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HAZARDOUS RANKING SYSTEM FINAL SCORING BOOK 1 CNC CHARLESTON SC
7/15/1992
KEMRON

CHARLESTON NAVAL BASE
HAZARDOUS RANKING SYSTEM
FINAL SCORING
BOOK I

COMPREHENSIVE LONGTERM
ENVIRONMENTAL ACTION NAVY
DISTRICT II
CONTRACT N62467-89-D-0318
CTO-044

JULY 15, 1992

SOUTHERN DIVISION, CODE 18
NAVAL FACILITIES
ENGINEERING COMMAND
2155 EAGLE DR., P.O. BOX 10068
CHARLESTON, SC 29411-0068
(803) 743-0341

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EnSafe / Allen & Hoshall
a joint venture for professional services
5720 Summer Trees Dr. Suite 8 Memphis, TN 38134
(901) 383-9115 Fax (901) 383-1743

July 15, 1992

Commanding Officer
Southern Division
Naval Facilities Engineering Command
P.O. Box 10068, 2155 Eagle Drive
Charleston, South Carolina 29411-0068
ATTN: Code 182KQ

SUBJ: Contract N62467-89-D-0318/001 Comprehensive Long-Term Environmental Action Navy (CLEAN); CTO-044, Charleston Naval Base, Charleston, SC.

Gentlemen:

Ensafe/Allen & Hoshall is pleased to submit two (2) copies of the final HRS scoring report for the Charleston Naval Base. Please call me at (901) 372-7962 if you have any further questions.

Sincerely,

Robert Lipscomb
Task Order Manager

cc: file

HAZARD RANKING SYSTEM SCORE COMMENTS

COMMENTS BY R. LIPSCOMB	CODE N/A	PHONE 701 372-7966	DATE 6/26/92
PROJECT TITLE HRS II SCORING OF NAVAL BASE CHARLESTON, SOUTH CAROLINA — DRAFT REPORT			

COMMENT NUMBER	COMMENTS	REVIEW ACTION
1	The last three paragraphs of	
	Section 1.0 (pg 1-2) should follow	
	the first 2 paragrahs (pg 1-1).	
	Please note that no PA or SI	
	has been completed	
2	Map should be given a Figure	
	number & border. Map should	
	be on 11 x 17" PAPER. (pag 2-2 & 3)	
3	Need to add a space between	
	paragraphs (pg 2-6)	
4	Add to each subsection statement	
	that this assumption is	
	based on a "strict interpretation	
	of the HRS guidance" or on a	
	"conservative evaluation of the	
	existing data" AS APPROPRIATE	
	TO SECTION 2.3.	

SHEET 1 OF ___ SHEETS

HAZARD RANKING SYSTEM SCORE COMMENTS

COMMENTS BY	R. LIPSCOMB	CODE	PHONE 901 372-7966	DATE 6/26/92
PROJECT TITLE	HRS II SCORING - NB CHARLESTON, SC DRAFT			

COMMENT NUMBER	COMMENTS	REVIEW ACTION
5	FLOOD FREQ MAPS ONLY INDICATE	
	YES/NO FOR 100 YR PLAIN. THERE	
	IS NO INFO FOR 10 YR &	
	ANNUALLY. IT IS ASSUMED THAT	
	FEMA MAP TAKE INTO ACCOUNT	
	HURRICANES.	
6	I AGREE W/ THIS ASSUMPTION BUT	
	IT IS BASED ON A STRICT INTERPRETATION	
	OF HRS.	
7	THE OTHER AIR STUDY HAS BEEN	
	NOTED & IS CONSIDERED TO BE A	
	POTENTIAL SOURCE OF ADDITIONAL	
	INFO	
8	AN ACCURATE HRS SCORE CANNOT	
	BE CALCULATED UNTIL AN	
	SI OR ESI IS COMPLETED.	

6.0 REVIEW

The checklists contained in this section are intended to provide the reviewer with a method of evaluation for individual HRS scores. The checklists should be used in conjunction with the HRS review score sheets, examples of which are presented in Appendix J, and HRS figures and tables presented in Appendices C through G. The reviewer should note that many of the parameters noted in the review scoresheets are followed by table or figure nubmers, i.e. travel time (Table 3-7). These table and figure numbers correspond to these found in Appendices C through G. At all points in the review score sheets, the reviewer should make note of maximum values to ensure none has been exceeded.

6.1 Review Checklist Organization

Checklists have been divided into eight tables:

- Report Format Checklist (Table 6-1)
- Hazardous Waste Quantity Checklist (Table 6-2)
- Groundwater Pathway Checklist (Table 6-3)
- Overland/Flood Pathway Checklist (Table 6-4)
- Groundwater to Surface Water Pathway Checklist (Table 6-5)
- Soil Exposure Checklist (Table 6-6)
- Air Pathway Checklist (Table 6-7)
- Overall Score Checklist (Table 6-8)

6.2 Review Checklists

The following pages contain checklists 6-1 through 6-8.

TABLE 6-1 REPORT FORMAT CHECKLIST					
	Evaluation	Yes	No	N/A	Comment Number
1.	Does the introduction (Section 1.0) provide the reviewer with a concise explanation of the site HRS score?	✓			1
2.	Do you agree with statements made?	✓			
3.	Does the narrative (Section 2.0) provide the reviewer with a site summary?	✓			2
4.	Do you agree with statement made?	✓			
5.	Does the narrative provide the reviewer with a source summary?	✓			3
6.	Do you agree with statements made?	✓			
7.	Are reference numbers provided for further information?	✓			
8.	Have significant assumptions been made and stated?	✓			4
9.	Do you agree with assumptions made?	✓			
10.	Has a pathway score summary been provided?	✓			
11.	Do you agree with the discussion of the pathway score summary?	✓			
12.	Have HRS Score Sheets (Section 3.1) been provided?	✓			
13.	Have HRS Review Score Sheets (Section 3.2) been provided?	✓			
14.	Have PREscore Score Sheets (Section 3.3) been provided?	✓			
15.	Has a PREscore floppy diskette (Section 3.4) containing the site file been provided?	✓			
16.	Are Sections 1.0, 2.0 and 3.0 provided in the deliverable package?	✓			
17.	Is Section 4.0, Documentation Package provided in the deliverable package?	✓			

TABLE 6-1
REPORT FORMAT CHECKLIST

Evaluation	Yes	No	N/A	Comment Number
18. Is a legible copy of each reference provided after each reference number in Section 4.0?	✓			
19. Is the Documentation Package complete?	✓			
20. Comment on overall deliverable package.		✓		

TABLE 6-2
HAZARDOUS WASTE QUANTITY CHECKLIST

	EVALUATION	YES	NO	N/A	COMMENT NUMBER
1.	Are all applicable sources listed under sources?	✓			
2.	Has Hazardous Constituent Quantity (Tier A) been evaluated for any wastestreams. If not proceed to number 8?	✓			
3.	Have raw data, applicable calculations, and appropriate discussion been included to justify evaluation of Tier A?	✓			
4.	Are the calculations correct?	✓			
5.	Do you agree with the scorers discussion for this evaluation?	✓			
6.	Has the evaluation of Tier A been referenced appropriately?	✓			
7.	Do you know of any other source(s) of information which may make evaluation of Tier A more complete?		✓		
8.	Has Hazardous Wastestream Quantity (Tier B) been evaluated for any wastestream? If not proceed to number 14.	✓			
9.	Have raw data, applicable calculations, and appropriate discussion been included to justify evaluation of Tier B?	✓			
10.	Are the calculations correct?	✓			
11.	Do you agree with the scorers discussion for this evaluation?	✓			
12.	Has the evaluation of Tier B been referenced appropriately?	✓			
13.	Do you know of any other source(s) of information which may make evaluation of Tier B more complete?		✓		
14.	Has Source Volume (Tier C) been evaluated for any source? If not proceed to number 21.	✓			

TABLE 6-2 HAZARDOUS WASTE QUANTITY CHECKLIST				
EVALUATION	YES	NO	N/A	COMMENT NUMBER
15. Have raw data, applicable calculations, and appropriate discussion been included to justify evaluation of Tier C?	✓			
16. Are the calculations correct?	✓			
17. Have appropriate divisors from Tables 2-5 (Appendix C) and 5-2 (Appendix F) been used to obtain the assigned value?	✓			
18. Do you agree with the scorers discussion for this evaluation?	✓			
19. Has the evaluation of Tier C been referenced appropriately?	✓			
20. Do you know of any other source(s) of information which may make evaluation of Tier C more complete?		✓		
21. Has Source Area (Tier D) been evaluated for any source. If not proceed to number 28?	✓			
22. Have raw data, applicable calculations, and appropriate discussion been included to justify evaluation of Tier D?	✓			
23. Are calculations correct?	✓			
24. Have appropriate divisors from Tables 2-5 (Appendix C) and 5-2 (Appendix F) been used to obtain the assigned value?	✓			
25. Do you agree with the scorers discussion for this evaluation?	✓			
26. Has the evaluation of Tier D been referenced appropriately?	✓			
27. Do you know of any other source(s) of information which may make evaluation of Tier D more complete?		✓		

TABLE 6-2 HAZARDOUS WASTE QUANTITY CHECKLIST				
EVALUATION	YES	NO	N/A	COMMENT NUMBER
28. Have assigned values for all tiers evaluated for all sources been compiled in Part 3 of the Source Hazardous Waste Quantity Factor Worksheets?	✓			
29. Has the highest value from parts 3(a), 3(b), 3(c), and 3(d) been entered in part 3(c) for each source (one value for soil exposure, one value for all other pathways)?	✓			
30. Has the sum of these values been entered (one for soil, one for other pathways) at the base of Part 3(e)?	✓			
31. Has the appropriate Hazardous Waste Quantity Factor Value been chosen from Table 2-6 (Appendix C) based upon value(s) from 3(e) and entered into Part 4?	✓			
32. Do you have additional comments regarding Hazardous Waste Quantity Factor Value Calculation?		✓		

TABLE 6-3
GROUNDWATER PATHWAY CHECKLIST

EVALUATION	YES	NO	N/A	COMMENT NUMBER
1. Has this pathway been evaluated? If not proceed to Table 6-4.	✓			
2. Has the aquifer yielding the highest pathway score, of all aquifers evaluated, been selected for inclusion in the review score sheets (See PREscore program for evaluation of other aquifers)?			✓	
3. Do you agree that this aquifer should be the aquifer selected for inclusion in the review scoresheets?			✓	
4. Has an observed release score of 550 been assigned (line 1)? If not proceed to number 9.	✓			
5. Has an observed release been justified with data and appropriate discussion? An observed release may be scored based on analytical data or observation.	✓			
6. Do you agree with the scorers discussion for this evaluation?	✓			
7. Has the evaluation of observed release been referenced appropriately?	✓			
8. Do you know of any other source(s) of information which may make evaluation of observed release more complete? If the reviewer does not wish to evaluate potential to release because an observed release has been scored, proceed to number 31.		✓		
9. Has potential to release been evaluated and a value entered in line 2?				
10. Has the assigned value been calculated correctly from lines 2a through 2d of the review score sheets [lines 2a x (2b + 2c + 2d)]?				
11. Has a value for containment (line 2a) been assigned from Table 3-2 (Appendix D)?				
12. Is this the highest value for all containment values assigned to each source (maximum of 10)?				

TABLE 6-3 GROUNDWATER PATHWAY CHECKLIST				
EVALUATION	**YES**	**NO**	**N/A**	**COMMENT NUMBER**
13. Do you agree with the scorers discussion relating to containment?				
14. Has the evaluation of containment been referenced appropriately?				
15. Do you know of any other source(s) of information which may make evaluation of containment more complete?				
16. Has a value for net precipitation (line 2b) been assigned from either Figure 3-2 (Appendix D) or Table 3-4 (Appendix D)?				
17. Is the value correct?				
18. Has a value for depth to aquifer (line 2c) been assigned from Table 3-5 (Appendix D)?				
19. Have data, applicable calculations, and appropriate discussion been included to justify the evaluation of depth to aquifer?				
20. Are the calculations correct?				
21. Do you agree with the scorers discussion for this evaluation?				
22. Has the evaluation of depth to aquifer been referenced appropriately?				
23. Do you know of any other source(s) of information which may make evaluation of depth to aquifer more complete?				
24. Has a value for travel time (line 2d) been assigned from Table 3-7 (Appendix D)?				
25. Has input data (hydraulic conductivity from Table 3-6 (Appendix D) and thickness of lowest hydraulic conductivity layer) been assigned and entered in spaces provided below line 2d?				

TABLE 6-3 GROUNDWATER PATHWAY CHECKLIST				
EVALUATION	YES	NO	N/A	COMMENT NUMBER
26. Have data, applicable calculations, and appropriate discussion been included to justify the evaluation of travel time?				
27. Are the calculations correct?				
28. Do you agree with the scorers discussion for this evalaution?				
29. Has evaluation of travel time been referenced appropriately?				
30. Do you know of any other source(s) of information which may make evaluation of travel time more complete?				
31. Has the higher value of lines 1 or 2 been entered in line 3 as the likelihood of release value?	✓			
32. Has a value been assigned for toxicity/mobility and entered in line 4?	✓			
33. Has the contaminant used for this value been stated?	✓			
34. Has the Hazardous Waste Quantity value been entered in line 5 from the hazardous waste quantity work sheets?	✓			
35. Is a value for waste characteristics product (lines 4 x 5) entered below line 5?	✓			
36. Based on the above value, has the waste characteristics value been correctly chosen from Table 2-7 (Appendix C) and entered in line 6? Note that targets for the groundwater pathway include those for the aquifer being evaluated and all interconnected or overlying aquifers.	✓			
37. Has a value been assigned from Table 3-11 (Appendix D) for the nearest well and been entered in line 7?	✓			
38. Has population been evaluated and a value entered in line 8?	✓			

TABLE 6-3 GROUNDWATER PATHWAY CHECKLIST					
	EVALUATION	YES	NO	N/A	COMMENT NUMBER
39.	Has the assigned value been calculated correctly from lines 8a through 8c (lines 8a + 8b + 8c)?	✓			
40.	If line 8 has been assigned a value greater than zero, see Table 1 and 2.			✓	
41.	Have values for Level I and Level II concentrations and potential contamination been entered in lines 8a through 8c?	✓			
42.	Have values been calculated correctly in Tables 1 and 2 from demographic data?	✓			
43.	Do you agree with the scorers discussion for this evaluation?	✓			
44.	Has the evaluation of population been referenced appropriately?	✓			
45.	Do you know of any other source(s) of information which may make evaluation of population more complete?		✓		
46.	Has a value been assigned to resources and entered in line 9?	✓			
47.	Has the value been justified?	✓			
48.	Has the value been referenced?	✓			
49.	Has a value been assigned to wellhead protection area and entered in line 10?	✓			
50.	Has the value been justified?	✓			
51.	Has the value been referenced?	✓			
52.	Has the value for targets been correctly calculated from lines 7 through 10 [7 + 8 + 9 + 10] and entered in line 11?	✓			
53.	Has the aquifer score been calculated correctly and entered in line 12?	✓			

TABLE 6-3 GROUNDWATER PATHWAY CHECKLIST				
EVALUATION	YES	NO	N/A	COMMENT NUMBER
54. Has the highest aquifer score for all aquifers evaluated been entered in line 13?	✓			

TABLE 6-4
OVERLAND/FLOOD PATHWAY CHECKLIST

	EVALUATION	YES	NO	N/A	COMMENT NUMBER
1.	Has this pathway been evaluated? If not proceed to Table 6-5.	✓			
2.	Has a surface water migration pathway summary been provided as Table 3?	✓			
3.	Are all applicable surface water segments presented?	✓			
4.	Are surface water descripters, flow rates, depths (where applicable), and assigned dilution weights from Table 4-13 (Appendix E) included?	✓			
5.	Have data, applicable calculations, and appropriate discussion been included to justify the surface water segment evaluation?	✓			
6.	Are the calculations correct?	✓			
7.	Has Table 3 been referenced appropriately?	✓			
8.	Do you know of any other source(s) of information which may make completion of Table 3 more accurate?		✓		
9.	Has an observed release score of 550 been assigned (line 1)? If not proceed to number 15.		✓		
10.	Has an observed release been justified with data and appropriate discussion? An observed release may be scored based on analytical data or observation.			✓	
11.	Do you agree with the scorers discussion for this evaluation?			✓	
12.	Do you consider the observed release significant?			✓	
13.	Has the evalaution of observed release been referenced appropriately?			✓	

TABLE 6-4 OVERLAND/FLOOD PATHWAY CHECKLIST				
EVALUATION	YES	NO	N/A	COMMENT NUMBER
14. Do you know of any other source(s) of information which may make evaluation of containment more complete? If the reviewer does not wish to evaluate potential to release because an observed release has been scored proceed to number 47.			✓	
15. Has potential to release by overland flow been evaluated and a value entered in line 2?	✓			
16. Has the assigned value been calculated correctly from lines 2a, 2b, and 2c [2a x (2b + 2c)]?	✓			
17. Has a value for containment (line 2a) been assigned from Table 4-2 (Appendix E)?	✓			
18. Is this the highest value for all containment values assigned to each source (maximum of 10)?	✓			
19. Do you agree with the scorers discussion relating to containment?	✓			
20. Has the evaluation of containment been referenced appropriately?	✓			
21. Do you know of any other source(s) of information which may make evaluation of containment more complete?		✓		
22. Has a value for runoff (line 2b) been assigned? NOTE: This value is calculated through Tables 4-3, 4-4, 4-5, and 4-6 (Appendix E) with the rainfall, soil group and drainage area parameters.	✓			
23. Has a value for rainfall been correctly chosen from a 2 year, 24 hour rainfall map?	✓			
24. Has the 2 year, 24 hour rainfall map been referenced?	✓			

TABLE 6-4 OVERLAND/FLOOD PATHWAY CHECKLIST				
EVALUATION	**YES**	**NO**	**N/A**	**COMMENT NUMBER**
25. Has the appropraite soil group designator (A, B, C, or D) been chosen from Table 4-4 (Appendix E)?	✓			
26. Has the soil group chosen been referenced?	✓			
27. Has the correct value for rainfall/runoff been selected from Table 4-5 (Appendix E) based on rainfall and soil group?	✓			
28. Has the appropriate drainage area for the source(s) and upgradient areas been used to obtain an assigned value for drainage area from Table 4-3 (Appendix E)?	✓			
29. Has the appropriate value for runoff been selected from Table 4-6 (Appendix E) based on the rainfall/runoff value and drainage area value?	✓			
30. Do you agree with the calculations and discussion used to evaluate runoff?	✓			
31. Do you know of any other source(s) of information which may make evaluation of runoff more complete?		✓		
32. Has the appropriate value for distance to surface water been chosen from Table 4-7 (Appendix E) and entered in line 2c? This value is based on the overland distance from the perimeter of the base to the probable point of entry.	✓			
33. Do you agree with this value?	✓			
34. Has this value been appropriately referenced?	✓			
~~35. Based on the above value, has the waste characteristics value been correctly chosen from Table 2-7 (Appendix C) and entered in line 6?~~	✓			
36. Has the assigned value been calculated correctly from lines 3a and 3b [3a x 3b]?	✓			

TABLE 6-4
OVERLAND/FLOOD PATHWAY CHECKLIST

EVALUATION	YES	NO	N/A	COMMENT NUMBER
37. Is this the highest value for potential to release by flood for all sources evaluated (maximum of 10)?	✓			
38. Has a value for containment (flood) been correctly chosen from Table 4-8 (Appendix E) and entered in line 3a?	✓			
39. Do you agree with the scorers discussion relating to containment (flood)?	✓			
40. Has the evalaution of containment been referenced appropriately?	✓			
41. Do you know of any other source(s) of information which may make evaluation of containment more complete?		✓		
42. Has a value for flood frequency been correctly chosen from Table 4-9 (Appendix E) and entered in line 3b?	✓			
43. Do you agree with the scorers discussion relating to flood frequency?	✓			5
44. Has the evaluation of flood frequency been referenced appropriately?	✓			
45. Do you know of any other source(s) of information which may make evaluation of flood frequency more complete?		✓		
46. Have lines 2 and 3 been correctly summed and entered into line 4 as potential to release for the overland/flood pathway?	✓			
47. Has the higher of lines 1 or 4 been chosen and entered into line 5 as the likelihood of release factor?	✓			
48. Has a value been assigned for toxicity/persistence and entered in line 6?	✓			
49. Has the contaminant used for this value been stated?	✓			

TABLE 6-4 OVERLAND/FLOOD PATHWAY CHECKLIST				
EVALUATION	YES	NO	N/A	COMMENT NUMBER
50. Has the Hazardous Waste Quantity value been entered in line 7 from the hazardous waste quantity work sheets?	✓			
51. Is a value for waste characteristics product (lines 6 x 7) entered below line 8?	✓			
52. Based on this value, has the waste characteristics value been correctly chosen from Table 2-7 (Appendix C) and entered in line 8?	✓			
53. Has the higher of lines 9a, 9b, or 9c been entered in line 9 as the value for nearest intake?	✓			
54. If line 9 has been assigned a value greater than zero, see Table 4.			✓	
55. Has the value been correctly chosen based upon information presented in Table 4?			✓	
56. Do you agree with the scorers discussion for this evaluation?			✓	
57. Has the evaluation of nearest intake been referenced appropriately?			✓	
58. Do you know of any other source(s) of information which may make evaluation of nearest intake more complete?		✓		
59. Has a value for population been correctly calculated from lines 10a, 10b, and 10c (10a + 10b + 10c) and entered in line 10?			✓	
60. If line 10 has been assigned a value greater than zero, see Tables 4A and 5.			✓	
61. Have values for lines 10a and 10b been correctly chosen based upon information presented in Table 4A?			✓	
62. Has the value for line 10c been correctly chosen based upon information presented in Table 5?			✓	

