excavation of the Bainbridge Avenue roadway surface and the road build-up area.				
2	08/12/98	4	None	
3	08/12/98	4	None	
4	08/12/98	5.5	None	
5	08/12/98	4	None	
6	08/12/98	4	None	
7	08/12/98	4	None	
8	08/12/98	4	None	
9	-	-	-	Not excavated, located in asphalt parking lot
10	-	-	-	Not excavated, located in asphalt parking lot
11	-	-	-	Not excavated, located in asphalt parking lot
12	-	-	-	Not excavated, located in asphalt parking lot
13	-	-	-	Not excavated, located in asphalt parking lot
14	-	-	-	Not excavated, located in asphalt parking lot
15	08/24/98	5	None	
16	08/24/98	5	None	
17	08/24/98	5.5	None	
18	08/24/98	4.5	None	
19	08/24/98	7	None	

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Test Pit Location	Excavation Date	Excavation Depth (Ft.)	Foreign Material	Remarks
20	08/24/98	6	Sheet metal, wire cable	
21	08/24/98	4.5	Metal, glass, rags, wire	
22	08/24/98	See Remarks	See Remarks	Large corrugated steel plate buried approx. 8" deep prevented excavation
23	08/24/98	6	None	
24	08/24/98	6	Wire, metal strapping	
25	08/24/98	5	Wood, wire, sheet metal, broken concrete	
26	08/25/98	5.5	None	Strong odor of fuel oil
27	08/25/98	5	Broken bricks, broken concrete	Light odor of fuel oil
28	08/25/98	5	None	Standing water at 2 feet
29	08/25/98	5	Wood, plastic	
30	08/25/98	5	One 6ft. 2 x 6 wood board	
31	08/25/98	4.5	Traces of plastic	
32	08/27/98	4	Broken asphalt, broken concrete	
33	08/27/98	3.5	Rags, wire, wood, pipe, bricks, metal	Odor of fuel oil
34	08/27/98	3.5	Bricks, copper tubing, rope, metal, wire, wood, plastic	
35	08/27/98	3	Concrete blocks, broken concrete, re-bar, wood, wire	
36	08/27/98	3	Rags, plastic, metal, broken asphalt, broken concrete, bricks	
37	08/27/98	3	Rags, plastic, metal, broken asphalt, broken concrete, bricks	
Refer to Figure 1 and note the distance between test pits #37 & #38. This was necessary to avoid excavation of the Dyess Avenue roadway surface and the road build-up area.				
38	08/20/98	5	Household trash	

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Test Pit Location	Excavation Date	Excavation Depth (Ft.)	Foreign Material	Remarks
39	08/20/98	7	None	
40	08/20/98	4	Wood, paper, rubber	
41	08/20/98	4	Wood, metal strapping, paper, plastic	
42	08/20/98	4	Wood, broken concrete	
43	08/20/98	4	Wood, broken concrete, plastic, re-bar	
44	08/20/98	5	None	
45	08/20/98	5	None	
46	-	-	-	Not excavated, located in wetland ditch
Refer to Figure 1 and note the distance between test pits #46 & #47. This was necessary to avoid excavation of the Dyess Avenue roadway surface and the road build-up area.				
47	08/28/98	4	Wood, plastic, broken concrete	
48	08/28/98	4.5	Pieces of large creosoted timbers 10-12" diameter	
49	08/28/98	4.5	Broken concrete, glass, wire	
50	08/28/98	6	None	
51	08/28/98	1.5	Glass, wood, steel scrap, sheet metal, strapping	
52	08/28/98	1.5	Wood, paper, sheet metal, steel, broken asphalt	
53	08/28/98	3	Wood, strapping, broken concrete, wire	
54	08/28/98	2	Wood, nails, metal conduit, brick, wire	
55	08/28/98	6	Wood, copper cable, sheet metal, paper	
56	08/28/98	4	Wood, broken concrete, broken drain tile, scrap metal, strapping	