TABLE 6-4
OVERLAND/FLOOD PATHWAY CHECKLIST

EVALUATION	YES	NO	N/A	COMMENT NUMBER
77. If line 18 has been assigned a value greater than zero, see Table 6.			✓	
78. Has the value been correctly chosen based upon information presented in Table 6?			✓	
79. Do you agree with the scorers discussion for this evaluation?			✓	
80. Has the evaluation of food chain individual been referenced appropriately?			✓	
81. Do you know of any other source(s) of information which may make evaluation of food chain individual more complete?		✓		
82. Has a value for population been correctly calculated from lines 19a, 19b, and 19c (19a + 19b + 19c) and entered in line 19?	✓			
83. If line 19 has been assigned a value greater than zero, see Tables 7 and 8.	✓			
84. Have values for lines 19a and 19b been correctly chosen based upon information presented in Table 7?	✓			
85. Has the value for line 19c been correctly chosen based upon information presented in Table 8?	✓			
86. Do you agree with the scorers discussion for the evaluation of population?	✓			
87. Has the evaluation of population been referenced appropriately?	✓			
88. Do you know of any other source(s) of information which may make evaluation of population more complete?		✓		
89. Has a value for targets been calculated correctly (lines 18 and 19) entered in line 20?	✓			

TABLE 6-4
OVERLAND/FLOOD PATHWAY CHECKLIST

EVALUATION	YES	NO	N/A	COMMENT NUMBER
63. Do you agree with the scorers discussion for the evaluation of population?			✓	
64. Has the evaluation of population been referenced appropriately?			✓	
65. Do you know of any other source(s) of information which may make evaluation of population more complete?		✓		
66. Has a value been assigned to resources and entered in line 11?	✓			
67. Has the value been justified?	✓			
68. Has the value been referenced?	✓			
69. Has a value for targets been calculated correctly [lines 9 + 10 + 11] and entered in line 12?	✓			
70. Has the drinking water threat score been calculated correctly [(lines 5 x 8 x 12)/82,500] and entered in line 13?	✓			
71. Has a value for likelihood of release been entered in line 14 (same as line 5)?	✓			
72. Has a value been assigned for toxicity/persistence/bioaccumulation and entered in line 15?	✓			
73. Has the contaminant used for this value been stated?	✓			
74. Has the Hazardous Waste Quantity value been entered in line 16 (same as line 7)?	✓			
75. Is a value for waste characteristics product (lines 15 x 16) entered below line 17?	✓			
76. Based on this value, has the waste characteristics value been correctly chosen from Table 2-7 (Appendix C) and entered in line 17?	✓			

TABLE 6-4
OVERLAND/FLOOD PATHWAY CHECKLIST

EVALUATION	YES	NO	N/A	COMMENT NUMBER
102. Has the evaluation of sensitive environments been referenced appropriately?	✓			
103. Do you know of any other source(s) of information which may make evaluation of sensitive environments more complete?		✓		
104. Has a value for targets (same as line 26) been entered in line 27?	✓			
105. Has the environmental threat score been calculated correctly [(lines 22 x 25 x 27)/82,500] and entered in line 28?	✓			
106. Has the watershed score been calculated correctly (lines 13 + 21 + 28) and entered in line 29?	✓			
107. If more than one watershed has been evaluated, has the highest value for all watershed scores (lines 29) been entered in line 30. Note that if only one watershed has been evaluated, lines 29 and 30 will be identical.	✓			
108. If the groundwater to surface water component has been evaluated (line 58), the surface water pathway score will be the higher of lines 30 or 58. The result is entered in line 59.	✓			

TABLE 6-4 OVERLAND/FLOOD PATHWAY CHECKLIST					
	EVALUATION	**YES**	**NO**	**N/A**	**COMMENT NUMBER**
90.	Has the Human Food Chain Threat score been calculated correctly [(lines 14 x 17 x 20)/82,500] and entered in line 21?	✓			
91.	Has a value for likelihood of release been entered in line 22 (same as line 5)?	✓			
92.	Has a value been assigned for ecosystem toxicity/persistence/ bioaccumulation and entered in line 23?	✓			
93.	Has the contaminant used for this value been stated?	✓			
94.	Has the hazardous waste quantity value been entered in line 24 (same as line 7)?	✓			
95.	Is a value for waste characteristics product (lines 23 x 24) entered below line 25?	✓			
96.	Based on this value, has the waste characteristics value been correctly chosen from Table 2-7 (Appendix C) and entered in line 25?	✓			
97.	Has a value for sensitive environments been correctly calculated from lines 26a, 26b, and 26c (26a + 26b + 26c) and entered in line 26?	✓			
98.	If a value for line 26, greater than zero, has been assigned, see Tables 9, 9a, and 10?	✓			
99.	Have values for lines 26a and 26b been correctly chosen based upon information presented in Tables 9 and 9A?	✓			
100.	Has the value for line 26c been correctly chosen based upon information presented in Table 10?	✓			
101.	Do you agree with the scorers discussion for the evaluation of sensitive environments?	✓			

TABLE 6-5 GROUNDWATER TO SURFACE WATER PATHWAY CHECKLIST				
Evaluation	Yes	No	N/A	Comment Number
1. Has the groundwater to surface water component been evaluated? If not proceed to Table 6-6.		✓		
2. Has an observed release score of 550 been assigned and entered in line 31? If not proceed to number 7.				
3. Has an observed release been justified with data and appropriate discussion? An observed release may be scored based on analytical data or observation.				
4. Do you agree with the scorers discussion for this evaluation?				
5. Has the evaluation of observed release been referenced appropriately?				
6. Do you know of any other source(s) of information which may make evaluation of observed release more complete? If the reviewer does not wish to evaluate potential to release because an observed release has been scored, proceed to number 28.				
7. Has potential to release been evaluated and a value entered in line 32?				
8. Has the assigned value been correctly calculated from lines 32a through 32d [lines 32a x (32b + 32c + 32d)]?				
9. Has a value for containment (line 32a) been assigned from Table 3-2 (Appendix D)?				
10. Do you agree with the scorers discussion relating to containment?				
11. Has the evaluation of containment been referenced appropriately?				
12. Do you know of any other source(s) of information which may make evaluation of containment more complete?				

TABLE 6-5
GROUNDWATER TO SURFACE WATER PATHWAY CHECKLIST

Evaluation	Yes	No	N/A	Comment Number
13. Has a value for net precipitation (line 2b) been assigned from either Figure 3-2 (Appendix D) or Table 3-4 (Appendix D)?				
14. Is the value correct?				
15. Has a value for depth to aquifer (line 2c) been assigned from Table 3-5 (Appendix D)?				
16. Have data, applicable calculations, and appropriate discussion been included to justify the evaluation of depth to aquifer?				
17. Are the calculations correct?				
18. Do you agree with the scorers discussion for this evaluation?				
19. Has the evaluation of depth to aquifer been referenced appropriately?				
20. Do you know of any other source(s) of information which may make evaluation of depth to aquifer more complete?				
21. Has a value for travel time (line 2d) been assigned from Table 3-7 (Appendix D)?				
22. Has input data (hydraulic conductivity from Table 3-6 (Appendix D) and thickness of lowest hydraulic conductivity layer) been assigned and entered in spaces provided below line 2d?				
23. Have data, applicable calculations, and appropriate discussion been included to justify the evaluation of travel time?				
24. Are the calculations correct?				
25. Do you agree with the scorers discussion for this evaluation?				

TABLE 6-5 GROUNDWATER TO SURFACE WATER PATHWAY CHECKLIST				
Evaluation	**Yes**	**No**	**N/A**	**Comment Number**
26. Has evaluation of travel time been referenced appropriately?				
27. Do you know of any other source(s) of information which may make evaluation of travel time more complete?				
28. Has the higher value of lines 31 or 32 been entered in line 33 as the likelihood of release value?				
29. Has a value been assigned for toxicity/mobility/persistence and entered in line 34?				
30. Has the contaminant used for this value been stated?				
31. Is a value for waste characteristics product (lines 34 x 35) entered below line 36?				
32. Based on this value has the waste characteristics value been correctly chosen from Table 2-7 (Appendix C) and entered in line 36?				
33. If line 37 has been assigned a value greater than zero, see Table 11.				
34. Has the value been correctly chosen based upon information presented in Table 11?				
35. Do you agree with the scorers discussion for this evaluation?				
36. Has the evaluation of nearest intake been referenced appropriately?				
37. Do you know of any other source(s) of information which may make evaluation of nearest intake more complete?				
38. Has a value for population been correctly calculated from lines 38a, 38b, and 38c (38a + 38b + 38c) and entered in line 38?				

TABLE 6-5 GROUNDWATER TO SURFACE WATER PATHWAY CHECKL ;T				
Evaluation	Yes	No	N/A	Comment Number
39. If line 38 has been assigned a value greater than zero, see Tables 12 and 13.				
40. Have values for lines 38a and 38b been correctly chosen based upon information presented in Table 12?				
41. Has the value for line 38c been correctly chosen based upon information presented in Table 13?				
42. Do you agree with the scorers discussion for the evaluation of population?				
43. Has the evaluation of population been referenced appropriately?				
44. Do you know of any other source(s) of information which may make evaluation of population more complete?				
45. Has a value been assigned to resources and entered in line 39?				
46. Has the value been justified?				
47. Has the value been referenced?				
48. Has a value for targets been calculated correctly by summing lines 37, 38, and 39, and entered in line 40?				
49. Has the drinking water threat score been calculated correctly [(lines 33 x 36 x 40)/82,500] and entered in line 41?				
50. Has a value for likelihood of release been entered in line 42 (same as line 33)?				
51. Has a value been assigned for toxicity/mobility/persistence/bioaccumulation and entered in line 43?				
52. Has the contaminant used for this value been stated?				

TABLE 6-5
GROUNDWATER TO SURFACE WATER PATHWAY CHECKLIST

Evaluation	Yes	No	N/A	Comment Number
53. Has the Hazardous Waste Quantity value been entered in line 44 (same as line 35)?				
54. Is a value for waste characteristics product (lines 43 x 44) entered below line 45?				
55. Based on this value, has the waste characteristics value been correctly chosen from Table 2-7 (Appendix C) and entered in line 45?				
56. If line 46 has been assgned a value greater than zero, see Table 14.				
57. Has the value been correctly chosen based upon information presented in Table 14?				
58. Do you agree with the scorers discussion for this evaluation?				
59. Has the evaluation of food chain individual been referenced appropriately?				
60. Do you know of any other source(s) of information which may make evaluation of food chain individual more complete?				
61. Has a value for population been correctly calculated from lines 47a, 47b, and 47c (47a + 47b + 47c) and entered in line 47?				
62. If line 47 has been assigned a value greater than zero, see Tables 15 and 16.				
63. Have values for lines 47a and 47b been correctly chosen based upon information presented in Table 15?				
64. Has the value for line 47c been correctly chosen based upon information presented in Table 16?				
65. Do you agree with the scorers discussion for the evaluation of population?				

TABLE 6-5 GROUNDWATER TO SURFACE WATER PATHWAY CHECKLIST				
Evaluation	**Yes**	**No**	**N/A**	**Comment Number**
66. Has the evaluation of population been referenced appropriately?				
67. Do you know of any other source(s) of information which may make evaluation of population more complete?				
68. Has a value for targets been correctly calculated [lines 46 + 47] and entered in line 48?				
69. Has the Human Food Chain Threat score been calculated correctly [(lines 42 x 45 x 48)/82,500] and entered in line 49?				
70. Has a value for likelihood of release been entered in line 50 (same as line 33)?				
71. Has a value been assigned for ecosystem toxicity/mobility/persistence/ bioaccumulation and entered in line 51?				
72. Has the contaminant used for this value been stated?				
73. Has the hazardous waste quantity value been entered in line 52 (same as line 35)?				
74. Is a value for waste characteristics product (lines 51 x 52) entered below line 53?				
75. Based on this value, has the waste characteristics value been correctly chosen from Table 2-7 (Appendix C) and entered in line 53?				
76. Has a value for sensitive environments been correctly calculated from lines 54a, 54b, and 54c (54a + 54b + 54c) and entered in line 54?				
77. If line 54 has been assigned a value greater than zero, see Tables 17, 17A, 18 and 18A.				

TABLE 6-5
GROUNDWATER TO SURFACE WATER PATHWAY CHECKLIST

Evaluation	Yes	No	N/A	Comment Number
78. Have values for lines 54a and 54b been correctly chosen based upon information presented in Tables 17 and 17A?				
79. Has the value for line 54c been correctly chosen based upon information presented in Tables 18 and 18A?				
80. Do you agree with the scorers discussion for the evaluation of sensitive environments?				
81. Has the evaluation of sensitive environments been referenced appropriately?				
82. Do you know of any other source(s) of information which may make evaluation of sensitive environments more complete?				
83. Has a value for targets (same as line 54) been entered in line 55?				
84. Has the environmental threat score been calculated correctly [(lines 50 x 53 x 55)/82,500] and entered in line 56?				
85. Has the watershed score been calculated correctly (lines 41 + 49 + 56) and entered in line 57?				
86. Has the highest value for all watersheds evaluated (line 57) been entered in line 58? Note that if only one watershed has been evaluated then lines 57 and 58 will be identical.				
87. If the overland/flood component has been evaluated (line 30) then the surface water pathway score will be the higher of lines 30 or 58. The result is entered in line 59.				

TABLE 6-6 SOIL EXPOSURE CHECKLIST				
Evaluation	**Yes**	**No**	**N/A**	**Comment Number**
1. Has the pathway been evaluated? If not proceed to Table 6-7.	✓			
2. Has a likelihood of exposure value of 550 been entered in line 1? Note that the likelihood of exposure value is based on whether or not there is an area of observed contamination in the upper 2 feet of soil. Contamination must be within 200 feet of a school, residence, or workplace, and within the property boundary.	✓			
3. Has a value for toxicity been entered below line 2?	✓			
4. Has the contaminant used for the toxicity value been stated?	✓			
5. Has this value been correctly multiplied by the hazardous waste quantity (see hazardous waste quantity worksheets) and entered in line 2?	✓			
6. Based on the above value, has the waste characteristics value been correctly chosen from Table 2-7 (Appendix C) and entered in line 3?	✓			
7. Has a value for resident individual been assigned and entered in line 4?	✓			
8. Is the value assigned 50, 45, or 0 for level I, level II, or no observed contamination, respectively?	✓			
9. Has resident population been evaluated and a value entered in line 5 (lines 5a + 5b)?	✓			
10. Have values for level I and level II concentrations been entered in lines 5a and 5b?	✓			
11. Have these values been calculated correctly from data presented in Table 19?	✓			
12. Do you agree with the scorers discussion for this evaluation?	✓			

TABLE 6-6 SOIL EXPOSURE CHECKLIST				
Evaluation	Yes	No	N/A	Comment Number
13. Has the evaluation of resident population been referenced appropriately?	✓			
14. Do you know of any other source(s) of information which may make evaluation of resident population more complete?		✓		
15. Has a value for workers been correctly chosen from Table 5-4 (Appendix F) and entered in line 6?	✓			
16. Do you agree with this evaluation?	✓			
17. Has the evaluation of workers been referenced appropriately?	✓			
18. Do you know of any other source(s) of information which may make evaluation of workers more complete?		✓		
19. Has a value for resources been assigned and entered in line 7?	✓			
20. Has the value been justified?	✓			
21. Has the value been referenced?			✓	
22. Has a value been assigned for terrestrial sensitive environments from Table 5-5 (Appendix F)?		✓		
23. Has the value been justified?	✓			
24. Has the value been referenced?	✓			
25. Has the value for targets been correctly calculated [lines 4 + 5 + 6 + 7 + 8] and entered in line 9?	✓			
26. Has the resident population threat score been calculated correctly (lines 1 x 3 x 9) and entered in line 10?	✓			

TABLE 6-6
SOIL EXPOSURE CHECKLIST

	Evaluation	Yes	No	N/A	Comment Number
27.	Has a value for likelihood of exposure been assigned from Table 5-8 (Appendix F) and entered in line 11?	✓			
28.	Have values for attractiveness/accessibility (Table 5-6 - Appendix F) and area of contamination (Table 5-7 - Appendix F) been correctly chosen and entered below line 11?	✓			
29.	Do you agree with the scorers evaluation of likelihood of exposure?	✓			
30.	Is the evaluation referenced appropriately?	✓			
31.	Do you know of any other source(s) of information which may make evaluation of likelihood of exposure more complete?		✓		
32.	Has the value from line 2 been entered in line 12?	✓			
33.	Has the value from line 3 been entered in line 13?	✓			
34.	Has a value for nearest individual been assigned from Table 5-9 (Appendix F) and entered in line 14?	✓			
35.	Is the value correct?	✓			
36.	Has population within one mile been evaluated and a value entered in line 15? If so, see Table 20.	✓			
37.	Has the value been calculated correctly from data presented in Table 20?	✓			
38.	Do you agree with the scorers discussion for this evaluation?	✓			
39.	Has the evaluation of population within one mile been referenced appropriately?	✓			

TABLE 6-7
AIR PATHWAY CHECKLIST

	Evaluation	Yes	No	N/A	Comment Number
1.	Has this pathway been evaluated? If not proceed to Table 6-8.	✓			
2.	Has an observed release score of 550 been assigned and entered in line 1? If not proceed to number 8.	✓			
3.	Has an observed release been justified with data and appropriate discussion? An observed release may be scored based upon analytical data or observation.	✓			
4.	Do you agree with the scorers discussion for this evaluation?	✓			6
5.	Do you consider the observed release significant?	✓			6
6.	Has the evaluation of observed release been referenced appropriately?	✓			
7.	Do you know of any other source(s) of information which may make evaluation of observed release more complete?	✓			7
8.	Has potential to release been evaluated and a value entered in line 2, as the higher value of line 2a or line 2b?	✓			
9.	Has the higher of lines 1 or 2 been entered in line 3 as the likelihood of release value?	✓			
10.	Has a value for toxicity/mobility (calculated in the PREscore program) been entered in line 4?	✓			
11.	Has a value for hazardous waste quantity been entered in line 5 from the hazardous waste quantity worksheets?	✓			
12.	Has the waste characteristics product (lines 4 x 5) been calculated correctly and entered below line 5?	✓			

TABLE 6-6 SOIL EXPOSURE CHECKLIST				
Evaluation	Yes	No	N/A	Comment Number
40. Do you know of any other source(s) of information which may make evaluation of population within one mile more complete?		✓		
41. Has the value for targets been correctly calculated, [lines 14 + 15] and entered in line 16?	✓			
42. Has the nearby population threat score been calculated correctly (lines 11 x 13 x 16) and entered in line 17?	✓			
43. Has the soil exposure pathway score been correctly calculated [lines (10 + 17)/82,500] and entered in line 18?	✓			

TABLE 6-7 AIR PATHWAY CHECKLIST				
Evaluation	Yes	No	N/A	Comment Number
13. Based on this value has the correct waste characteristics value been chosen from Table 2-7 (Appendix C)?	✓			
14. Has a value for nearest individual been correctly chosen from Table 6-16 (Appendix E) and entered in line 7?	✓			
15. Do you agree with the scorers discussion for this evaluation?	✓			
16. Has the evaluation of nearest individual been referenced appropriately?	✓			
17. Do you know of any other source(s) of information which may make evaluation of nearest individual more complete?		✓		
18. Has a value for population been correctly calculated from lines 8a, 8b and 8c (8a + 8b + 8c) and entered in line 8?	✓			
19. If line 8 has been assigned a value greater then zero, see Tables 21 and 22.	✓			
20. Have values for lines 8a and 8b been correctly chosen based on information presented in Table 21?	✓			
21. Has the value for line 8c been correctly chosen based on information presented in Table 22?	✓			
23. Has the evaluation of population been referenced appropriately?	✓			
24. Do you know of any other source(s) of information which may make evaluation of population more complete?		✓		
25. Has a value been assigned to resources and entered in line 9?	✓			
26. Has the value been justified?	✓			
27. Has the value been referenced?	✓			

TABLE 6-7 AIR PATHWAY CHECKLIST				
Evaluation	**Yes**	**No**	**N/A**	**Comment Number**
28. Has a value for sensitive environments been correctly calculated from lines 10a and 10b [10a + 10b] and entered in line 10?	✓			
29. If line 10 has been assigned a value greater than zero, see Tables 23 and 24.	✓			
30. Has the value for line 10a been correctly chosen based on information presented in Table 23?	✓			
31. Has the value for line 10b been correctly chosen based on information presented in Table 24?	✓			
32. Do you agree with the scorers discussion for the evaluation of sensitive environments?	✓			
33. Has the evaluation of sensitive environments been referenced appropriately?	✓			
34. Do you know of any other source(s) of information which may make evaluation of sensitive environments more complete?		✓		
35. Has a value for targets been calculated correctly [lines 7 + 8 + 9 + 10] and entered in line 11?	✓			
36. Has the air migration pathway score been correctly calculated [(lines 3 x 6 x 11)/82,500] and entered in line 12?	✓			

TABLE 6-8 OVERALL SCORE CHECKLIST					
	Evaluation	Yes	No	N/A	Comment Number
1.	Has the final score calculations page (first page of HRS review score sheets) been completely filled out with values taken from the HRS review score sheets?	✓			
2.	Has the final score been calculated correctly from the four pathway scores?	✓			
3.	Do you feel there are any significant data gaps in the scoring package?	✓			8
4.	Do you feel there have been any misplaced assumptions in the scoring package?		✓		
5.	Is the reference package for the scoring package complete?	✓			
6.	Based on calculations presented in the HRS review score sheets, do you agree with the final score calculated for this site?	✓			

SECURITY CLASSIFICATION OF THIS PAGE

REPORT DOCUMENTATION PAGE

Form Approved OMB No 0704-0188

1a REPORT SECURITY CLASSIFICATION	1b RESTRICTIVE MARKINGS
2a SECURITY CLASSIFICATION AUTHORITY	3 DISTRIBUTION / AVAILABILITY OF REPORT
2b DECLASSIFICATION / DOWNGRADING SCHEDULE	
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8a NAME OF FUNDING / SPONSORING ORGANIZATION; 8b OFFICE SYMBOL *(If applicable)*	9 PROCUREMENT INSTRUMENT IDENTIFICATION NUMBER
8c ADDRESS *(City, State, and ZIP Code)*	10 SOURCE OF FUNDING NUMBERS: PROGRAM ELEMENT NO; PROJECT NO; TASK NO; WORK UNIT ACCESSION NO

11 TITLE *(Include Security Classification)*

12 PERSONAL AUTHOR(S)

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17 COSATI CODES			18 SUBJECT TERMS *(Continue on reverse if necessary and identify by block number)*
FIELD	GROUP	SUB-GROUP	

19 ABSTRACT *(Continue on reverse if necessary and identify by block number)*

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22a NAME OF RESPONSIBLE INDIVIDUAL	22b TELEPHONE *(Include Area Code)*; 22c OFFICE SYMBOL

CHARLESTON NAVAL BASE
HAZARDOUS RANKING SYSTEM
FINAL SCORING
BOOK I

COMPREHENSIVE LONGTERM
ENVIRONMENTAL ACTION NAVY
DISTRICT II
CONTRACT N62467-89-D-0318
CTO-044

JULY 15, 1992

SOUTHERN DIVISION, CODE 18
NAVAL FACILITIES
ENGINEERING COMMAND
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CHARLESTON, SC 29411-0068
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EXECUTIVE SUMMARY

The HRS score for the Charleston Naval Base is 50.06. Sites scoring above 28.5 are considered candidates for the National Priorities List (NPL). The score was calculated from the following pathway scores:

Groundwater Migration Pathway Score	3.33
Surface Water Migration Pathway Score	3.58
Soil Exposure Pathway Score	0.65
Air Migration Pathway Score	100.00
Overall Site Score	50.06

Although there is an observed release to the surficial aquifer, the Groundwater Migration Pathway score of 3.33 is low primarily because of the absence of groundwater targets. The entire base gets its water supply from surface water sources outside of the 15-mile downstream distance of the base. In addition, there were no drinking water wells identified within a 4-mile distance of the base which tap the surficial aquifer. The Cooper Marl acts as an excellent confining unit. It prevents potential contaminant spread from the surficial aquifer to the underlying Santee Limestone, which is used as a source of drinking water in the area. The Cooper Marl is documented to be continuous throughout the four mile distance from the base. This is shown in Reference 13 and in the geological sections of many of the references of the enclosed documentation package.