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Test Pit Location	Excavation Date	Excavation Depth (Ft.)	Foreign Material	Remarks
57	08/28/98	3.5	Wood, broken concrete	
58	08/28/98	4	Wood, broken concrete, broken drain tile	
59	08/28/98	4	Wood, broken concrete, broken tile, pieces of creosoted timbers	
Refer to Figure 1 and note the distance between test pits #59 & #60. This was necessary to avoid excavation of the Bainbridge Avenue roadway surface and the road build-up area.				
60	-	-	-	Not excavated, located south of Bainbridge Avenue
61	09/25/98	3	Timbers, paper, brick	
62	09/25/98	4	Wood, brick, scrap metal, cloth, wire	
63	09/25/98	7	None	
64	09/25/98	5	None	
65	09/25/98	7	None	
66	09/25/98	7	Timbers, angle iron, broken concrete	Excavated thru asphalt, very strong fuel oil odor
67	09/25/98	6	Timbers, broken concrete	Excavated thru asphalt
68	09/25/98	4.5	None	
69	09/25/98	4	None	May be inconclusive. Large subsurface structure limited excavation to 4'
70	09/25/98	4	None*	*One small piece of glass and one small piece of wire
71	09/25/98	3.5	Broken concrete, broken tile, brick	
72	09/25/98	3.5	Broken concrete, iron, plating, brick	
73	10/21/98	4	Wire, steel scrap, broken tile	
74	10/21/98	2.5	Wire, wood, scrap metal, brick	
75	10/21/98	7	None	Layered soil

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Test Pit Location	Excavation Date	Excavation Depth (Ft.)	Foreign Material	Remarks
76	10/21/98	7	None	
77	10/21/98	7	One 5' timber, one piece copper wire	Excavated thru asphalt, very strong fuel oil odor
78	10/21/98	6	None	
79	10/21/98	7	Very small amounts of rubber, glass & metal	Strong fuel oil odor
80	10/21/98	5	Timbers, broken concrete	Strong fuel oil odor
81	10/21/98	6	None	
82	10/21/98	3	Wire, scrap metal, wood, brick, strapping	Free product fuel oil
83	10/21/98	6.5	None	Strong fuel oil odor
84	10/21/98	6	Timbers, one piece broken concrete	Strong fuel oil odor
85	10/21/98	5	One piece wire cable & small amounts of broken concrete	Strong fuel oil odor
86	10/21/98	2	Wood, plastic, metal, paper, bottles, broken concrete	
87	10/21/98	1	Glass, broken concrete, brick, scrap metal	
88	10/21/98	5	None	Layered soil
89	10/22/98	6	None	
90	10/22/98	6	None	
91	10/22/98	6	None	
92	10/22/98	5	Wood, scrap metal, broken concrete, wire	
93	10/22/98	1.5	Concrete, wire, scrap metal, plastic	
94	10/22/98	1.5	Concrete, wire, scrap metal	
95	10/22/98	3	Concrete, wire, scrap metal, brick, wood, rope	

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Test Pit Location	Excavation Date	Excavation Depth (Ft.)	Foreign Material	Remarks
96	10/22/98	4	scrap metal, brick, wood, glass	
97	10/22/98	1	Concrete, wire, scrap metal, brick, wood, glass, rubber, china	
98	10/22/98	1.5	Concrete, wire, wood, china	
99	10/22/98	6	Very small amounts of wood & plastic	
100	10/22/98	2.5	Scrap metal, china, wood, glass	
101	10/22/98	4	Scrap metal, plastic, tile, brick	
102	10/22/98	5	None	
103	10/22/98	5	Concrete, tile, brick, glass, metal, wood	
104	11/12/98	4.5	None*	*One small piece of broken concrete approx. 6" deep
105	11/12/98	5.5	None	
106	11/12/98	4.5	None	
107	11/12/98	5	None	
108	12/01/98	3	Wood, brick, concrete, plastic, wire, metal strapping, rubber	Odor of fuel oil
109	12/01/98	5	None	
110	12/01/98	5	None	
111	12/01/98	3	Scrap metal, china, glass, wire, rags, wood, bottles	
112	12/01/98	5	None	
113	12/01/98	6	None	
114	12/01/98	6	None	
115	12/01/98	7	None	
116	12/01/98	7	None	



Test Pit #72



Test Pit #75



Test Pit #82



Test Pit #86



Test Pit #88



Test Pit #95



Test Pit #97



Test Pit #100



Test Pit #101



Test Pit #103



Test Pit #108



Test Pit #114