The Surface Water Pathway score of 3.58 is low primarily because there is not an observed release scored. In addition, there were no surface water intakes identified within 15 downstream miles of the base. The fact that seafood is caught in this area has the potential to drive the Human Food Chain Threat portion of this pathway. However, since there is no observed release scored to the surface water, this is relatively low. Similarly, the Environmental Threat is low because of the absence of an observed release. There are wetlands located on base and endangered species in the area which could have an impact on the score of this pathway.

The Soil Exposure Pathway score of 0.65 is low primarily because of the low population threat score in the area. Most of the SWMUs considered are not within 200 feet of any area where people may live, work, or go to school. The Closed Landfill, SWMU #9, takes up a large area of the base and many people work within 200 feet of it. However, contamination is documented to be deeper than 2 feet. No one is considered to be exposed through the soil at SWMU #9.

The Air Migration Pathway score of 100.0 is driven primarily by the documented release of lead dust in the air from the area of SWMU 1 and SWMU 2. The HRS will consider the entire base population of 22,731 as exposed to this fugitive dust. Many of the SWMUs considered have shown high levels of surface soil contamination. Because many of these SWMUs are not heavily vegetated, the HRS considers these SWMUs as likely to release their contaminants to the air.

The data used to calculate the Air Migration Pathway Score is six years old and may be unrepresentative of current conditions. Additional ambient air analysis from the same site and locations will be performed. The data will be forwarded within six to eight weeks for incorporation into the HRS II package.

1.0 INTRODUCTION

The Hazard Ranking System (HRS) score for the Charleston Naval Base, Charleston, South Carolina is 50.06. The score was calculated as shown in the attached package using the December 14, 1990, Final Rule Hazard Ranking System with the USEPA PREscore software package. Sites scoring 28.5 or above are considered candidates for the National Priorities List (NPL).

The HRS score is based on data gathering efforts of EnSafe/Allen & Hoshall personnel including previous studies conducted under the direction of the Department of the Navy. The bulk of the documents referenced include a RCRA Facility Investigation Work Plan by Kemron Environmental Services, an Initial Assessment Study written by Environmental Science and Engineering, Inc. (ESE), a Contamination and Exposure Assessment written by ESE, and a Confirmation Study written by Geraghty & Miller. These documents and all other pertinent sources of information have been referenced and can be found in the accompanying documentation package. It should be noted that neither a Preliminary Assessment (PA) nor a Site Inspection (SI) had been completed prior to the HRS scoring of the Charleston Naval Base.

In response to increasing national concern regarding past hazardous waste disposal methods, EPA developed a comprehensive national program to manage sites such as the Charleston Naval Base. This program is outlined in the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of December 1980.

In response to CERCLA, the Navy established the IR program to identify and abate or control contaminant migration resulting from past operations at Naval installations. Federal facilities are required to comply with this program. SOUTHDIV is the agency responsible for the Navy IR program in the southeastern United States. SOUTHDIV is responsible for processing its activities through the Preliminary Assessment (PA), Site Inspection (SI), priority listing, and remedial response. The newly promulgated HRS has been substantially revised and is designed to prioritize sites after the SI phase of the CERCLA process. Either the SI or the Expanded Site Inspection (ESI) may be used to present required validated data to perform an HRS scoring. SOUTHDIV is responsible for developing the data for use in the HRS.

The PREscore software package has been developed by the USEPA to assist SI stage HRS scoring by generating a Preliminary Ranking Evaluation score and associated documentation. The PREscore software package is comprised of the PREscore and PREprint computer programs and user's manual.

The PREscore program (PREscore) provides an accurate, efficient, and convenient means of scoring sites using the HRS. PREscore performs HRS calculations from raw data, calculates values from hazardous substance information, and calculates site scores. The PREprint computer program generates HRS scoresheets and the HRS documentation record. The PREscore software package assists investigators by reducing time in developing site scores and minimizing potential math errors in scoring. The PREscore program does not check for logic and is not intended as a training tool or to take the place of HRS training.

EnSafe/Allen & Hoshall has detected a possible error in the PREscore program involving the Air Migration Pathway. The program assigns a Source Type Factor Value of zero for SWMU 1, the DRMO staging area. According to Table 6-4 of Reference 7 this value should be 22. It should be noted that this error in no way affects the score of the Charleston Naval Base since there is an observed release for the air pathway. Other errors previously noted in the PREscore program are not applicable to the Charleston HRS scoring.

2.0 SCORING NARRATIVE

2.1 Site Summary

In 1901 the U.S. Navy acquired 2,250 acres of property on what is now the Charleston Naval Base and established the U.S. Naval Yard to supply and repair vessels. The yard grew, particularly during World War II, when the base saw the greatest period of military ship construction in its history. Today, as the Charleston Naval Base, it still serves an important role in providing port services, construction, conversion, and overhaul of vessels.

The Charleston Naval Base is located on various properties in Charleston and Berkeley counties on South Carolina's central coast. The base is divided into two major areas: Naval Weapons Station and Naval Base South. Naval Base South, the subject of this study, will be referred to in this report as the Charleston Naval Base.

The 3,300-acre Charleston Naval Base is located on the south bank of the Cooper River approximately five miles north of downtown Charleston. The installation consists of an undeveloped and a developed area. The undeveloped area on the east bank of the Cooper River, which consists of Daniel Island in Berkeley County, is currently used for the disposal of dredge spoil. The developed area on the west bank of the Cooper River lies on a peninsula, bounded to the west by the Ashley River and to the east by the Cooper River.

2.2 Source Summary

Please refer to Figure 1-1 and Figure 1-2 which show the location of the Charleston Naval Base and each Solid Waste Management Unit (SWMU) located on base. The 36 SWMUs identified to date and summarized in this section are condensed from descriptions in Reference 1 of the enclosed documentation package. Of these, six are considered in the HRS scoring.

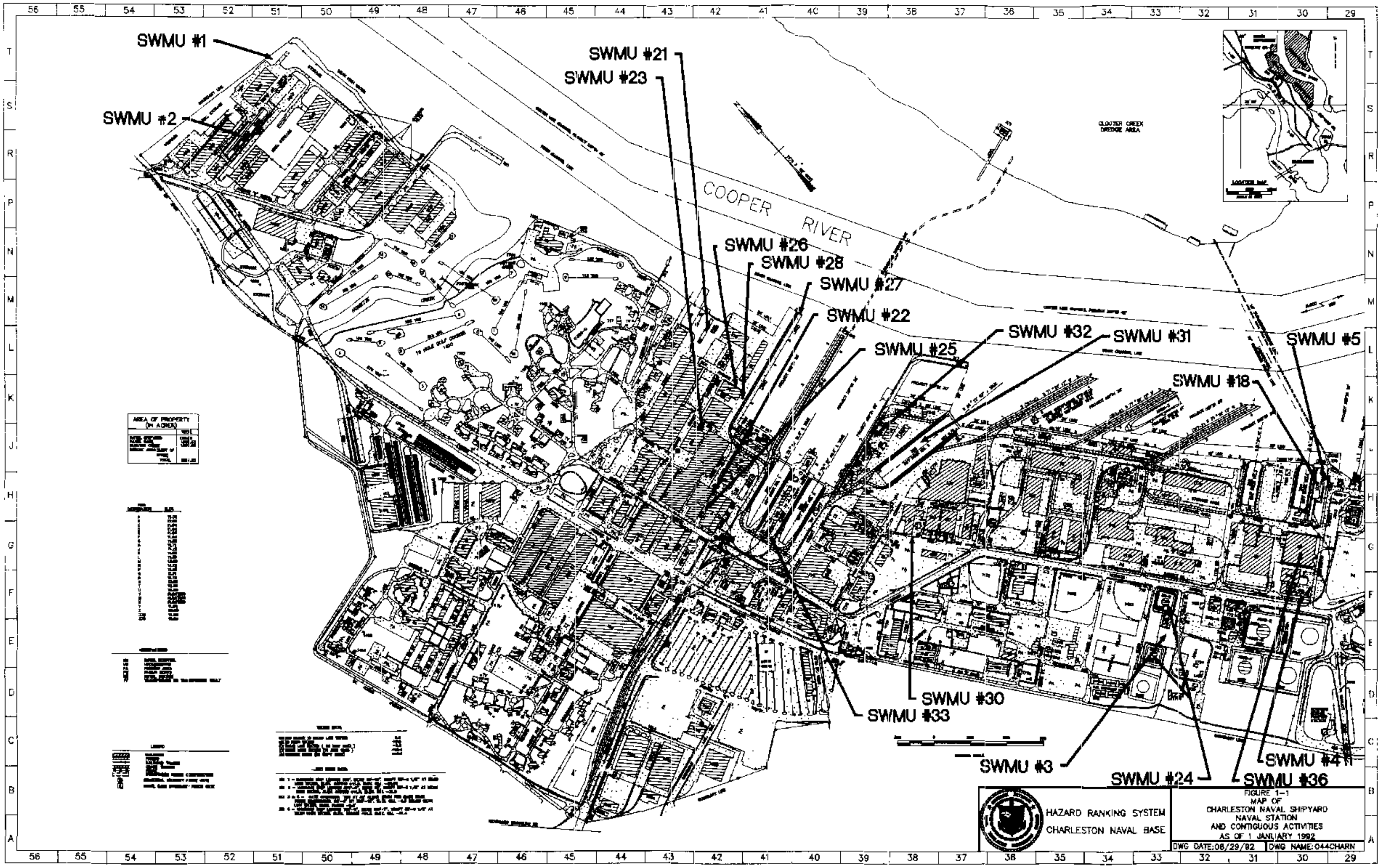
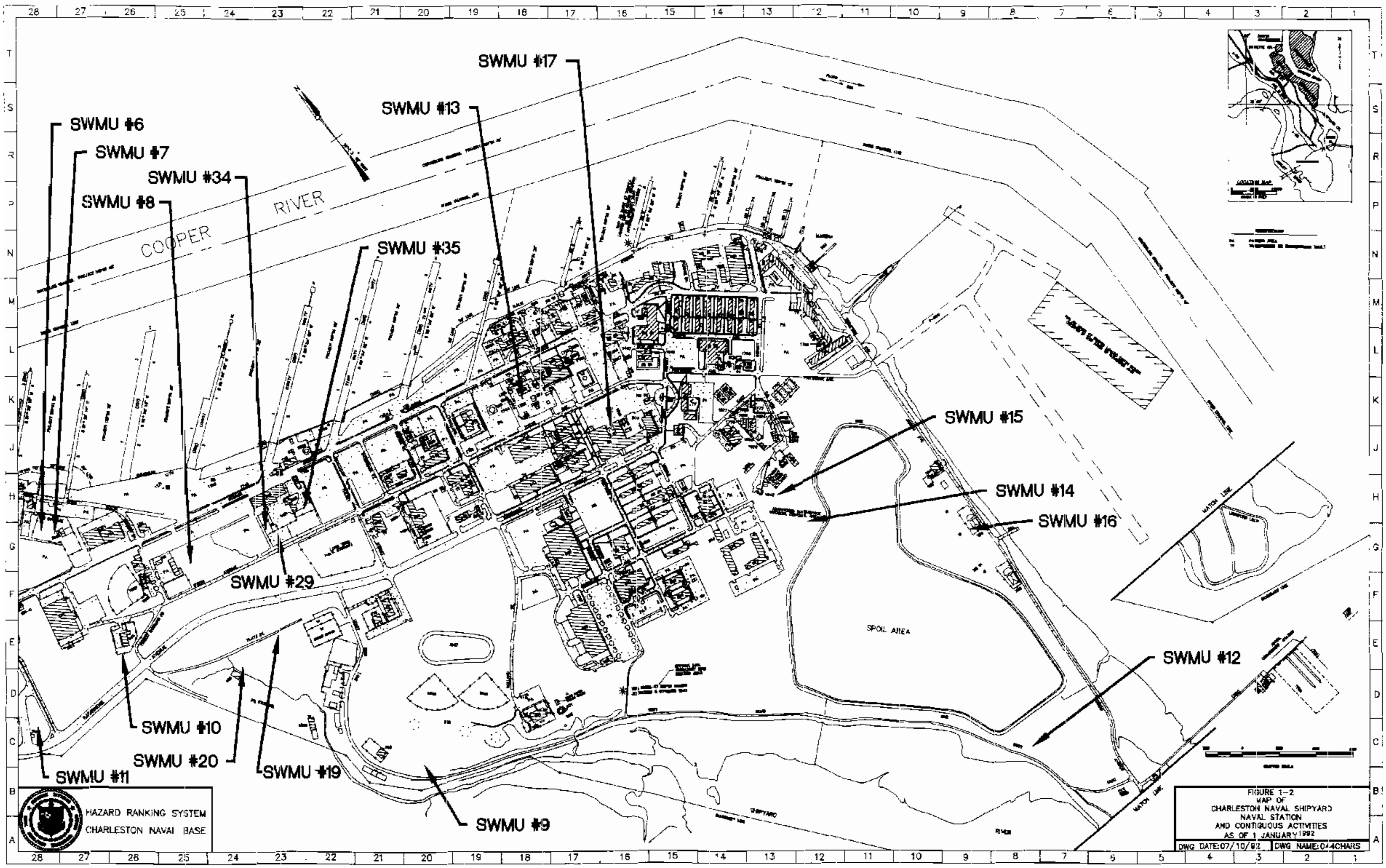


FIGURE 1-1
MAP OF
CHARLESTON NAVAL SHIPYARD
NAVAL STATION
AND CONTIGUOUS ACTIVITIES
AS OF 1 JANUARY 1992


SWMU #6
SWMU #7
SWMU #8
SWMU #34
SWMU #35
SWMU #13
SWMU #17
SWMU #15
SWMU #14
SWMU #16
SWMU #12
SWMU #29
SWMU #10
SWMU #20
SWMU #19
SWMU #11
SWMU #9
COOPER RIVER
SPOIL AREA
MATCH LINE
HAZARD RANKING SYSTEM
CHARLESTON NAVAL BASE
FIGURE 1-2
MAP OF
CHARLESTON NAVAL SHIPYARD
NAVAL STATION
AND CONTIGUOUS ACTIVITIES
AS OF 1 JANUARY 1992
DWG DATE:07/10/92
DWG NAME:044CHARS

2.2.1 DRMO Staging Area

This area (SWMU #1) has been used since 1974 by the Defense Reutilization and Marketing Office (DRMO) to store property. Property which is no longer needed has been turned in to DRMO by various branches of the Armed Forces within the region of the Naval Base. The stored property handled by DRMO includes some products that have consequently become classified as wastes. Hazardous wastes were stored until recently in a covered storage shed formerly known as Building #1617. Part of the floor consisted of an asphalt pad; the remainder of the floor was unpaved. Hazardous wastes were stored in containers and segregated according to waste type.

No spills at the site have been documented. Two sample events were conducted to delineate contamination at the DRMO Storage Shed. A total of 53 surface samples (0 to 6 inches) and 159 subsurface samples (1, 2, and 3 feet) were collected and analyzed.

The site has been extensively studied in connection with its closure. Because the only significant contamination of SWMU #1 is the lead which migrated from SWMU #2, it would be appropriate to address SWMU #1 as part of SWMU #2.

2.2.2 Lead Contamination Area

The lead contamination area (SWMU #2) consists of a salvage bin and adjacent paved ground surface. The area was used to store recovered lead from lead-acid submarine batteries from the mid-1960's until 1984. Electrodes and associated internal metallic components were removed from the battery jars in the battery electrolyte treatment area. Recovered materials were then placed on a railcar and transferred to the DRMO area for storage and eventual sale to a salvage contractor. Lead dust from the recovered materials was released to the salvage bin by handling.

Vehicular traffic in the DRMO yard area and natural processes such as wind and stormwater flow caused spreading of the lead contamination. Extensive studies of soil have delineated the extent of lead contamination at the site. A soil sampling investigation was conducted during the Contamination and Exposure Assessment. Seventy-one soil samples were collected; 35 samples consisted of surficial soils (surface to 0.5 feet depth) and the remaining 36 samples were collected at various depth intervals from 10 individual soil borings (total depths of 7.5 to 10 feet below surface).

Lead concentrations in surficial soils vary widely, from less than 1.3 to 371,000 mg/kg. Current activity in the materials storage shed has spread a 1,000 mg/kg isopleth of lead contaminated soil an estimated six acres. Additionally, stormwater runoff of contaminated soil has spread the lead contamination along a surface drainage located immediately south of the bin area.

Soil borings were made in order to characterize the vertical extent of lead contamination in the soils. The results of lead analysis of the soil boring samples show that contamination is principally confined to the surface soils (surface to 0.5 feet). While there are very high lead levels in the surficial soils, the lead apparently is not migrating vertically through the soil column. Due to its ionic nature, lead is strongly adsorbed to soils.

Outdoor ambient air sampling was conducted during the contamination and exposure assessment for lead contamination within DRMO. The lead concentrations are expressed in units of micrograms of lead per cubic meter of air (μg/m). One outdoor Hi-Vol sample (HVD2-1) did exhibit a lead level (2 μg/m), above the National Ambient Air Quality Standard (1.5 μg/m). The data used to calculate the Air Migration Pathway Score is six years old and may be unrepresentative of current conditions. Additional ambient air analysis from the same site and locations will be performed. The data will be forwarded within six to eight weeks for incorporation into the HRS II package.

2.2.3 Pesticide Mixing Area

The pesticide mixing area (SWMU #3) is approximately 50 feet by 25 feet in area. Prior to 1971, pesticides were mixed inside a small shed. However, equipment used for spraying and mixing of pesticides was rinsed on the grounds outside. Rinseate was allowed to drain into the soils. During the Confirmation Study conducted at NSY, groundwater analyses were performed at the Pesticide Mixing Area. The samples were analyzed for pesticides, herbicides, PCBs, and arsenic. Results show that the concentrations of all of the above parameters were below method detection limits.

A soil sampling program was conducted at the pesticide mixing area in February, 1982. A total of eight samples were collected at four locations and analyzed for arsenic, herbicides, pesticides, and PCBs. The area is contaminated with low concentrations of various pesticides and associated degradation products. Concentrations of arsenic in the soil ranged from 1.1 μg/gm (micrograms per gram) in PA-4 to a high of 6.3 μg/gm in PA-1.

Six pesticides, including DDT, were detected in the soil samples. Two of the six pesticides found, DDD and DDE, are formed during the biodegradation of DDT. This is significant since DDT has not been in general use for about 15 years. They may have been present in the soil for a long period of time. Three other pesticides were found in samples PA-3 and PA-7, including heptachlor, beta BHC, and delta BHC. The eight soil samples were also analyzed for seven PCB compounds, and six of the samples were found to contain one of these compounds, Aroclor 1260.

In May 1982, personnel from the Navy collected two samples of the uppermost soil within the pesticide mixing area. The results indicate that the greatest concentration of DDT in the soil is near the surface. These data, along with the previous data collected at the pesticide mixing area, show that the concentration of DDT in the soil is highest at land surface and decreases rapidly with depth.

2.2.4 Pesticide Storage Building

The pesticide storage building (SWMU #4) has been used to store various insecticides and rodenticides since 1980. It is a steel building with a concrete floor. The building is equipped with a formulation and mixing room. Sink and floor drains within the building are connected to the sanitary sewer system or to blind sumps (sumps with no outlets). An equipment rinse area/wash rack is located adjacent to the storage administration facility. No evidence of contamination was found or reported at this site. The building and concrete floor have since been removed and the area is now a paved parking lot.

2.2.5 Battery Electrolyte Treatment Area

The battery electrolyte treatment unit (SWMU #5) was part of the battery salvaging, restoring, and recharging operation. It was the unit used for neutralization of submarine battery acid. Current used battery management practices at NSY are limited to shipment of intact batteries offsite for salvage.

A subsurface investigation and tank decontamination was performed in October of 1987. Twelve sample stations were hand augured around the perimeter to a depth corresponding to that of the floor of the treatment unit (5.5 feet below ground surface). Three vertically successive, 6-inch soil samples collected from the base of each auger hole were found to contain elevated levels of lead.

2.2.6 Public Works Storage Yard

The Public Works storage yard (SWMU #6), or "old corral area," is a fenced, open area where routinely generated, containerized wastes were stored prior to shipment offsite. Among the wastes stored at the site were cleaning solvents, waste oil, and paint waste. The storage yard ceased operation as a hazardous waste storage area when construction of the new temporary hazardous waste storage and transfer facility was completed.

A partial closure of this unit was completed in 1986 when a renovation and expansion of the cold storage warehouse (Building #193) was extended into the eastern boundary of the public works storage yard. A soil sampling program was completed in March 1987 as part of the requirements for the closure of this unit. Results of the analyses indicate that soils in the Public Works Storage Yard are contaminated with metals including barium, cadmium, chromium and lead.

A supplemental sampling phase was added to further define the vertical extent of contamination. Samples were collected at 1-, 2- and 3-foot intervals at the 51 stations exhibiting any contamination in the prior surface sampling investigation. The supplemental samples were analyzed for each metal exceeding the threshold limit in surface samples. At 9 of the 51 stations, at least one constituent exceeded the threshold value.

In summary, based upon the considerable amount of soil analytical data available from previous sampling events, three limited areas of elevated lead levels were identified. The data suggest that contamination is primarily within the upper three feet of soils.

This unit was undergoing closure under interim status until the RCRA permit was issued on 4 June 1990. Currently, the Public Works Storage Yard has been investigated under a risk assessment. Approval of the risk assessment by the USEPA and South Carolina DHEC will determine if the soils can be clean closed. However, groundwater has not been characterized for this site.

2.2.7 PCB Transformer Storage Area

The PCB Transformer Storage Area (SWMU #7) consists of Building 3902 located within the Public Works Storage Yard, the adjacent concrete slab located outside the building, and surrounding areas that were used for storage of transformers and associated electrical equipment. Transformers no longer in service were brought to the concrete pad on the south side of the building prior to transportation off base between 1970 and 1976. Transformers were either sold intact or drained near the concrete pad prior to sale. The area around this concrete pad shows evidence of previous oil spills. The total amount of PCBs released to the soil and the concentrations in particular areas have not been adequately characterized. Transformers have been stored in a new hazardous waste storage and transfer facility since 1986. The site is abandoned with no material storage or activity in the area. The building is locked and a perimeter fence restricts access into the area.

The site was sampled in 1981 and 1982 to determine the presence of contaminants in soil and groundwater. As part of the Confirmation Study two groundwater monitoring wells (WOC-1 and WOC-2) were installed during 1982. Water samples were analyzed for arsenic, pesticides, and PCBs. Water from well WOC-1 contained 19 μg/l of arsenic, 0.2 μg/l of DDT, and 0.2 μg/l of PCB (Aroclor 1260). Water from well WOC-2 contained 13 μg/l of arsenic, 0.1 μg/l of DDT, 1 μg/l each of alpha, beta, and gamma benzene hexachloride (BHC) and 0.6 μg/l of PCB (Aroclor 1260).

During the Confirmation Study, a soil sampling program was also conducted. The sampling program was carried out in two phases. The first phase, conducted in July of 1981, consisted of collecting composite samples along lines running parallel to the sides of Building 3902 and the attached concrete slab. Four composite samples, A through D, were collected at a depth of six inches, one from each side of the building.

The second sampling phase was conducted in February 1982 to better define the horizontal distribution of PCBs in the soil. Composite soil samples, OC-1 through OC-12, were collected on sampling lines paralleling each side of the building and attached slab at distances of 10 ft, 25 feet, and 40 away from the building and slab. As in Phase I, these samples were collected every 3 feet at a depth of six inches. A total of 12 composite soil samples were collected in the electrical transformer storage area during Phase II.

The arsenic concentrations in the composite soil samples were as high as 15.5 μg/gm in sample OC-3. Ten of the other 12 composite samples were found to contain Aroclor 1260, a PCB compound. Sample OC-2 contained the greatest concentration of Aroclor 1260, 62.0 μg/gm. Residual concentrations of DDT and its daughter compounds were also found in the soil at the site. Sample OC-11 had a DDT concentration of 40 μg/gm. PCBs and DDT were found at levels that pose a threat to human health or the environment.

Because the samples were composited over large areas, delineation of the DDT and PCB contamination requires a more detailed sampling of the area prior to selection of an appropriate remedial action. The area east of the concrete pad was remediated during expansion of the cold storage warehouse in 1986.

2.2.8 Oil Sludge Pit

Oil sludges produced by industrial activities at NSY from 1944 to 1971 were disposed of in three unlined pits near the Warehouse Administrative Building. These pits are collectively known as SWMU #8. Heavy rains occasionally caused the pits to overflow, creating oil spills in low areas adjacent to the pits. Two of the pits had been covered with fill by 1956, potentially trapping oil within the subsoils. Free oil is known to have been pumped from the remaining pit in 1974. Clean fill was then brought in and compacted within the pit. Portions of the area have now been converted into a parking lot. A ditch dug at this site in 1982 intercepted free oil floating on the water table. The ditch was dammed immediately afterwards and later filled to prevent migration of oil into Shipyard Creek.

During the Confirmation Study, two soil boring investigations were conducted. During Phase I, shallow borings were installed in the reported vicinity of the abandoned oil-sludge pits. The field investigation was expanded during Phase II after oil was discovered in a section of a newly-dug ditch.

Within the area of the abandoned oil-sludge pits, a total of 87 shallow borings were drilled to determine the areal extent of oil in the ground. Six borings were also drilled along the Cooper River to determine if oil seeping from these pits had moved toward the river. Because oil floats on top of the water table, the borings were drilled to the top of the water table at an average depth of approximately four feet.

From the results of the boring program, it was determined that a long, narrow plume of free oil exists in the southwestern portion of the oil-sludge area. This area is approximately 50 ft wide by 600 ft long and trends in a northeast-southwest direction. Measurements taken in borings and in well OPW-2 indicate that the oil ranges in thickness from about two to four inches. East of the free floating oil plume is a small area containing oily residues. The remaining portions of the oil-sludge area were found to be free of oil. Morphology of this plume reflects the shape of the underlying abandoned pit. The low hydraulic gradient, the low permeability of the surrounding soils, and the high viscosity of the oil within the soils may have limited the potential for oil migration.

This SWMU has been covered with fill and a portion of the area is currently being used for a parking lot. However, oil is reportedly trapped in the subsoil and could potentially migrate towards the Cooper River or Shipyard Creek. Data provided characterizes only the free floating oil in the groundwater. The free floating oil plume, dissolved phase plume, and constituents of the oil from each pit have not been characterized, nor have the site hydrogeologic conditions been adequately defined. Potential migration of this plume to nearby surface waters could violate applicable water quality criteria.

2.2.9 Closed Landfill

From the 1930's until 1973, many solid wastes generated at NSY were disposed of onsite in a landfill (SWMU #9) located in the southwestern portion of the peninsula. Originally, the area was marshland. Items reportedly disposed of in the landfill include: asbestos, acids, PCBs, waste oils, waste solvents, waste paints, paint sludges, mercury, metal sludge, acid neutralization sludge, various inorganic and organic chemicals, sanitary wastes, office wastes and rubbish. The largest volume of wastes consisted of office wastes and rubbish. Liquid wastes were placed in drums before disposal and combustible wastes were burned daily. Residue from the burning was pushed into the marsh as fill along with concrete rubble, metal scrap, and other non-combustible materials. Waste materials were covered with soils when they were available. Soils from onsite building excavations, dredged soil, and bottom ash from the power plant were used as cover materials. Much of the site is currently paved and used as a parking lot.

NSY has installed 17 groundwater monitoring wells in and around the landfill to characterize the chemical quality of the groundwater in the vicinity. Some of the wells were initially sampled during July, 1981. The samples were analyzed for several physical and chemical parameters. Additional sampling for inorganic and organic pollutants was performed in February, 1982. Several trace metals and chlorinated organic compounds were found in the groundwater samples. These constituents likely reflect past disposal of metal plating sludges, waste chemicals, and industrial degreasing solvents disposed in the landfill.

A second geotechnical and environmental investigation for the proposed new Fire Fighting Training Facility was performed by Westinghouse Environmental and Geotechnical Services in April, 1991. Five test pits and four shallow groundwater monitor wells were constructed at the proposed new training facility site. Soil and groundwater samples were analyzed for volatile organic and semi-volatile organic compounds and RCRA metals.

The laboratory results of the soil samples indicated elevated levels of some metals and organics in all soil samples collected. Lead was found to be elevated in all five samples. Other metals found included chromium, arsenic, and barium. The highest concentrations were detected in test pits TP-2 and TP-2A. The other test pits were found to contain only lead, with the exception of test pit TP-8 where 49 mg/kg of chromium was detected. The organics detected were primarily heavy petroleum derivatives. Some constituents which are typically found in plastics were also identified. The plastics constituents identified are typical of landfilled wastes (plastic bags, rubber, etc.).

The laboratory results of the groundwater samples indicated that the groundwater has been impacted. As with the soil samples, most of the organic constituents detected were petroleum derivatives. Benzene is identified in monitoring wells CSY-FMW-2 (20 μg/l) and CSY-FMW-4 (6.9 μg/l), both above the drinking water standard of 5 μg/l. The other organic constituents were found at relatively low levels.

Monitoring well gauging results from 10 February 1982 suggest that a groundwater ridge exists along an east to west trending axis across the central portion of the site. Hence, groundwater flow appears to be northerly within the northern part of the closed landfill area and southerly over the southern portion of the site. A comparison of the landfill soil and groundwater analytical data with the EPA proposed action levels and MCLs shows that most of the constituents are below the proposed action levels. However, the previous investigation was of limited scope.

2.2.10 Hazardous Waste Storage Facility

The new hazardous waste container storage and transfer facility (SWMU #10) was completed in October 1986. The facility was constructed to serve the entire base and is managed by the shipyard. Current status of the unit is that of a permitted storage facility with permission to store wastes for a maximum of 90 days. The building contains seven storage bays. Each bay has separate spill containment berms to allow flexibility in segregating incompatible wastes.

The hazardous waste storage facility is designed to store hazardous materials/wastes until time of proper disposal. A 6-inch high concrete ramp is located at the entrance to each storage bay for spill containment. Storage bays are separated by interior partition walls. A catch basin for spill and storm drainage is located in the exterior load/unload area. Wastes stored in the facility are grouped into eight categories: (1) flammable liquids, (2) acids, (3) alkalis, (4) chlorinated hydrocarbons, (5) oxidizers, (6) reducers, (7) general wastes, and (8) PCBs. These general classifications are reflected on signs used to identify the contents of each storage bay. The unit is constructed of concrete with sloped floors bounded by curbs in order to isolate leaks or spills within each storage bay. There is no evidence of a release from this unit.

2.2.11 Caustic Pond

The caustic pond (SWMU #11), located near the junction of Bainbridge Avenue and Viaduct Road, was used for the disposal of calcium hydroxide $Ca(OH)_2$ from the early 1940's through the early 1970's.

Calcium hydroxide was generated as a byproduct during the reaction of water with calcium carbide to produce acetylene gas. Water saturated with $Ca(OH)_2$ was discharged to the pond during operations. Supernatant was discharged to Shipyard Creek. The quantity and areal extent of the original $Ca(OH)_2$ deposits are not precisely known. Soil borings conducted during the initial assessment studies found sludge depths of up to one foot. Water infiltrating into the surficial groundwater through $Ca(OH)_2$ should have a high pH. Samples collected from the monitoring wells around the site, however, show that groundwater is neutral in pH.

Four monitoring wells were installed in the area of the caustic pond during the Confirmation Study conducted at NSY. Water samples were collected from each of the four monitoring wells. The samples collected were analyzed for pH, calcium, chloride and sulfate content. The calcium and chloride contents and specific conductance are somewhat elevated. The relatively neutral pH values suggest that the normally high pH of the caustic water infiltrating from the pond has been lowered due to the naturally occurring acidic soils at the site.

Calcium hydroxide does not occur naturally and cannot persist for extended periods when released to the environment. It reacts with carbon dioxide which diffuses from the air or is carried by infiltrating rainwater to form calcium carbonate (limestone). The groundwater data indicate that this process has gone to completion and that no calcium hydroxide remains.

2.2.12 Old Fire Fighting Training Area

The old fire fighting training area (SWMU #12) consisted of a pit located at the southern end of NSY. The pit reportedly measured between 30 and 50 feet in diameter. It was used between 1966 and 1971 for training purposes. Oil, gasoline, and alcohol were poured into the pit, ignited, and subsequently extinguished during fire fighting training exercises.
The pit was cited by the U.S. Coast Guard in 1971 for an oil spill. The spill occurred following a heavy rainfall which caused the oil in the pit to overflow into Shipyard Creek. The pit was closed, filled with bottom ash, and leveled in 1972.

The approximate location of the pit was determined by NSY personnel. Three soil borings were drilled at the fire fighting pit: one in the center of the pit, and the other two along the road bordering Shipyard Creek. Soil boring sample results at the site showed no trace of petroleum contamination.

2.2.13 Current Fire Fighting Training Area

The training center (SWMU #13), in use since 1973, uses approximately 20,000 gallons of No. 2 diesel fuel and 2,000 gallons of gasoline per year in training operations. Training exercises include extinguishing ignited diesel fuel and gasoline. Fuel, floating on water in tanks or sprayed onto mock buildings, is ignited in a controlled area consisting of a paved ground with bermed perimeters.

Wastewater from the area is routed through a gravity oil-water separator prior to discharge into a sanitary sewer system leading to the North Charleston Consolidated Public Service Department (NCCPSD) sewage treatment plant. Recovered fuels are recycled. Effluent from the operation is well below discharge limits imposed by NCCPSD. There is no evidence of releases from this unit.

2.2.14 Chemical Disposal Area

The chemical disposal area (SWMU #14) is located at the southern end of the active portion of NSY in the vicinity of the skeet and pistol ranges. The precise locations of chemical burials are unknown. Unknown amounts of various chemicals containing tetrachloroethane, dichlorodimethyl-hydantoin, diethylene triamine, methyl cellosolve, and sodium hydroxide have reportedly been disposed of at the site. Other chemicals may have been buried either at the skeet range or behind the dike at the pistol range. Construction crews unearthed drums of chemicals at the skeet range in 1972 and 1974. Some workers suffered minor chemical burns in the excavation episodes.

During the Confirmation Study conducted at NSY, five groundwater monitoring wells were installed in the vicinity of the chemical disposal area. Water samples collected from these wells were analyzed for pH, cadmium, iron, lead, magnesium, mercury, sodium, fluoride, nitrate, sulfate, total organic carbon, specific conductance, chloride, base-neutral compounds and volatile organic compounds.

The water samples analyzed for volatile organic compounds indicated that chlorobenzene was present at 10.68 mg/l in well CD-5. During a second sampling episode, well CD-3 contained 1.5 μg/l of chloroform and methylene chloride was found in all five wells at levels up to 2.0 mg/l. Methylene chloride is frequently used as a degreasing agent, and the data suggest that waste materials containing methylene chloride may have also been deposited in the chemical disposal area.

Construction activities are proposed for the site. This area represents a potential safety hazard because the type, quantity, and exact location of the chemical disposal areas are unknown. Also, the potential for impacts via groundwater pathways has not been adequately characterized.

2.2.15 Incinerator

The incinerator (SWMU #15) is located adjacent to the pistol range and consists of a primary burning chamber and a 30-foot high stack. The unit is used only for burning of classified documents. Incineration activities occur approximately twice per week.
Residues from incineration operations are placed in waste disposal containers and disposed of along with other NSY solid waste. The unit is situated on a concrete pad. Since the incinerator burns only paper, no hazardous residues are generated. No releases have occurred at this unit.

2.2.16 Paint Storage Bunker

The paint storage bunker (SWMU #16) was used briefly, and without proper authorization, for paint container and miscellaneous material storage piles. It was located at an ammunition magazine adjacent to the Cooper River. The storage piles contained paint, paint thinner, oil containment booms, wooden crates, and buoys. The site was clean closed on the day it was brought to management attention during a DHEC site inspection.

2.2.17 Oil Spill Area

The oil spill area (SWMU #17) is located beneath Building FBM61. Building FBM61 was built in 1961 as a Submarine Training Center. Electrical transformers were installed to serve the center at that time. Several samples collected from the spill area were found to contain PCBs. The quantity and source of PCBs beneath the building remain uncertain. PCBs from the transformers were probably released many years ago before the area was paved. The entire area is capped either by the building or an adjacent paved parking lot. Consequently, there is no current potential for exposure. However, data gaps exist concerning the full extent of subsurface impacts resulting from the spill.

The spill occurred in June 1987 when an underground pipe supplying No. 2 diesel fuel to the boiler in Building FBM61 ruptured, spilling a small amount of its contents into the basement of the building and several thousand gallons into soils beneath the building. Some of the oil entered drainage sumps beneath the building and the storm drainage system, discharging into the Cooper River. The resulting slick was promptly contained. Remediation efforts subsequently removed all floating oils from the water table.

2.2.18 PCB Spill Area

A PCB spill (SWMU #18) reportedly occurred at Building 1278 on 12 June 1987 while a PCB-containing transformer destined for disposal was being loaded onto a truck. The loading accident resulted in discharge approximately 75 gallons of Pyranol from the unit onto unprotected ground. The contractor immediately placed a drip pan under the transformer to catch the flow of additional fluid. Three 55 gallon drums of fluid were drained from the transformer by response personnel. Steps were then taken to contain the spill area via installation of trenches and construction of a clay absorbent berm north of the spill to prevent migration of liquids into the storm drain. Twenty-two drums of oil saturated soils/absorbents and asphalt were excavated and hauled offsite for disposal. The spill area was covered with plastic sheeting.

Visibly contaminated soils were removed directly after the spill. Subsequent sampling of the area, however, showed additional excavation of soil was necessary. An additional 85,000 pounds of soil were removed from the spill site and disposed of in June 1987. Soils were resampled following this excavation and again revealed unacceptable levels of contamination. On 5 August 1987, additional soils were excavated and disposed of. Five confirmation samples were retrieved and analyzed for PCB's. These results indicated that additional excavation was required. The site has been completely remediated under the Toxic Substances Control Act. The area is currently used for storage of empty drums and used oil.

2.2.19 Solid Waste Transfer Station

The Solid Waste Transfer Station (SWMU #19) consists of a staging area for temporary storage of solid waste prior to transport and disposal off-site. The solid waste is compacted after collection and temporarily stored at the site in containers. No hazardous wastes have been stored at the site and the unit is only used for temporary storage of solid waste. No releases of hazardous constituents have occurred at this SWMU.

2.2.20 Waste Disposal Area

The Waste Disposal Area (SWMU #20) occupies an open area adjacent to the solid waste transfer station and has been in operation since 1985. Solid wastes consisting of cardboard boxes, wood, concrete blocks, tree stumps, sandblasting residues, and a small number of vehicle batteries were disposed of in this area. The few batteries disposed of at the site are the sole concern. This SWMU overlies the old sanitary landfill (SWMU #9). Groundwater monitoring in the surrounding area has found widespread but low level contamination which cannot be remediated without much greater expense than potential benefits might justify. No evidence of a release of hazardous constituents to air, water or soil was observed. No impacts to human health or the environment are anticipated.

2.2.21 Old Paint Storage Area

The old paint storage area (SWMU #21) is located inside the Controlled Industrial Area (CIA) near the waterfront adjacent to the Cooper River. The unit was used for temporary storage of containerized paint wastes from ships returning to NSY and from ship repair and overhaul operations at the base. The waste containers were temporarily stored on a 20 x 180 feet concrete pad to await offsite transport. Sandblasting operations also occurred in this area.

Paint wastes stored at this unit contained cadmium, chromium, lead, cyanide, toluene and tetrachloroethylene. Sandblasting residues containing organo-tin paints were also generated at this unit. These residues were allowed to accumulate on the ground surface. A release from a 55-gallon container was observed during a site inspection by DHEC and EPA in August of 1990.

Leaking material from a hole in the bottom of the container was identified as kerosene. The spilled material was cleaned up immediately. In 1988, the concrete pad was reportedly decontaminated using a rotary scraper and sand blasting techniques. The residual sand and paint chips were collected from the pad and surrounding soils and was containerized. Samples of the paint chips from the concrete pad and soil areas were analyzed using EP Toxicity characteristic leaching procedures for metals. Results of the sample analysis showed the paint chips were below the EP Toxic limits. Therefore, the material was characterized as non-hazardous and no further action was recommended.

It was certified that closure of the interim status unit was completed according to the conditions of the Closure Plan. A review of the closure activities by DHEC determined that the unit was not fully characterized and additional delineation would be required.

2.2.22 Old Plating Shop Waste Treatment System

The old plating shop waste treatment system is located within the CIA. The unit (SWMU #22) was constructed in 1972 to process wastewater from the metal plating shop and continued in operation until the new non-cyanide plating process and treatment system were built. The treatment facility included two in-ground concrete tanks, one for chromic acid reduction and one for cyanide oxidation. Additional treatment was conducted in a "clarifier" where soda ash was manually added and mixed with the wastewater to adjust the pH to approximately 8.5 and precipitate any chromium or other metals. After settling for 48 hours, the clarified wastewater effluent was discharged to the sanitary sewer. Sludge in the bottom of the clarifier was removed and disposed of at the base sanitary landfill until 1973. After 1973, sludge was transported off base for disposal.

The site has not been in operation since 1982 when the new plating shop waste treatment system (SWMU #23) started. The waste treatment system has been decontaminated. However, questions remain regarding subsurface contamination. Final rinseate samples were collected from the decontaminated plating waste treatment unit and analyzed for cyanide, cadmium, and chromium. The results of the rinseate samples indicated that all but one sample exceeded threshold values. Most of the samples also exceed the EPA's maximum contaminant levels (MCLs) in the tables of proposed action levels.

Sixteen soil samples were collected around the perimeter of the treatment tank from directly below the surface of the concrete. The soil samples were analyzed for pH, cadmium, and chromium. Forty-three of the 48 samples exceeded the threshold values. None of the sample results exceeded the action levels for cadmium or chromium.

Two additional subsurface soil sample investigations delineated the vertical extent of contamination around the plating waste treatment tank. Soil samples were collected from 1 foot to 6 feet below ground surface and analyzed for cadmium, chromium, and total cyanides. The highest concentrations of metals were detected in sample PW 13-2 (2 foot interval). The highest concentration for the constituents are as follows: cadmium, 47.7 ppm; chromium, 143 ppm; and cyanide, 6.28 ppm.

The sample investigation performed at this SWMU indicates contamination has affected the near surface soils and is still present in the concrete of the treatment unit. However, no information is available on groundwater or subsurface soils beyond the perimeter of this SWMU. In addition, the potential for contamination affecting this area originating from the adjacent Old Plating Operation (SWMU #25) has not been investigated.

2.2.23 New Plating Shop WWTS

The new plating shop WWTS unit (SWMU #23) is located inside the CIA. The system is currently used to treat wastewaters containing lead, chromium, cadmium, and acids or alkalis from metal plating operations. Treated effluent is discharged to a holding tank and tested prior to final discharge into the sanitary sewer system. Underflow from the clarifier is directed to a centrifuge for sludge thickening and then to a plate and frame filter press for dewatering. The sludge is hauled off base for disposal. No evidence of a release from this operation has been found.

2.2.24 Waste Oil Reclamation Facility

The waste oil reclamation facility (SWMU #24) is located in the central portion of the shipyard and has been in operation since 1980. This unit consists of two storage/separation tanks. Waste oils unloaded from ships or from base operations are pumped into this facility via underground pipelines. Gravity oil-water separation occurs inside the tanks which are operated in alternation. The water phase is drawn off and discharged to the sanitary sewer system. The oil is reused at the base. No evidence of a release from the site has been found.

2.2.25 Building 44, Old Plating Operation

The old plating operation (SWMU #25) occupies the northern portion of Building 44. Phased out of operation in 1983, the unit was replaced by a new (non-cyanide process) plating operation (SWMU #23). The interior of this unit still contains all operation equipment from the plating process (tanks, vats, ventilation hoods, mechanical and ancillary equipment). Before the plating operation was deactivated, all vats and tanks were emptied and the waste removed. Areas of concern for this SWMU are deteriorated concrete flooring, product accumulation around tanks, the floor drainage system, interior surface contamination, subsurface soils, and groundwater.

An environmental study of the abandoned Building 44 Electroplating Facility was performed to study the necessary actions prior to demolition. Samples were collected primarily from the process tanks so that interim corrective measures to remove the tanks could begin. Several samples were also collected from an overhead structure, wall, floor and floor drain.

Sample results for each area contained high levels of metals contamination. Total metals analysis ranges are:

Silver	<1.0 to 145 ppm
Cadmium	2.02 to 84340 ppm
Chromium	18 to 11940 ppm
Nickel	0.63 to 2.7 ppm
Mercury	6.7 to 446000 ppm
Lead	<0.08 to 6920 ppm
Cyanide	83 to 129100 ppm

TCLP analysis performed on samples also exceeded the regulatory limits for barium, cadmium, and chromium. Although this extensive sampling program has identified contamination in the building interior, contamination of subsoils and groundwater beneath the area of operation has not yet been documented. Visual observations of the floor and drainage system indicate a high potential for subsurface contamination.

Subsurface contamination around the waste treatment tank, SWMU #22, revealed high levels of chromium and cadmium contamination. Although the treatment tank is the most obvious source, contributing factors may include spillage and leaks from Building 44, underground ancillary piping, or leakage and migration from the floor drain system.

An investigation and building decontamination is proposed for this SWMU. A phased approach delineating potential contamination on the building's concrete floor, subsurface soils, and groundwater will be required to determine the effort required for remediation.

2.2.26 Waste Storage Area, Building 64-40, Pier C

This area (SWMU #26) is approximately 100 square feet of asphalt pavement located on the east side of Building 74 in a heavily industrialized area near Pier C. Six 55-gallon drums of waste (seam filler, lead waste, adhesive waste, alcohol rags, and trichloroethane rags) were temporarily stored here without proper authorization. The area was clean closed on the day it was brought to management's attention, during the DHEC and EPA site inspection. No releases occurred at this unit.

2.2.27 Waste Storage Area, East End, Pier C

This paint storage area (SWMU #27) is a satellite accumulation area located at the east end of Pier C. The unit comprises approximately 200 square feet of the concrete pier. A storage shed and lockers are used to store virgin paints, enamel thinners and fire retardants used for ship repair. Waste containers from the operation are accumulated beneath a canvas tent. The floor is canvas covered plywood surrounded by a berm. Bermed areas at this unit include 55 and 30-gallon drum containers and a storm drain.

During the DHEC and EPA site inspection, containers of hazardous wastes were either not labeled or had no accumulation dates. Also, there were no inspection records for the unit. Because of the large number of shops and numerous employees in the shipyard, implementation of established hazardous waste procedures for handling waste material have been difficult to implement fully.

There is no evidence of a release in this area. Although there are paint stains on the surface, none is in proximity to the storm drain. Additional measures to be taken to mitigate a release include expanding bermed areas, sealing off the storm drain, and adding drip pans.

2.2.28 Waste Paint Storage Area, West End, Pier C

This unit (SWMU #28) was used as a one time waste accumulation area. The unit is approximately 100 square feet in area and is surrounded by asphalt. Adjacent to the area is an empty flammable liquids storage shed. A storm sewer drain is located 30 feet downgradient of this unit. Paint spills from this accumulation area were confined to the small 100 square foot area.

The inspection by DHEC and EPA revealed drums and bags of paint waste, waste thinners, and waste naphtha/alcohol. Standard protocol for labelling, maintenance, and control measures were not being followed in handling the hazardous waste. The unit was clean closed the day of the inspection. No evidence of a release was observed.

2.2.29 Building X-10

This unit (SWMU #29) is located south of Building X-10, near Building 1431. Used as a waste accumulation area, this unit received waste from submarine maintenance and repair. This area is primarily a large asphalt covered area with some soil and grassy areas to the southwest and northeast. The area was clean and no evidence of surface staining was observed.

The inspection performed by DHEC and EPA revealed eleven 55-gallon containers (waste paint, waste monoethanolamine, and waste solvents), twenty-six 5-gallon containers of waste monoethanolamine and numerous 5-gallon and smaller containers of paint waste. Also stored in this unit were 20 pallets of waste stock labelled corrosive along with other pallets of waste chemicals. Many of the containers failed to have the proper hazardous waste label, date of accumulation, or inspection records. Storage of incompatible waste and evidence of spills were also observed during the inspection. Currently, this site is used to store non-hazardous material only. Asphalt and soil from previous spills have been removed and properly disposed of.

Historical information gathered from the past utilization of this area and the visual observations noted during the DHEC and EPA site inspection warrants a preliminary subsurface investigation.

2.2.30 Satellite Accumulation Area, Building 13

The Satellite Accumulation Area (SWMU #30) is used to receive waste generated from the laboratory in Building 13. Located between Buildings 13 and 187, the unit and surrounding area is asphalt with a storm sewer drain 20 feet downgradient.

This accumulation area contains a steel box for storage and containment of pails (5 gallons and smaller), trash bags, and a portable 300-gallon steel waste oil tank. Two 55-gallon drums of oil sludge labelled hazardous waste were also present at the time of the DHEC and EPA site inspection. Spillage was observed around the drums. Comments from the DHEC and EPA site inspection state that containers either did not have accumulation dates, proper labelling, inspection records, or spill control equipment to minimize release of hazardous waste to the environment.

Since this area will continue to be used as a satellite accumulation area, additional construction, operation, and maintenance measures are planned for this unit. Spill control measures and equipment such as a concrete bermed area with roof, drip pans, signs, inspection records, and waste pickup schedule are planned. Beyond implementation of operational and maintenance procedures, no further action is planned for this unit.

2.2.31 Waste Paint Storage Area, Dry Dock No. 5

This unit (SWMU #31) is a satellite accumulation area located in Dry Dock No. 5. The area, 200 square feet in size, performs the same functions as SWMU #26. Located on the concrete floor of the drydock near the center of the north wall, the unit is used intermittently to service submarines in drydock. A tent is erected over canvas covered plywood with sand bag berms.

Paints are thinned and placed in one gallon buckets with plastic liners for transport to the submarine. A trench drain directly behind the unit is part of the intake system to drain the drydock once the ship has entered.

Comments made during the inspection by DHEC and EPA noted two 55-gallon drums of waste paint, solvent rags. Thinners stored onsite did not have proper labelling, date of accumulation, inspection records, or spill control equipment. Numerous spills were also noted in the unit. The storage shed was noted as having a bad solvent odor. No releases have been reported from this unit. Since wastes were stored in covered drums on concrete, the probability of a release to soil, groundwater, or air is limited.

Hazardous constituents have the potential to migrate to surface waters during filling of the drydock with water. According to the written SOP, these wastes are to be removed from the drydock prior to filling with water. The written SOP requires that the drydock will be maintained in such a manner to limit the potential for release to surface waters. The potential for migration of the paints and thinners is limited since the paints harden and the thinners volatilize before the drydock is filled anyway.

This unit requires additional operational and maintenance measures to be implemented for prevention of spills and handling emergencies. Although this site is defined as a SWMU, no further action is planned for this unit.

2.2.32 Waste Paint Storage Area, Building 195

This waste paint storage area (SWMU #32) was used as a one time waste accumulation area located along Pier F between Buildings 195 and 1802. The unit encompassed approximately 400 square feet and is estimated to be 40 feet from the edge of the water. The surface is concrete with asphalt to the south.

At the time of the DHEC and EPA inspection, this area contained five 55-gallon drums of paint waste, lead and thinner waste, numerous 5-gallon containers of paint waste, and trash bags with paint and solvent rags. A shipping container, adjacent to the site, was used to store paint containers. None of the containers had proper labelling, markings, date of accumulation, secure lids, or were maintained to minimize fire, explosion, or a sudden release of hazardous waste to the environment. In addition, a corroded area in the shipping container allowed liquids to leak from the shipping container into a storm drain.

An inspection of this unit by SOUTHDIV revealed the waste and shipping container had been removed from the area. A subsequent investigation confirmed SOUTHDIV's inspection that this area was no longer used for storage. This unit was a one-time accumulation area. The containers stored here were removed from the area immediately after the investigation. Leakage from the container was a one-time event. Any subsurface investigation of this area would not provide significant information due to the conditions of the site and nature of the release. No further action is planned for this unit.

2.2.33 Waste Paint Storage Area, West End, Dry Dock No. 2

The waste paint storage area (SWMU #33) was used as a one time waste accumulation area located at the western end of Dry Dock No. 2. This unit covers approximately 200 square feet of concrete pavement and is situated 40 feet from the edge of the dry dock. This heavily industrialized area is primarily asphalt with railroad tracks, overhead cranes, heavy equipment, and elevated offices surrounding the dry dock and SWMU area.

The inspection performed by DHEC and EPA revealed two 55-gallon drums of waste paint and waste thinner, numerous 5-gallon containers of paint waste, and trash bags containing solvent rags and paint waste. Spillage was observed in the area. Operation and maintenance procedures to minimize a release were not followed. Labelling, accumulation dates, and securing containers were not performed properly as well.

During the time subsequent investigations were performed, the waste material had been removed from the site. In fact, much of the asphalt and concrete had been excavated to overhaul the railroad tracks servicing the dry dock.

As stated earlier, increased zone inspections and enforcement of SOP will be essential for maintaining the proper handling of hazardous materials in the NSY. Because this is a one-time waste accumulation point, no further action is planned for this unit.

2.2.34 Morale, Welfare, and Recreation, Southwest of Building X-10

The Morale, Welfare, and Recreation area (SWMU #34) was utilized as a one time waste accumulation area. This fenced compound, southwest of Building X-10, is 70 feet by 50 feet in size and is primarily soil and grass.

During the DHEC and EPA site inspection, four 55-gallon containers of paint were stored in this area. Several of the drums were reported as leaking with spillage apparent on the ground near them. The containers lacked the proper labelling, date of accumulation, inspection logs, and operations and maintenance procedures to guard against fire, explosion, or releases to the environment. A diesel tank in this area was also observed to be leaking. Closure of the diesel tank was completed immediately after the inspection. Diesel fuel contaminated soils and asphalt were removed and properly disposed of.

No surface staining or evidence of a release were observed in this area during the latter investigation. Because the site is located on bare ground, a limited soil sampling investigation will be performed in concert with SWMU #29. SWMU #34 will be incorporated into SWMU

#29 to cover the area behind building X-10, since these are adjacent to one another. Run-off from the asphalt storage area behind building X-10 influences both areas.

2.2.35 Building X-12

The area on the east side of Building X-12 (SWMU #35) was used as a one time waste accumulation area. The unit measures approximately 100 square feet in size and is covered with gravel.

At the time of the DHEC and EPA site inspection, five 55-gallon containers and numerous smaller containers of waste paint were stored at this unit. None of the containers were properly labelled, had a date of accumulation, or inspection records. Numerous containers did not have secured lids and spill control equipment was not available.

All improperly stored containers were removed immediately after the site inspection. Each container was handled following the established SOP for hazardous waste transportation, storage, and disposal at the Naval Shipyard facility.

This unit was used as a one-time waste accumulation area and does not exhibit the characteristics of having had routine or systematic releases of hazardous waste to the environment.

2.2.36 Building 68, Battery Shop

The Battery Shop (SWMU 36) began in use in the early 1940's and is still in use today. It is contained inside of Building 68 which is approximately 48,000 square feet in size. During normal Battery Shop operations all spills are contained within the building, drained to a holding tank at the south end of the building, and pumped to a neutralization pot at Building 1278.

Virgin sulfuric acid and sodium bicarbonate are stored at this site in bulk quantities. Various other chemicals are stored in Building 68, but in smaller quantities. They include detergents, lacquers, adhesives, penetrating oil, kerosene, dry cleaning solvents, and hydraulic fluid.

The building's acid tank room is elevated about two feet above the soil. Drain lines run between the bottom of the floor and the surface of the soil to the edge of the building. From the edge of the building they run below ground to the holding tank.

On two occasions the floor drain to the holding tank reportedly separated from the floor allowing approximately 1025 gallons of sulfuric acid to discharge to the soil below the building. Following each spill a sodium carbonate solution was used in an attempt to neutralize the surface below the building.

2.3 SWMUS CONSIDERED IN THE HRS SCORING

The six solid waste management units (SWMUs) evaluated at the Charleston Naval Base were chosen because they are most relevant to the HRS in assessing risk to human health and the environment. All six SWMUs and all four pathways were evaluated to determine if the base would score above the critical threshold of 28.5.

The Surface Water Migration pathway was evaluated using the overland/flood migration component instead of the groundwater to surface water migration component (only the higher of these two components can be used in the scoring). This is because the overland/flood component yields a higher score of 3.58 as opposed to the groundwater to surface water which scores 3.57. Section 3.1, the HRS Scoresheets, documents this.

SWMUs considered for HRS scoring are listed below:

- 1 DRMO Staging Area
- 2 Lead Contamination Area
- 5 Battery Electrolyte Treatment Area
- 6 Public Works Storage Yard
- 7 PCB Transformer Storage Area
- 9 Closed Landfill

It should be noted that there may be other SWMUs on base that may influence the score more acutely than some of the above. When initially deciding which SWMUs to consider, crucial information that may drive a SWMU score is often not yet available. Since these six SWMUs were sufficient to drive the score above the 28.5 threshold, no others were considered. It is possible that other SWMUs on base may drive the score higher than the SWMUs evaluated above. EnSafe/Allen & Hoshall feels that it has considered the SWMUs that represent the most significant threats with the data currently available. Further studies may show other SWMUs to pose a greater threat to human health or the environment.

An integral part of source evaluation involves the levels of contamination found at each SWMU location. The HRS defines levels of contamination in terms of actual or potential contamination and whether the actual contamination is Level I or Level II. Level I contamination is defined as media-specific concentrations that meet the criteria for an observed release for the pathway and are at or above any media-specific benchmarks as defined by federal regulation. These benchmark values vary for each contaminant, the media in which the contaminant is found, and the actual or potential targets. If more than one benchmark applies to the contaminant, Level I is assigned if the concentration of the contaminant exceeds the lowest applicable benchmark. Level II contamination occurs when media-specific concentrations that meet the criteria for an observed release for the pathway are below any media-specific benchmarks or no benchmarks exist for the applicable contaminant or media. Potential contamination applies when concentrations do not exceed the media-specific detection limit for any contaminant or no sampling data is available. The one exception to this is the soil pathway, which incorporates Level I or Level II contamination but not potential contamination. A more detailed explanation of contaminant levels can be found in Section 2.5 of Reference 7 of the documentation package.

2.3.1 SWMU #1

SWMU 1, the DRMO Staging Area, has been used by the Defense Reutilization and Marketing Office to store property since 1974. SWMU 1 is located at the northeastern corner of the base near the Cooper River. Contamination in the surface soil is documented in an area estimated to be at least 2800 square feet. Stored in this area were some products which could not be utilized by other commands and had become classified as wastes. Until recently hazardous wastes were stored in a covered storage shed formerly known as Building 1617. Part of the floor of Building 1617 consisted of an asphalt pad and the remainder was unpaved.

Fifty-three surface samples (0 to 6 inches) were collected and analyzed from the DRMO area. Please see Figure 2-11 of Reference 1 which depicts sampling locations. Analysis of the surface and subsurface soils showed Level II concentrations of barium, cadmium, chromium, lead, mercury, nickel, and silver. The sample results are shown in Appendix D of Reference 1. Contamination has been documented to spread by both wind and stormwater runoff. There is no data to indicate whether contamination has spread into the nearby Cooper River.

Outdoor air sampling was also conducted in the DRMO area. These samples showed Level I concentrations of lead dust up to 2 $\mu g/m^3$. This value is above the National Ambient Air Quality Standard of 1.5 $\mu g/m^3$. The data used to calculate the Air Pathway Score is six years old and may be unrepresentative of current conditions. Additional ambient air analysis from the same site and at the same locations will be performed. The data will be forwarded within six to eight weeks for incorporation into the HRS II package.

No groundwater or surface water sampling was conducted. More information about the DRMO staging area is available in the enclosed PREscore scoresheets, HRS review scoresheets, and in Reference 1 of the attached documentation package.

2.3.2 SWMU #2

SWMU 2, the Lead Contamination Area, is located west of SWMU 1. It consists of a salvage bin, a scrap area, and adjacent paved ground surface. The area was used to store recovered lead from lead-acid submarine batteries during the mid-1960s until 1984. Electrodes and associated internal metallic components were removed from the battery jars in the battery electrolyte treatment area. Recovered materials were placed on a railcar and transferred to the DRMO area for storage. Lead dust from the recovered materials was released to the salvage bin by handling. Like SWMU 1, routine activities in the area and natural processes such as wind and stormwater flow spread the contamination into an area which eventually encompassed six acres. Seventy-one soil samples were collected from the site. Lead concentrations in the soil were reported up to 371,000 parts per million. There are no benchmarks for establishing Level I or Level II lead contamination in the soil. Because of this, the HRS automatically assumes these lead concentrations to be Level II. No groundwater or surface water sampling was conducted. More detailed information about the lead contamination area can be found in the PREscore scoresheets, HRS review scoresheets, and Reference 1 of the attached documentation package.

SWMU 1 and SWMU 2 are both considered for the HRS because there are high levels of contaminants reported in the surface soils. Contamination has been shown to have spread both through the air and surface water. These sites are not very heavily vegetated so the potential for these contaminants to spread by the air and the surface water is very high. These sources are also very close to the Cooper River, a documented fishery.

2.3.3 SWMU #5

SWMU 5, the Battery Electrolyte Treatment Area, is located near Dry Dock 4 next to the Cooper River. SWMU 5 was used as part of the battery salvaging, restoring, and recharging operation and was used for neutralization of submarine battery acid. The area of contamination is estimated to be at least 800 square feet. A subsurface investigation was performed at 12 sampling stations around the perimeter of the tank. Level II concentrations of lead was detected in soil as high as 21,772 parts per million. No groundwater or surface water sampling has been conducted. More detailed information about the Battery Electrolyte Treatment Area can be found in the PREscore scoresheets and Reference 1 of the enclosed documentation package.

This site is considered for the HRS because of the high levels of lead contamination in the soil. There is a potential for this contamination to spread through the groundwater into a nearby surface water source.

2.3.4 SWMU #6

SWMU 6, the Public Works Storage Yard, also known as the "old corral area," is a fenced, open area where routinely generated, containerized wastes were stored prior to shipment off site. Among the wastes stored at the site were hazardous wastes generated from vehicle maintenance, building maintenance, and pest control operations. A partial closure of this unit was completed in 1986 when a renovation and expansion of the cold storage warehouse was extended into the eastern boundary of the Public Works Storage Yard. The area of the Public Works Storage Yard is estimated to be almost 60,000 square feet.

A subsurface soil investigation of was performed in 1987. Based on the sample results contamination of heavy metals is estimated to be 37,500 square feet in area. Thirty-six soil sample points were established for collection from the surface to 6 inches below the surface. Supplemental sampling was added to further define the vertical extent of the contamination. Lead, barium, cadmium, chromium, lead, mercury, nickel, and silver were found in the upper 6 inches of the soil. Lead was detected at Level II concentrations. No groundwater or surface water sampling was conducted. More detailed information about the Public Works Storage Yard can be found in the PREscore scoresheets, HRS review scoresheets, and Reference 1 of the enclosed documentation package.

This SWMU was chosen for scoring because of the high levels of several contaminants in the surface soil over such a large area. This contamination has a high potential to spread by the air and surface water pathways.

2.3.5 SWMU #7

SWMU 7, the PCB Transformer Storage Area, includes Building 3902, located within the public works storage yard, the concrete slab located outside of the building, and surrounding areas. It was used for storage of transformers and associated electrical equipment between 1970 and 1976. The area of contamination is estimated to be almost 20,000 square feet in size.

The site was sampled in 1981 and 1982. Contaminants reported in the soil include Level I concentrations of arsenic, PCBs, DDT and its daughter compounds. Contaminants reported in the groundwater include Level I concentrations of arsenic, DDT, PCB, and benzene hexachloride. No surface water sampling was conducted. A more detailed report of the contamination of the PCB Transformer Storage Area can be found in the PREscore scoresheets, HRS review scoresheets, and Reference 1 of the documentation package.

This site was chosen for scoring because of the harmful environmental contaminants found in the surface soil and groundwater. The potential exists for these contaminants to spread through the surface water pathway.

2.3.6 SWMU #9

SWMU 9, the Closed Landfill, contains many solid wastes generated at the Charleston Naval Base between the 1930s and 1973. Originally the area was a marshland. Items reportedly disposed of in the landfill include: asbestos, acids, PCBs, waste oils, waste solvents, waste paints, paint sludges, mercury, metal sludge, acid neutralization sludge, inorganic and organic chemicals, sanitary wastes, office wastes, and rubbish. Liquid wastes were placed in drums before disposal and combustible wastes were burned daily. Much of the site is now paved and is used as a parking lot. Some areas are forested while others contain marshland and fields. Seventeen groundwater monitoring wells were installed in and around the landfill to characterize the chemical quality of the groundwater in the vicinity. Level I and Level II concentrations of many trace metals and chlorinated organic compounds were detected in the groundwater and soil in the vicinity of the landfill. These contaminants likely reflect past disposal practices of metal plating sludges, waste chemicals, and industrial degreasing solvents.

No surface water sampling was conducted. A more detailed report of the contamination of the Closed Landfill can be found in the PREscore scoresheets, HRS review scoresheets, and Reference 1 of the documentation package.

This SWMU was chosen for scoring because of the high levels of harmful wastes that were documented to have been disposed over such a long period of time. Groundwater is a significant pathway because monitoring wells placed in the vicinity of the landfill have shown contamination. This landfill is located within wetlands and is adjacent to Shipyard Creek. The potential for this landfill's contaminants to threaten sensitive environments and migrate through the groundwater into Shipyard Creek is very high.

2.4 Significant Assumptions

This section will focus on the significant assumptions that were made during the scoring. These as well as other assumptions are detailed in the PREscore scoresheets, HRS review scoresheets, and/or PREscore floppy diskette. Each SWMU and the significant assumptions made about it will be listed in each section. Many of these assumptions were made because of a lack of data. Accordingly, all assumptions are based on a strict interpretation of the HRS guidance.

2.4.1 SWMU 1 DRMO Staging Area

Risk Assessment Assumptions versus HRS Assumptions — Gradient Corporation published a risk assessment of the DRMO Staging Area in 1991. Gradient concluded that based on the reported contaminant levels at the site, blood lead levels would not be expected to exceed regulatory limits and that the cancer risk was within the target risk range or lower. However, the HRS supports considering this site to be a significant threat to human health and the environment. This apparent disparity of conclusions can be resolved by understanding two key differences of the HRS and the risk assessment.

One must first understand that the HRS is designed to evaluate existing data in a very conservative fashion. In addition, where data is missing, the worst case scenario is considered. Two ambient air samples taken from the area in 1985 tested positive for lead dust contamination. There is no data available to establish how extensive this air contamination is at the base today. In considering the worst case scenario, 22,371 people, or the entire population working and living on base, are considered exposed to fugitive dust from the DRMO staging area. The risk assessment does not consider this air sampling data or such a high number of people as potentially exposed to any contaminants. It considers a "hypothetical future population of on-site residents." Based on this consideration alone, it can be seen that the HRS considers a much larger population exposed to higher levels of contaminants than the risk assessment. The more people considered to be exposed to contamination, the greater the risk the site will pose to human health.

The HRS also differs in that it considers the levels of contaminants found at each individual sample point. Theoretically one sample point that has contaminant levels much higher than surrounding sample points can significantly influence a site's score. The risk assessment evaluates average contaminant concentrations throughout a specified area. This makes it very difficult for an unusually high sampling point to influence a site.

2.4.2 SWMU 9 Closed Landfill

Hazardous Waste Quantity — It is possible to estimate the amount of industrial wastes disposed of in this landfill based on Table 2-8 of Reference 1. The HRS assumes that each gallon of substance disposed weighs 10 pounds (Table 2-5 of Reference 7).

2.4.3 Food Chain Targets

Reference 3 of the documentation package contains data supporting information on seafood catches in the Cooper River, Ashley River, Charleston Harbor, Lake Moultrie, and the intercoastal waterway up to the Isle of Palms. Because some of these areas are within the 15-mile downstream distance from the base, the pounds of seafood caught was apportioned. The apportionment considered the surface area of the water bodies only; depth was not considered. Lake Moultrie, a freshwater lake, was not considered in this apportionment because saltwater seafood is the principal catch of these areas.

A similar apportionment was also done for the Atlantic coast of South Carolina. The total length of the South Carolina Coast and the distances considered for the HRS were apportioned using data found in Reference 3. These assumptions are based on a conservative evaluation of the existing data.

2.4.4 Sensitive Environments in the Surface Water and Air Migration Pathways

In considering endangered species that live in the area, EnSafe/Allen & Hoshall consulted with the National Heritage Trust Database in Columbia, South Carolina. Species not listed as either endangered or threatened were not evaluated. Threatened or endangered species were found to live both within and outside of base boundaries. Reference 10 and the topographic maps enclosed as Reference 2 of the documentation package will further explain the listing of endangered and threatened species in the area.

In considering wetlands, National Wetland Inventory Maps were used. It was assumed that these maps accurately portrayed wetlands that would be defined by HRS criteria in the area of the Charleston Naval Base.

2.5 Pathway Score Summary

The HRS score of 50.06 was calculated from the following pathway scores:

Groundwater Migration Pathway Score	3.33
Surface Water Migration Pathway Score	3.58
Soil Exposure Pathway Score	0.65
Air Migration Pathway Score	100.00
Overall Site Score	50.06

This section summarizes the driving threat or target associated with each of the above pathway scores. Low scores among the groundwater, surface water, and soil exposure pathways are also explained.

Although there is an observed release to the surficial aquifer, the Groundwater Migration Pathway score of 3.33 is low primarily because of the absence of groundwater targets. The entire base gets its water supply from surface water sources which are outside of the 15-mile downstream distance of the base. In addition, there were no drinking water wells identified within a 4-mile distance of the base which tap the surficial aquifer. The Cooper Marl acts as an excellent confining unit which prevents potential contaminant spread from the surficial aquifer to the underlying Santee Limestone, which is used as a source of drinking water in the area. The Cooper Marl is documented to be continuous throughout the four mile distance from the base. This is documented in Reference 13 and in the geological sections of many of the references of the enclosed documentation package.

The Surface Water Pathway score of 3.58 is low primarily because there is not an observed release to the surface water. In addition, there were no surface water intakes identified within 15 downstream miles of the base. The fact that seafood is caught in this area has the potential to drive the Human Food Chain Threat portion of this pathway. However, since there is no documented observed release to the surface water this score is relatively low. Similarly, the Environmental Threat is low because of the absence of an observed release. There are wetlands located on base and endangered species in the area which could have an impact on the score of this pathway.

The Soil Exposure Pathway score of 0.65 is low primarily because of the low population threat score in the area. Most of the SWMUs considered are not within 200 feet of any area where people may live, work, or go to school. The Closed Landfill, SWMU #9, takes up a large area of the base and many people work within 200 feet of it. However, contamination is documented to be deeper than 2 feet. No one is considered to be exposed through the soil at SWMU #9.

The Air Migration Pathway score of 100.0 is driven primarily by the documented release of lead dust in the air from the area of SWMU 1 and SWMU 2. The HRS will consider the entire base population of 22,731 as exposed to this fugitive dust. Many of the SWMUs considered have shown high levels of surface soil contamination. Because many of these SWMUs are not heavily vegetated, the HRS considers these SWMUs as likely to release their contaminants to the air.

The data used to calculate the Air Migration Pathway Score is six years old and may be unrepresentative of current conditions. Additional ambient air analysis from the same site and at the same locations will be performed. The data will be forwarded within six to eight weeks for incorporation into the HRS II package.

3.0 SCORING SHEETS

3.1 HRS Score Sheets

TABLE 3-1
GROUNDWATER MIGRATION PATHWAY SCORE SHEET

<u>Factor Categories and Factors</u>

		Maximum Value	Value Assigned
	Likelihood of Release to an Aquifer		
1.	Observed Release	550	550
2.	Potential to Release		
	2a. Containment	10	10
	2b. Net Precipitation	10	3
	2c. Depth to Aquifer	5	5
	2d. Travel Time	35	35
	2e. Potential to Release [lines 2a x (2b + 2c +2d]	500	430
3.	Likelihood of Release (higher of lines 1 and 2e)	550	550
	Waste Characteristics		
4.	Toxicity/Mobility	a	$1.0\text{x}10^4$
5.	Hazardous Waste Quantity	a	$1.0\text{x}10^4$
6.	Waste Characteristics	100	100
	Targets		
7.	Nearest Well	50	0
8.	Population		
	8a. Level I Concentrations	b	0
	8b. Level II Concentrations	b	0
	8c. Potential Contamination	b	0
	8d. Population (lines 8a + 8b + 8c)	b	0
9.	Resources	5	5
10.	Wellhead Protection Area	20	0
11.	Targets (lines 7 + 8d + 9 +10)	b	5
	Ground Water Migration Score for an Aquifer		
12.	Aquifer Score [(lines 3 x 6 x 11)/82,500][c]	100	3.33

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.

Ground Water Migration Pathway Score

13.	Pathway Score (S_{gw}), (highest value from line 12 for all aquifers evaluated)[c]	100	3.33

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.

TABLE 4-1
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT
SCORE SHEET

Factor Categories and Factors			Maximum Value	Value Assigned
DRINKING WATER THREAT				
	Likelihood of Release			
1.	Observed Release		550	0
2.	Potential to Release by Overland Flow			
	2a.	Containment	10	10
	2b.	Runoff	25	25
	2c.	Distance to Surface Water	25	25
	2d.	Potential to Release by Overland Flow (lines 2a x [2b + 2c])	500	500
3.	Potential to Release by Flood			
	3a.	Containment (Flood)	10	10
	3b.	Flood Frequency	50	25
	3c.	Potential to Release by Flood (lines 3a x 3b)	500	250
4.	Potential to Release (lines 2d + 3c, subject to a maximum of 500)		500	500
5.	Likelihood of Release (higher of lines 1 and 4)		550	500
	Waste Characteristics			
6.	Toxicity/Persistence		a	1.0×10^4
7.	Hazardous Waste Quantity		a	1.0×10^4
8.	Waste Characteristics		100	100
	Targets			
9.	Nearest Intake		50	0.0
10.	Population			
	10a.	Level I Concentrations	b	0.0
	10b.	Level II Concentrations	b	0.0
	10c.	Potential Contamination	b	0.0
	10d.	Population (lines 10a + 10b + 10c)	b	0.0
11.	Resources		5	5

TABLE 4-1 (Continued)

Factor Categories and Factors		Maximum Value	Value Assigned
DRINKING WATER THREAT (Concluded)			
	Targets (Concluded)		
12.	Targets (lines 9 + 10d + 11)	b	5.0
	Drinking Water Threat Score		
13.	Drinking Water Threat Score ([lines 5 x 8 x 12]/82,500, subject to a maximum of 100)	100	3.03
HUMAN FOOD CHAIN THREAT			
	Likelihood of Release		
14.	Likelihood of Release (same value as line 5)	550	500
	Waste Characteristics		
15.	Toxicity/Persistence/Bioaccumulation	a	5.0×10^{8}
16.	Hazardous Waste Quantity	a	1.0×10^{4}
17.	Waste Characteristics	1,000	1.0×10^{3}
	Targets		
18.	Food Chain Individual	50	0
19.	Population		
	19a. Level I Concentrations	b	0.0
	19b. Level II Concentrations	b	0.0
	19c. Potential Human Food Chain Contamination	b	3.4×10^{-2}
	19d. Population (lines 19a + 19b + 19c)	b	3.4×10^{-2}
20.	Targets (lines 18 + 19d)	b	3.4×10^{-2}
	Human Food Chain Threat Score		
21.	Human Food Chain Threat Score ([lines 14 x 17 x 20]/82,500, subject to a maximum of 100)	100	0.21

TABLE 4-1 (Continued)

Factor Categories and Factors	Maximum Value	Value Assigned
ENVIRONMENTAL THREAT		
Likelihood of Release		
22. Likelihood of Release (same value as line 5)	550	500
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioaccumulation	a	5.0×10^8
24. Hazardous Waste Quantity	a	1.0×10^4
25. Waste Characteristics	1,000	1.0×10^3
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	b	0.0
26b. Level II Concentrations	b	0.0
26c. Potential Contamination	b	5.58×10^{-2}
26d. Sensitive Environments (lines 26a +26b +26c)	b	5.58×10^{-2}
27. Targets (value from line 26d)	b	5.58×10^{-2}
Environmental Threat Score		
28. Environmental Threat Score ([lines 22 x 25 x 27]/82,500, subject to a maximum of 60)	60	0.34
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED		
29. Watershed Score[c] (lines 13 + 21 + 28, subject to a maximum of 100)	100	3.58

---

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.

TABLE 4-1 (Continued)

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE

30.	Component Score (S_{of})[c] (highest score from line 29 for all watersheds evaluated, subject to a maximum of 100)	100	3.58

---

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.

TABLE 4-2
GROUNDWATER TO SURFACE WATER MIGRATION COMPONENT SCORE SHEET

Factor Categories and Factors			Maximum Value	Value Assigned
DRINKING WATER THREAT				
	Likelihood of Release			
1.	Observed Release		550	550
2.	Potential to Release			
	2a.	Containment	10	10
	2b.	Net Precipitation	10	3
	2c.	Depth to Aquifer	25	5
	2d.	Travel Time	35	35
	2e.	Potential to Release (lines 2a x [2b + 2c + 2d])	500	430
3.	Likelihood of Release (higher of lines 1 and 4)		550	550
	Waste Characteristics			
4.	Toxicity/Persistence		a	1×10^4
5.	Hazardous Waste Quantity		a	1×10^4
6.	Waste Characteristics		100	100
	Targets			
7.	Nearest Intake		50	0
8.	Population			
	8a.	Level I Concentrations	b	0
	8b.	Level II Concentrations	b	0
	8c.	Potential Contamination	b	0
	8d.	Population (lines 8a + 8b + 8c)	b	0
9.	Resources		5	5
	Targets			
10.	Targets (lines 7 + 8 + 9)		b	5
	Drinking Water Threat Score			
11.	Drinking Water Threat Score ([lines 3 x 6 x 10]/82,500, subject to a maximum of 100)		100	3.33

TABLE 4-2 (Continued)

Factor Categories and Factors		Maximum Value	Value Assigned
HUMAN FOOD CHAIN THREAT			
	Likelihood of Release		
12.	Likelihood of Release (same value as line 3)	550	550
	Waste Characteristics		
13.	Toxicity/Persistence/Bioaccumulation	a	5×10^8
14.	Hazardous Waste Quantity	a	1.0×10^4
15.	Waste Characteristics	1,000	1.0×10^3
	Targets		
16.	Food Chain Individual	50	0
17.	Population		
	17a. Level I Concentrations	b	0
	17b. Level II Concentrations	b	0
	17c. Potential Human Food Chain Contamination	b	1.37×10^{-2}
	17d. Population (lines 17a + 17b + 17c)	b	1.37×10^{-2}
18.	Targets (lines 16 + 17d)	b	1.37×10^{-2}
	Human Food Chain Threat Score		
19.	Human Food Chain Threat Score ([lines 12 x 15 x 17]/82,500, subject to a maximum of 100)	100	0.09
ENVIRONMENTAL THREAT			
	Likelihood of Release		
20.	Likelihood of Release (same value as line 3)	550	550
	Waste Characteristics		
21.	Ecosystem Toxicity/Persistence/ Bioaccumulation	a	5×10^8
22.	Hazardous Waste Quantity	a	1.0×10^4
23.	Waste Characteristics	1,000	1.0×10^3

TABLE 4-2 (Continued)

Factor Categories and Factors			Maximum Value	Value Assigned
ENVIRONMENTAL THREAT (Concluded)				
	Targets			
24.	Sensitive Environments			
	24a.	Level I Concentrations	b	0.0
	24b.	Level II Concentrations	b	0.0
	24c.	Potential Contamination	b	2.23×10^{-2}
	24d.	Sensitive Environments (lines 24a +24b +24c)	b	2.23×10^{-2}
25.	Targets (value from line 24d)		b	2.23×10^{-2}
	Environmental Threat Score			
26.	Environmental Threat Score ([lines 20 x 23 x 25]/82,500, subject to a maximum of 60)		60	0.15
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE FOR A WATERSHED				
27.	Watershed Score[c] (lines 11 + 19 + 26, subject to a maximum of 100)		100	3.57
SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORE				
28.	Component Score (S_{of})[c] (highest score from line 28 for all watersheds evaluated, subject to a maximum of 100)			3.57

---

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]Do not round to nearest integer.

TABLE 5-1
SOIL EXPOSURE PATHWAY
SCORE SHEET

Factor Categories and Factors		Maximum Value	Value Assigned
RESIDENT POPULATION THREAT			
	Likelihood of Exposure		
1.	Likelihood of Exposure	550	550
	Waste Characteristics		
2.	Toxicity	a	1.0×10^4
3.	Hazardous Waste Quantity	a	10
4.	Waste Characteristics	100	18
	Targets		
5.	Resident Individual	50	0.0
6.	Resident Population		
	6a. Level I Concentrations	b	0.0
	6b. Level II Concentrations	b	0.0
	6c. Resident Populations (lines 6a + 6b)	b	0.0
7.	Workers	15	5
8.	Resources	5	0.0
9.	Terrestrial Sensitive Environments	c	0.0
10.	Targets (lines 5 +6c + 7 + 8 + 9)	b	5
	Resident Population Threat Score		
11.	Resident Population Threat (lines [1 x 4 x 10]/82,500)	b	0.60
NEARBY POPULATION THREAT			
	Likelihood of Exposure		
12.	Attractiveness/Accessibility	100	5.0
13.	Area of Contamination	100	60
14.	Likelihood of Exposure	500	5.0
	Waste Characteristics		
15.	Toxicity	a	1.0×10^4
16.	Hazardous Waste Quantity	a	10
17.	Waste Characteristics	100	18

TABLE 5-1 (Continu d)

Factor Categories and Factors		Maximum Value	Value Assigned
NEARBY POPULATION THREAT (Concluded)			
	Targets		
18.	Nearby Individual	1	1.0
19.	Population Within 1 Mile	b	41.0
20.	Targets (lines 18 + 19)	b	42.0
	Nearby Population Threat Score		
21.	Nearby Population Threat (lines [14 x 17 x 20]/82,500)	b	0.05
SOIL EXPOSURE PATHWAY SCORE			
22.	Soil Exposure Pathway Score[d] (s_8), (lines [11+21] ÷ 82,500, subject to a maximum of 100)	100	0.65

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]No specific maximum value applies to factor. However, pathway score based solely on terrestrial sensitive environments is limited to maximum of 60.
[d]Do not round to nearest integer.

TABLE 6-1
AIR MIGRATION PATHWAY
SCORE SHEET

<u>Factor Categories and Factors</u>

Likelihood of Release		Maximum Value	Value Assigned
1.	Observed Release	550	550
2.	Potential to Release		
	2a. Gas Potential to Release	500	250
	2b. Particulate Potential to Release	500	280
	2c. Potential to Release (higher of lines 2a and 2b)	500	280
3.	Likelihood of Release (higher of lines 1 and 2c)	550	550
	Waste Characteristics		
4.	Toxicity/Mobility	a	2.0×10^{3}
5.	Hazardous Waste Quantity	a	100
6.	Waste Characteristics	100	18
	Targets		
7.	Nearest Individual	50	50
8.	Population		
	8a. Level I Concentrations	b	2.3×10^{6}
	8b. Level II Concentrations	b	0.0
	8c. Potential Contamination	b	0.0
	8d. Population (lines 8a + 8b + 8c)	b	2.3×10^{6}
9.	Resources	5	5
10.	Sensitive Environments		
	10a. Actual Contamination	c	125
	10b. Potential Contamination	c	5.8×10^{-2}
	10c. Sensitive Environments	c	125
11.	Targets (lines 7 +8d + 9 + 10c)	b	2.3×10^{6}
	Air Migration Pathway Score		
12.	Pathway Score (S_a) [(lines 3 x 6 x 11)/82,500][d]	100	100

---

[a]Maximum value applies to waste characteristics category.
[b]Maximum value not applicable.
[c]No specific maximum value applies to factor. However, pathway score based solely on terrestrial sensitive environments is limited to maximum of 60.
[d]Do not round to nearest integer.

3.2 HRS Review Score Sheets

HRS REVIEW SCORE SHEETS

FINAL SCORE CALCULATIONS

	$S_{pathway}$	$S^2_{pathway}$
Groundwater Migration Pathway Score (S_{gw})	3.33	11.09
Surface Water Migration Pathway Score (S_{sw})	3.58	12.82
Soil Exposure Pathway Score (S_s)	0.65	0.42
Air Migration Pathway Score (S_a)	100.00	10,000
$S^2_{gw} + S^2_{sw} + S^2_s + S^2_a$		10,024.33
$(S^2_{gw} + S^2_{sw} + S^2_s + S^2_a)/4$		2,506.08
$[(S^2_{gw} + S^2_{sw} + S^2_s + S^2_a)/4]^{1/2} = S$		50.06

SITE NAME: Charleston Naval Base

PREPARER: Charles Mason

HRS REVIEW SCORE SHEETS
WASTE CHARACTERIZATION WORKSHEET

SOURCES

1. #1 DRMO Staging Area
2. #2 Lead Contamination Area
3. #5 Battery Treatment Area
4. #6 Public Works Storage Yard
5. #7 PCB Transformer Area
6. #9 Closed Landfill
7. ______
8. ______
9. ______
10. ______
11. ______
12. ______
13. ______
14. ______
15. ______
16. ______
17. ______
18. ______
19. ______
20. ______
21. ______
22. ______
23. ______
24. ______
25. ______

Reference/Comment: ______

TIERS A & B	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 1

1. WASTESTREAM QUANTITY SUMMARY TABLE

Complete the following table using all available data to allocate hazardous constituents and hazardous wastestreams to sources. Consider those hazardous constituents and hazardous wastestreams that cannot be allocated to any specific source as constituting a separate "unallocated source". However, do not include in the unallocated source for a pathway any hazardous constituent or hazardous wastestream for which definitive information indicates the constituent or wastestream could only have been placed in sources with a containment value of 0 for that pathway. If hazardous constituent or hazardous wastestream data for a source is adequately determined (see HRS Sections 2.4.2.1.1 and 2.4.2.1.2) on the source is the unallocated source, assign the volume and area measures a value of 0. If either of these conditions is met for a source, proceed to Section 3 of this worksheet. If neither condition is met, proceed to Section 2.

Source Number	Pathway	1. (a) Wastestream Name	(b) Wastestream Hazardous Constituent Quantity (S) (lbs)	(c) S Assigned Value [S = 1(b)]	(d) Are Data Adequately Determined?	(e) Hazardous Wastestream Quantity (W) (lbs)	(f) W Assigned Value* [1(e) ÷ 5,000]	(g) Are Data Adequately Determined?
SWMU 1	GW [✓] SW [✓] AIR [✓] SOIL [✓]	DRMO Staging Area	N/A	N/A	NO	N/A	N/A	NO
SWMU 2	GW [✓] SW [✓] AIR [✓] SOIL [✓]	Lead Contamination Area	N/A	N/A	NO	N/A	N/A	NO
SWMU 5	GW [✓] SW [✓] AIR [ ] SOIL [ ]	Battery Treatment Area	N/A	N/A	NO	N/A	N/A	NO
SWMU 6	GW [✓] SW [✓] AIR [✓] SOIL [✓]	Public Works Storage Yard	N/A	N/A	NO	N/A	N/A	NO
Unallocated Source	GW [ ] SW [ ] AIR [ ]				YES			YES
					NO			NO

* Do not round to the nearest integer

Reference/Comment: There is not enough data present to evaluate the above SWMUs for this section.

TIERS A & B	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 1

1. WASTESTREAM QUANTITY SUMMARY TABLE

Complete the following table using all available data to allocate hazardous constituents and hazardous wastestreams to sources. Consider those hazardous constituents and hazardous wastestreams that cannot be allocated to any specific source as constituting a separate "unallocated source". However, do not include in the unallocated source for a pathway any hazardous constituent or hazardous wastestream for which definitive information indicates the constituent or wastestream could only have been placed in sources with a containment value of 0 for that pathway. If hazardous constituent or hazardous wastestream data for a source is adequately determined (see HRS Sections 2.4.2.1.1 and 2.4.2.1.2) on the source is the unallocated source, assign the volume and area measures a value of 0. If either of these conditions is met for a source, proceed to Section 3 of this worksheet. If neither condition is met, proceed to Section 2.

Source Number	Pathway	1. (a) Wastestream Name	(b) Wastestream Hazardous Constituent Quantity (S) (lbs)	(c) S Assigned Value [S = 1(b)]	(d) Are Data Adequately Determined?	(e) Hazardous Wastestream Quantity (W) (lbs)	(f) W Assigned Value* [1(e) ÷ 5,000]	(g) Are Data Adequately Determined?
SWMU 7	GW [✓] SW [✓] AIR [✓] SOIL [✓]	PCB Transformer Area	N/A	N/A	NO	N/A	N/A	NO
SWMU 9	GW [✓] SW [✓] AIR [ ] SOIL [ ]	Closed Landfill	7.35×10^4	7.35×10^4	YES	3.59×10^7	7171.01	YES
	GW [ ] SW [ ] AIR [ ] SOIL [ ]				YES NO			YES NO
	GW [ ] SW [ ] AIR [ ] SOIL [ ]				YES NO			YES NO
Unallocated Source	GW [ ] SW [ ] AIR [ ]				YES NO			YES NO

* Do not round to the nearest integer

Reference/Comment: Please see Comment #1.

COMMENTS:

Comment #1. Column C and Column F of SWMU 9 were estimated by evaluating the total weight of industrial wastes that were disposed of in the landfill over a period of up to 70 years. This information was found from Table 2-8 of Reference 1 (Reference 1, Table 2-8).

TIERS C & D	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 2

2. SOURCE VOLUME/AREA FACTOR TABLE

If source volume can be determined, do not evaluate the area measure. Instead, assign area a value of 0 and proceed to Section 3 of this worksheet.

Source	Pathway	1. (a) Source Type*	(b) Source Volume (V)	(c) Volume Divisor (Table 2-5)* (Table 5-2)*	(d) V Assigned Value** [2(b) ÷ 2(c)]	(e) Source Area (A)	(f) Area Divisor (Table 2-5)* (Table 5-2)*	(g) A Assigned Value** [2(e) ÷ 2(f)]
SWMU 1	GW [✓] SW [✓] AIR [✓]	Cnt. Soil	52	2,500	0.0208	0	0	0
	SOIL [✓]	Cnt. Soil	N/A	N/A	N/A	2800	34,000	0.82
SWMU 2	GW [✓] SW [✓] AIR [✓]	Cnt. Soil	4,840	2,500	1.94	0	0	0
	SOIL [✓]	Cnt. Soil	N/A	N/A	N/A	261,360	34,000	7.69
SWMU 5	GW [✓] SW [✓] AIR [ ]	Cnt Soil	30.0	2,500	0.012	0	0	0
	SOIL [ ]							
SWMU 6	GW [✓] SW [✓] AIR [✓]	Cnt. Soil	913	2,500	0.37	0	0	0
	SOIL [✓]	Cnt. Soil	N/A	N/A	N/A	49,312	34,000	1.45
SWMU 7	GW [✓] SW [✓] AIR [✓]	Cnt. Soil	9,250	2,500	3.7	0	0	0
	SOIL [✓]	Cnt. Soil	N/A	N/A	N/A	18,500	34,000	0.54

* Use Table 2-5 for the groundwater, surface water, and air pathways. Use Table 5-2 for the soil exposure pathway.

** Do not round to the nearest integer

Reference/Comment: Please see Comments #2 - #6.

COMMENTS:

Comment #2. The area sampled which tested positive for contamination at SWMU #1 is estimated to be approximately 52 cubic yards in volume. Contamination is estimated to be approximately 2,800 square feet in area and one half foot deep (Reference 1, Figure 2-1).

Comment #3. The area sampled which tested positive for contamination at SWMU #2 is estimated to be approximately 4,840 cubic yards in volume. Contamination is estimated to be approximately six acres in area (261,360 square feet) and confined principally to the upper portion of the soil (Reference 1, Section 2.6.2; Reference 8, Section 4.1).

Comment #4. The area which tested positive for contamination at SWMU #5 is estimated to be approximately 30 cubic yards in volume. Contamination is estimated to be 800 square feet in area and one foot deep (Reference 1, Section 2.6.5, Figure 2-14, Table 2-5).

Comment #5. The area samples which tested positive for contamination at SWMU #6 is estimated to be 913 cubic yards in volume. Contamination is estimated to be 49,312 square feet in area and one half foot deep (Reference 1, Section 2.6.6, Figure 2-16).

Comment #6. The area sampled which tested positive for contamination at SWMU #7 is estimated to be 9,250 cubic yards in volume. Contamination is estimated to be 9,250 square feet in area and one foot deep (Reference 1, Section 2.6.7, Figure 2-17).

TIERS C & D	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 2

2. SOURCE VOLUME/AREA FACTOR TABLE

If source volume can be determined, do not evaluate the area measure. Instead, assign area a value of 0 and proceed to Section 3 of this worksheet.

Source	Pathway	1. (a) Source Type*	(b) Source Volume (V)	(c) Volume Divisor (Table 2-5)* (Table 5-2)*	(d) V Assigned Value** [2(b) ÷ 2(c)]	(e) Source Area (A)	(f) Area Divisor (Table 2-5)* (Table 5-2)*	(g) A Assigned Value** [2(e) ÷ 2(f)]
SWMU 9	GW [✓] SW [✓] AIR [ ]	Landfill	N/A	N/A	N/A	N/A	N/A	N/A
	SOIL [ ]							
	GW [ ] SW [ ] AIR [ ]							
	SOIL [ ]							
	GW [ ] SW [ ] AIR [ ]							
	SOIL [ ]							
	GW [ ] SW [ ] AIR [ ]							
	SOIL [ ]							
	GW [ ] SW [ ] AIR [ ]							
	SOIL [ ]							

* Use Table 2-5 for the groundwater, surface water, and air pathways. Use Table 5-2 for the soil exposure pathway.

** Do not round to the nearest integer

Reference/Comment: Source #9 is evaluated under Tiers A and B.

	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 3

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY TABLE

Complete the following table using the data compiled in Sections 1 and 2 of this worksheet for each of the sources at the site. Then proceed to Section 4.

Source	3. (a) Hazardous Constituent Quantity Assigned Value [from 1(c)]	(b) Hazardous Wastestream Quantity Assigned Value [from 1(f)]	(c) Source Volume Assigned Value [from 2(d)]	(d) Source Area Assigned Value [from 2(g)]	(e) Source Hazardous Waste Quantity Value* (Highest of 3a, 3b, 3c, or 3d)
#1 DRMO Staging Area	GW 0 [✓] SW [✓] AIR [✓] SOIL [✓]	GW 0 [✓] SW [✓] AIR [✓] SOIL [✓]	GW 0.021 [✓] SW 0.021 [✓] AIR 0.021 [✓] SOIL 0 [✓]	GW 0 [✓] SW 0 [✓] AIR 0 [✓] SOIL 0.82 [✓]	GW 0.021 [✓] SW 0.021 [✓] AIR 0.021 [✓] SOIL 0.82 [✓]
#2 Lead Contamination Area	GW 0 [✓] SW [✓] AIR [✓] SOIL [✓]	GW 0 [✓] SW [✓] AIR [✓] SOIL [✓]	GW 1.94 [✓] SW 1.94 [✓] AIR 1.94 [✓] SOIL [✓]	GW 0 [✓] SW 0 [✓] AIR 0 [✓] SOIL 7.69 [✓]	GW 1.94 [✓] SW 1.94 [✓] AIR 1.94 [✓] SOIL 7.69 [✓]
#5 Battery Electrolyte Treatment Area	GW 0 [✓] SW [✓] AIR [ ] SOIL [ ]	GW 0 [✓] SW [✓] AIR [ ] SOIL [ ]	GW 0.012 [✓] SW 0.012 [✓] AIR [ ] SOIL [ ]	GW 0 [✓] SW 0 [✓] AIR [✓] SOIL [✓]	GW 0.012 [✓] SW 0.012 [✓] AIR 0 [ ] SOIL 0 [ ]
#6 Public Works Storage Yard	GW 0 [✓] SW [✓] AIR [✓] SOIL [✓]	GW 0 [✓] SW [✓] AIR [✓] SOIL [✓]	GW 0.37 [✓] SW 0.37 [✓] AIR 0.37 [✓] SOIL 0 [✓]	GW 0 [✓] SW 0 [✓] AIR 0 [✓] SOIL 1.45 [✓]	GW 0.37 [✓] SW 0.37 [✓] AIR 0.37 [✓] SOIL 1.45 [✓]
Unallocate Source	GW [ ] SW [ ] AIR [ ]	GW [ ] SW [ ] AIR [ ]			GW [ ] SW [ ] AIR [ ]

* Do not round to the nearest integer

** Round the sum to the nearest integer, except: If the sum is > 0 but < 1, round it to 1.

The sum of the source hazardous waste quantities = Site Hazardous Waste Quantity Value**

GW	[ ]
SW	[ ]
AIR	[ ]
SOIL	[ ]

HRS REVIEW SCORE SHEETS

	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 3

3. <u>SITE HAZARDOUS WASTE QUANTITY SUMMARY TABLE</u>
Complete the following table using the data compiled in Sections 1 and 2 of this worksheet for each of the sources at the site. Then proceed to Section 4.

Source	3. (a) Hazardous Constituent Quantity Assigned Value [from 1(c)]	(b) Hazardous Wastestream Quantity Assigned Value [from 1(f)]	(c) Source Volume Assigned Value [from 2(d)]	(d) Source Area Assigned Value [from 2(g)]	(e) Source Hazardous Waste Quantity Value* (Highest of 3a, 3b, 3c, or 3d)
#7 PCB Transformer Storage Area	GW 0 [✓] SW 0 [✓] AIR 0 [✓] SOIL 0 [✓]	GW 0 [✓] SW 0 [✓] AIR 0 [✓] SOIL 0 [✓]	GW 3.7 [✓] SW 3.7 [✓] AIR 3.7 [✓] SOIL 0 [✓]	GW 0 [✓] SW 0 [✓] AIR 0 [✓] SOIL 0.54 [✓]	GW 3.7 [✓] SW 3.7 [✓] AIR 3.7 [✓] SOIL 0.54 [✓]
#9 Closed Landfill	GW 7.35×10^4 [✓] SW 7.35×10^4 [✓] AIR [ ] SOIL [ ]	GW 7171.0 [✓] SW 7171.0 [✓] AIR [ ] SOIL [ ]	GW 0 [✓] SW 0 [✓] AIR [ ] SOIL [ ]	GW 0 [✓] SW 0 [✓] AIR [ ] SOIL [ ]	GW 7.35×10^4 [✓] SW 7.35×10^4 [✓] AIR [ ] SOIL [ ]
	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]
	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]	GW [ ] SW [ ] AIR [ ] SOIL [ ]
Unallocate Source	GW [ ] SW [ ] AIR [ ]	GW [ ] SW [ ] AIR [ ]			GW [ ] SW [ ] AIR [ ]
* Do not round to the nearest integer ** Round the sum to the nearest integer, except: If the sum is > 0 but < 1, round it to 1.			The sum of the source hazardous waste quantities = <u>Site Hazardous Waste Quantity Value**</u>		GW 73506.0 [✓] SW 73506.0 [✓] AIR 6.03 [✓] SOIL 10.5 [✓]

	SOURCE HAZARDOUS WASTE QUANTITY FACTOR WORKSHEET	SECTION 4

4. From 3(e) list the site hazardous waste quantity value for each pathway and then assign the appropriate hazardous waste quantity factor value from Table 2-6.

SITE HAZARDOUS WASTE QUANTITY VALUE [From 3(e)]	HAZARDOUS WASTE QUANTITY FACTOR VALUE* (Table 2-6)
Groundwater Pathway 73565.0	10,000
Surface Water Pathway 73565.0	10,000
Air Pathway 6.03	10*
Soil Exposure Pathway 10.5	10*

* Please see Comment #7.

COMMENTS:

Comment #7. Based on Section 2.4.2.2 of Reference 7, the Hazardous Waste Quantity Factor Value for the Air Pathway and Soil Exposure Pathway is 10. Sub-section b of Table 2-6 of Reference 7 states that a value of one (1) cannot be given if the hazardous constituent quantity is not adequately determined. Since the hazardous constituent quantity cannot be adequately determined for evaluations of the air and soil pathways, a value of 10 is assigned for both pathways.

HRS REVIEW SCORE SHEETS

GROUNDWATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
Likelihood of Release			
1. Observed Release	550	550	Please see Comment #8.
2. Potential to Release [lines 2a x (2b + 2c + 2d)]	500		Since an observed release is established, line 2 need not be calculated.
a. Containment (Table 3-2)	10		
b. Net Precipitation (Figure 3-2)(Table 3-4)	10		
c. Depth to Aquifer (Table 3-5)	5		
d. Travel Time (Table 3-7)	35		
• Hydraulic Conductivity (Table 3-6)	10^{-2} cm/sec		
• Thickness of Lowest Hydraulic Conductivity Layer	> 500 feet		
3. Likelihood of Release (higher of lines 1 or 2)	550	550	
Waste Characteristics			
4. Toxicity/Mobility	10,000	10,000	Please see Comment #9.

COMMENTS:

Comment #8. Monitoring wells placed in the area of the closed landfill (SWMU #9) showed Level I concentrations of arsenic, DDT, hexachlorocyclohexane, anthracene, antimony, benzene, and other contaminants. This, along with data from other monitoring wells, confirms the presence of groundwater contamination (Reference 1, Section 2.6.9, Appendix I).

Comment #9. The toxicity value of 10,000 represents contaminants, such as cadmium, found on base. This value comes from the Superfund Chemical Matrix Database (SCMD).

HRS REVIEW SCORE SHEETS

GROUNDWATER MIGRATION PATHWAY SCHORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
5. Hazardous Waste Quantity (Table 2-6)	1 x 10^6	10,000	(See hazardous waste quantity work sheets)
• Waste Characteristics Product (lines 4 x 5) (go to line 6)	1 x 10^8	1 x 10^8	
6. Waste Characteristics (Table 2-7)	100	100	
Targets	10		
7. Nearest Well (Table 3-11)	50	0	Please see Comment #10.
8. Population (lines 8a + 8b + 8c)	N/A	0.0	
8a. Level I Concentrations	N/A	0.0	(See Table 1)
8b. Level II Concentrations	N/A	0.0	(See Table 1)
8c. Potential Contamination	N/A	0.0	(See Table 2)
9. Resources (HRS Section 3.3.3)	5	5	Please see Comment #11.
10. Wellhead Protection Area	20	0.0	No wellhead protection areas identified (Reference 2).
11. Targets (lines 7 + 8 + 9 + 10)*	N/A	5.0	
Groundwater Migration Pathway Score			
12. Aquifer Score [(lines 3 x 6 x 11)/82,500]*	100	3.33	
13. Groundwater Pathway Score (S_{gw})*	100	3.33	

* Do not round to the nearest integer

HRS REVIEW SCORE SHEETS

COMMENTS:

Comment #10. The Charleston Naval base and the surrounding 4-mile distance zone is documented to be served by county and city public water supply. There are no drinking water wells identified within the 4-mile distance zone which tap the surficial aquifer.

A confining unit, continuous throughout the 4-mile distance zone of the base, has been identified below the surficial aquifer. Known as the Cooper Marl, it precludes the use of deeper aquifers for this scoring (Reference 13).

HRS REVIEW SCORE SHEETS

GROUNDWATER PATHWAY CALCULATIONS

TABLE I POPULATION - ACTUAL CONTAMINATION					
Well Identifier	Contaiminant Detected	Concentration Level I or Level II	(A) Population	(B) Level Multiplier*	(A x B)
None					
* Multipliers • Level I = 10 • Level II = 1		Groundwater Population Targets Actual Contamination Values		Sum (A/B) Level I	0
				Sum (A/B) Level II	0

Reference/Comment: No drinking water wells identified on base or in the 4-mile distance from the base (Reference 1, Section 2.3.5; Reference 13).

GROUNDWATER PATHWAY CALCULATIONS

TABLE 2 POPULATION - POTENTIAL CONTAMINATION				
		Distance - Weighted Population Value		Distance - Weighted Population Value
Distance (miles)	Population	Karst (Table 3-12)	Population	Other Than Karst (Table 3-12)
0 to 1/4	0			
> 1/4 to 1/2	0			
> 1/2 to 1	0			
> 1 to 2	0			
> 2 to 3	0			
> 3 to 4	0			
		Sum		Sum 0

Potential Contamination = $\frac{\text{Sum of Distance-Weighted Population Values}}{10}$ = 0 *

* If < 1, do not round to the nearest integer; if $\geq$ 1, round to the nearest integer.

Reference/Comment: No populations are documented to use the surficial aquifer as drinking water (Reference 1, Section 2.3.5; Reference 13).

COMMENTS:

Comment #11. The surficial aquifer is documented to be used for irrigational use (Reference 1, Section 2.3.5; Reference 13).

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

Table 3
SURFACE WATER MIGRATION PATHWAY SUMMARY

Surface Water Segment	Distance (miles)		Surface Water Descriptor (Table 4-13)	Flow (cfs)/Depth (ft) (Table 4-13)	Dilution Weight Table 4-13)
	Start	End			
1. Cooper River	0.01	4.00	River	4,500	0.001
2. Charleston Harbor	4.00	7.00	Coastal Tidal	N/A	N/A
3. Atlantic Ocean	7.00	15.00	Deep Ocean Zone	N/A	N/A
4.					
5.					
6.					
7.					
8.					
9.					
10.					
11.					
12.					
13.					
14.					
15.					
16.					
17.					
18.					

Reference/Comments: Referenced from topographic maps and Army Corps of Engineers data (Reference 2; Reference 25).

HRS REVIEW SCORE SHEETS

SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors / Overland/Flood Migration Component	Max Value	HRS Value Assigned	References and Comments
DRINKING WATER THREAT Likelihood of Release			
1. Observed Release	550	0	
2. Potential to Release [lines 2a x (2b + 2c)]	500	500	
a. Containment (Table 4-2)	10	10	Nothing present to prevent contaminant release (Reference 6).
b. Runoff (Table 4-6)	25	25	
• 2 year, 24-hour rainfall (inches)	>3.5	4.5	Referenced from 2 yr/24 hr rainfall map (Reference 12).
• Soil Group (Table 4-4)		D	Primarily sandy clay (Reference 1, Section 2.3.5).
• Rainfall/Runoff Value (Table 4-5)	6	6	
c. Distance to Surface Water (Table 4-7)	25	25	Some of the SWMUs are less than 100 ft. from surface water (Ref. 6).
3. Potential to Release by Flood (lines 3a x 3b)	500	250	
a. Containment (flood) (Table 4-8)	10	10	Nothing present to prevent release by flood (Reference 6).
b. Flood Frequency (Table 4-9)	50	25	Please see Comment #12.
4. Potential to Release (lines 2 + 3) (maximum of 500)	500	500	
5. Likelihood of Release (higher of lines 1 or 4)	550	500	
Waste Characteristics			
6. Toxicity/Persistence (Table 4-12)	10,000	10,000	From the Superfund Chemical Matrix Database (SCMD)/for lead and other heavy metals.
7. Hazardous Waste Quantity (Table 2-6)	1×10^8	10,000	(See hazardous waste quantity work sheet)
8. Waste Characteristics (Table 2-7)	100	100	
• (lines 6 x 7) (go to line 8)	1×10^8	1×10^8	

COMMENTS:

Comment #12. The majority of the Charleston Naval Base lies on the 100 year flood plain (Reference 1, Section 2.3.1).

HRS REVIEW SCORE SHEETS

SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
Targets			
9. Nearest Intake (higher of lines 9a, 9b or 9c)	50	0	No surface water intakes have been identified.
a. Level I Concentrations	50	0	(See Table 4)
b. Level II Concentrations	45	0	(See Table 4)
c. Potential Contamination (20 x dil wt)† (Table 4-13)	20	0	(See Table 4)
10. Population (lines 10a + 10b +10c)*	N/A	0	No surface water intakes have been identified.
a. Level I Concentrations	N/A	0	(See Table 4A)
b. Level II Concentrations	N/A	0	(See Table 4A)
c. Potential Contamination	N/A	0	(See Table 5)
11. Resources	5	5	Surface water is used for irrigation and domestic use (Reference 13).
12. Targets (lines 9 + 10 + 11)*	N/A	5	
Drinking Water Threat Score			
13. Drinking Water Threat [(lines 5 x 8 x 12)/82,500]*	100	3.03	
HUMAN FOOD CHAIN THREAT Likelihood of Release			
14. Likelihood of Release (same value as line 5)	550	500	
Waste Characteristics			
15. Toxicity/Persistence/Bioaccumulation (Table 4-16)	5×10^8	5×10^8	From Superfund Chemical Matrix Database (SCMD) for lead and other heavy metals.

† Round to the nearest integer

* Do not round to the nearest integer

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 4 DRINKING WATER TARGETS Nearest Intake - Potential Contamination			
Intake	Concentration Level I or Level II	Flow (cfs)/ (Table 4-13)	(A) Dilution Weight (Table 4-13)
None Identified			

Nearest intake Level I Contamination Value = 50
Nearest intake Level II Contamination Value = 45
Nearest intake Potential Contamination Value = [A x 20]* = ______________

* Round to the nearest integer

Reference/Comment: There is no evidence that surface water is used as a drinking water source (Reference 13).

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 4A
DRINKING WATER TARGETS
ACTUAL CONTAMINATION - POPULATION

Intake	Contaminant Detected	Concentration Level I or Level II	(A) Population	(B) Level Multiplier*	(A x B)
None Identified					
* Multipliers • Level I = 10 • Level II = 1		Drinking Water Population Targets Actual Contamination Values		Sum (A x B) Level I	
				Sum (A x B) Level II	

Reference/Comment: There is no evidence that the surface water is used as a drinking water source (Reference 13).

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 5 DRINKING WATER TARGETS - POTENTIAL CONTAMINATION			
Surface Water Body	Average Stream Flow/Depth	Population Served by Intake(s)	(DWP) Dilution-Weighted Population Value (Table 4-14)
None Identified			
		Sum (DWP)	

Potential Contamination = $\frac{\text{Sum (DWP)}}{10}$ = ________________*

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.

Reference/Comment: No drinking water intakes have been identified (Reference 13).

SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
16. Hazardous Waste Quantity (same as line 7)	1×10^8	10,000	
17. Waste Characteristics (Table 2-7)	1000	1,000	
• (Lines 15 x 16) (go to line 17)	1×10^{12}	5×10^{12}	
Targets			
18. Food Chain Individual	50	0.0	(See Table 6)
19. Population (lines 19a + 19b + 19c)*	N/A	0.03441	
a. Level I Concentrations	N/A	0	(See Table 7)
b. Level II Concentrations	N/A	0	(See Table 7)
c. Potential Contamination	N/A	0.03441	(See Table 8)
20. Targets (lines 18 + 19)*	N/A	0.03441	
Human Food Chain Threat Score			
21. Human Food Chain Threat [(lines 14 x 17 x 20)/82,500]*	100	0.21	
<u>ENVIRONMENTAL THREAT</u> Likelihood of Release			
22. Likelihood of Release (same value as line 5)	550	500	

* Do not round to the nearest integer

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 6
HUMAN FOOD CHAIN TARGETS
Food Chain Individual

Fishery Subject to Actual Contamination	Contaminant/Concentration Level I or Level II	Factor Value Calculation
		If Level I Concentration, then factor value = 50; If Level II Concentration, then factor value = 45

If there is a fishery present within the target distance limit not subject to Level I or II concentrations, but there is an observed release of a hazardous substance having a bioaccumulation potential factor value ≥ 500 to surface water in the watershed being evaluated, assign a value of 20. If there is no observed release in the watershed, or there is no observed release of a hazardous substance having a bioaccumulation potential factor value ≥ 500 but there is a fishery present, calculate the food chain individual factor value as follows: determine the highest dilution weight (i.e., lowest amount of dilution) applicable to the fisheries within the target distance limit. Multiply this dilution weight by 20 and round to the nearest integer.

[Dilution weight (Table 4-13) _______ x 20] = _________

If there are no fisheries within the target distance limit of the watershed, assign a value of 0.

Food Chain Individual Factor Value Assigned: 0

Reference/Comment: Please see Comment #13.

HRS REVIEW SCORE SHEETS

COMMENTS:

Comment #13. There is not enough data present to establish a release to the Cooper River or any other surface water body. There are two areas in particular, SWMUs #1 and #2 and the closed landfill (SWMU #9), where the contaminants are likely to have been released into the surface water. However, there is no data to confirm this so an observed release cannot be established. Further study should be done to confirm this (Reference 1).

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 7
HUMAN FOOD CHAIN TARGETS
POPULATION - ACTUAL CONTAMINATION

Fishery	Contaminant Detected	Concentration Level I or Level II	Human Food Chain Production (lbs/year)	(A) Human Food Chain Population Value (Table 4-18)	(B) Level Multiplier*	(A x B)
Cooper River	N/A					
Charleston Harbor	N/A					
Atlantic Ocean	N/A					

* Multipliers
- Level I = 10
- Level II = 1

Human Food Chain Population Targets
Actual Contamination Values

Sum (A x B) Level I	0
Sum (A x B) Level II	0

Reference/Comment: Available analytical data is insufficient to attribute contamination at the Naval Base (References 20, 21, and 22).

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 8
HUMAN FOOD CHAIN TARGETS
Population - Potential Contamination

Fishery	Human Food Chain Production (lb/year)	(P) Human Food Chain Population Value (Table 4-18)	Average Stream Flow/Depth at Fishery	(DW) Dilution Weighting Factor (Table 4-13)	(P x DW)
Cooper River	270,486	310	4,500	0.001	0.31
Charleston Harbor	270,486	310	4,500	0.0001	0.031
Atlantic Ocean	648,740	310	N/A	0.00001	0.0031
				Sum (P x DW)	0.03441

Potential Contamination = $\frac{\text{Sum (P x DW)}}{10}$ = 0.062 *

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer

Reference/Comment: Please see Comment #14.

COMMENTS:

Comment #14. It has been estimated that in 1986, 676,215 pounds of commercial seafood was caught in the Cooper River, Ashley River, Charleston Harbor, Lake Moultrie, and the Intercostal waterway. This value is apportioned based on surface area of the water bodies and whether they are fresh or salt water.

For fishing in the Atlantic Ocean, the entire catch along the coast of South Carolina was apportioned to give a crude estimate of the catch in the downstream area of consideration of the Charleston Naval Base (Reference 2; Reference 3).

HRS REVIEW SCORE SHEETS

SURFACE WATER MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
Waste Characteristics			
23. Ecosystem Toxicity/Persistence/ Bioaccumulation (Table 4-21)	5×10^8	5×10^8	Referenced from Superfund Chemical Matrix Database (SCMD) for lead and other heavy metals.
24. Hazardous Waste Quantity (same as line 7)	1×10^6	10,000	
25. Waste Characteristics (Table 2-7)	1000	1,000	
• (lines 23 x 24) (go to line 25)	1×10^{12}	5×10^{12}	
Targets			
26. Sensitive Environments (lines 26a + 26b + 26c)*			
a. Level I Concentrations	N/A	0	(See Tables 9 and 9A)
b. Level II Concentrations	N/A	0	(See Tables 9 and 9A)
c. Potential Contamination	N/A	0.055	(See Table 10)
27. Target (lines 26a + 26b + 26c)*	N/A	0.055	
Environmental Threat Score			
28. Environmental Threat [(lines 22 x 25 x 27)/82,500]*†	60	0.34	
Overland/Flood Migration Component Score or a Watershed			
29. Watershed Score * (lines 13 + 21 + 28)	100	3.58	
30. Overland/Flood Migration Component Score* (highest score from line 29 for all watersheds evaluated)	100	3.58	

* Do not round to the nearest integer

† This value is subject to a maximum of 60.

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 9 ENVIRONMENTAL TARGETS Actual Contamination - Other Than Wetlands					
Sensitive Environment (other than wetlands)	Contaminant Detected	Concentration Level I or Level II	(A) Sensitive Environments Rating Value (Table 4-23)	(B) Level Multiplier*	(A x B)
* Multipliers • Level I = 10 • Level II = 1		Environmental Targets Actual Contamination Values		Sum (A x B) Level I	0
				Sum (A x B) Level II	0

Reference/Comment: Please see Comment #15.

HRS REVIEW SCORE SHEETS

COMMENTS:

Comment #15. No environmental targets on base have tested positive for any contamination (Reference 2; Reference 10).

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 9A
ENVIRONMENTAL TARGETS
ACTUAL CONTAMINATION - WETLANDS

Wetland	Contaminant Detected	Concentration Level I or Level II	Length of Wetlands (miles)	(C) Wetlands Rating Value (Table 4-24)	(D) Level Multiplier*	(C x D)
* Multipliers • Level I = 10 • Level II = 1		Wetland Targets Actual Contamination Values			Sum (C x D) Level I	0
					Sum (C x D) Level II	0

Actual Contamination - Level I Targets = [Sum (A x B) Level I] + [Sum (C x D) Level I] = 0

Actual Contamination - Level II Targets = [Sum (A x B) Level II] + [Sum (C x D) Level II] = 0

Reference/Comment: Please see Comment #16.

COMMENTS:

Comment #16. No environmental targets on base have tested positive for contamination (Reference 20).

HRS REVIEW SCORE SHEETS

SURFACE WATER PATHWAY CALCULATIONS
Overland/Flood Migration Component

TABLE 10
ENVIRONMENTAL TARGETS - POTENTIAL CONTAMINATION

Sensitive Environment	(A) Assigned Rating Value (Table 4-23)	Flow/ Depth	(B) Dilution Weight (Table 4-13)	(A x B)	Length of Wetlands (miles)	(C) Wetlands Rating Value (Table 4-24)	Flow/ Depth	(D) Dilution Weight (Table 4-13)	(C x D)
Shortnose Sturgeon	75	N/A	0.00001	7.5×10^{-4}					
Wetlands Downstream					30.0	500		0.001	0.5
Least Tern	50	N/A	.001	.05					
			Sum (A x B)	0.0508				Sum (C x D)	0.5

Potential Contamination = $\frac{\text{Sum (A x B) + Sum (C x D)}}{10}$ = 0.055 *

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.

Reference/Comment: Please see Comment #17.

COMMENTS:

Comment #17. According to information provided by Ms. Kathy Boyle of the Heritage Trust Database, the Least Tern, the Shortnose Sturgeon, and wetlands downstream are the only sensitive environments that are potentially exposed to contaminants via the surface water pathway within the 15-mile downstream limit of the Charleston Naval Base. Since these wetlands occur on both sides of the waterbody downstream, in effect doubling the distance of the wetlands present, 30 miles of wetlands are assumed to exist (Reference 2; Reference 10).

HRS REVIEW SCORE SHEETS
SOIL EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
RESIDENT POPULATION THREAT Likelihood of Release			
1. Likelihood of Exposure	550	550	Please see Comment #18.
Waste Characteristics			
2. Toxicity x Hazardous Waste Quantity (go to line 3)	1×10^8	1×10^6	(See Hazardous Waste Quantity Worksheets)
• Toxicity	10,000	10,000	From Superfund Chemical Matrix Database (SCMD)for lead and other heavy metals.
3. Waste Characteristics (Table 2-7)	100	18	
Targets			
4. Resident Individual	50	0	Please see Comment #19.
5. Resident Population (lines 5a + 5b)	N/A	0	Please see Comment #19.
a. Level I Concentrations	N/A	0	(See Table 19)
b. Level II Concentrations	N/A	0	(See Table 19)
6. Workers (Table 5-4)	15	5	Please see Comment #20.
7. Resources (HRS Section 5.1.3.4)	5	0	No resources have been identified within any contamination.
8. Terrestrial Sensitive Environments* (Table 5-5)	N/A	0	No terrestrial sensitive environments have been identified (Reference 2; 10; 20).
9. Targets (lines 4 + 5 + 6 + 7 + 8)**	N/A	5	

* Multiply lines 1 x 3 x 8 and divide the product by 82,500. If the result if $\leq$ 60, assign the terrestrial sensitive environments targets value as calculated. If the result is > 60, assign a targets value for the terrestrial sensitive environments as follows:

$\frac{(60)\ (82,500)}{(\text{line } 1)\ (\text{line } 3)}$ Please note that a pathway score based solely on terrestrial sensitive environments is limited to a maximum of 60.

** Do not round to the nearest integer.

HRS REVIEW SCORE SHEETS

COMMENTS:

Comment #18. Soil samples from the DRMO staging area show contamination for several heavy metals. Based on this and documented contaminated soil from other SWMUs, the maximum valve is assigned (Reference 1, Section 2.6.1, Appendix D; Reference 17, Table 9; Reference 11, Section 2.0, 7.2).

Comment #19. There is no one documented to live or go to school within 200 ft. of any SWMU on base (Reference 14).

SOIL EXPOSURE PATHWAY CALCULATIONS

TABLE 19 RESIDENT POPULATION				
Contaminant Detected	Concentration Level I or Level II	(A) Population	(B) Level Multiplier*	(A x B)
None				
* Multipliers • Level I = 10 • Level II = 1	Soil Exposure Resident Population Targets Values		5a. Sum (A x B) Level I	0
			5b. Sum (A x B) Level II	0

Reference/Comment: No residents are documented to be within 200 ft. of any SWMU (Reference 14).

COMMENTS:

Comment #20. There are 33 workers documented to work within 200 ft. of all of the SWMUs evaluated. Only those SWMUs with soil contamination 2 feet in depth or shallower were considered (Reference: 14).

HRS REVIEW SCORE SHEETS

SOIL EXPOSURE PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
10. Resident Population Threat** (lines 1 x 3 x 9)	N/A	49,500	
NEARBY POPULATION THREAT Likelihood of Release			
11. Likelihood of Exposure (Table 5-8)	500	5	
• Attractiveness/Accessibility (Table 5-6)	100	5	The Charleston Naval Base is surrounded by a maintained fence and guarded at all times (Reference #6).
• Area of Contamination (Table 5-7)	100	60	Please see Comment #21.
Waste Characteristics			
12. Toxicity x Hazardous Waste Quantity (from line 2)	1 x 10^8	10,000	
13. Waste Characteristics (from line 3)	100	18	
Targets			
14. Nearest Individual (Table 5-9)	1	1	Please see Comment #22.
15. Population Within One Mile	N/A	41	(See Table 20)
16. Targets (lines 14 + 15)*	N/A	42	
17. Nearby Population Threat* (lines 11 x 13 x 16)	N/A	3,780	
18. Soil Exposure Pathway Score (S_s)* [lines (10 + 17)/82,500]	100	0.65	

* Do not round to the nearest integer

** Do not round to the nearest integer

HRS REVIEW SCORE SHEETS

COMMENTS:

Comment #21. Only those SWMUs with soil contamination 2 feet deep or less were summed to give a final estimate (Reference 1, Sections 2.6.1, 2.6.2, 2.6.5, 2.6.6, 2.6.7).

Comment #22. It is estimated that there are 22,731 people who live and work at the Charleston Naval Base (Reference 4; Reference 13).

SOIL EXPOSURE PATHWAY CALCULATIONS

TABLE 20
POPULATION WITHIN ONE MILE

Distance (miles)	Population	Distance - Weighted Population Values (Table 5-10)
0 to 1/4	22,731	408
> 1/4 to 1/2	N/A	N/A
> 1/2 to 1	N/A	N/A
		Sum 408

Population Within One Mile Factor Value = $\frac{\text{Sum}}{10}$ = 41 *

* If < 1, do not round to the nearest integer; if $\geq$ 1, round to the nearest integer.

Reference/Comment: This value was estimated by base personnel. Populations outside of the base were not evaluated (Reference 9; Reference 13).

AIR MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
Likelihood of Release			
1. Observed Release	550	550	Please see Comment #23.
2. Potential to Release (higher of lines 2a or 2b)	500	300	
2a. Gas Potential to Release	500	300	Calculated in PREscore program
2b. Particulate Potential to Release	470	280	Calculated in PREscore program
3. Likelihood of Release (higher of lines 1 or 2)	550	550	
Waste Characteristics			
4. Toxicity/Mobility (Table 6-13)	10,000	2,000	Calculated in PREscore program
5. Hazardous Waste Quantity (Table 2-6)	1×10^{8}	100	(See hazardous waste quantity worksheet)
• Waste Characteristics Product (lines 4 x 5) (go to line 6)	1×10^{12}	2×10^{5}	
6. Waste Characteristics (Table 2-7)	100	18	

COMMENTS:

Comment #23. Ambient air was sampled at the DRMO Storage Area (SWMU #1). Level I concentrations of lead were detected (Reference 8, Table 4.3.1, Section 4.3; Reference 1, Table 2-3).

AIR MIGRATION PATHWAY SCORESHEET

Factor Categories and Factors	Max Value	HRS Value Assigned	References and Comments
Targets			
7. Nearest Individual (Table 6-16)	50	50	Please see Comment #24.
8. Population (8a + 8b + 8c)*	N/A	2.27×10^5	
a. Level I Concentrations	N/A	2.27×10^5	(See Table 21)
b. Level II Concentrations	N/A	0	(See Table 21)
c. Potential Contamination	N/A	0	(See Table 22)
9. Resources (HRS Section 6.3.3)	5	0	No resources identified within 1/2 mile of the base.
10. Sensitive Environments** (lines 10a + 10b)	N/A	125	
a. Actual Contamination	N/A	125	(See Table 23)
b. Potential Contamination	N/A	0.058	(See Table 24)
11. Targets (lines 7 + 8 + 9 + 10)*	N/A	227,225	
12. Air Pathway Score (S_a)* [(lines 3 x 6 x 11)/82,500]	100	100	

* Do not round to the nearest integer

** Multiply lines 3 x 6 x 10 and divide the product by 82,500. If the results is $\leq$ 60, assign the sensitive environments targets value as calculated. If the result is > 60, assign a targets value for the sensitive environments as follows:

$\frac{(60)(82,500)}{(\text{line 3})(\text{line 6})}$ Please note that a pathway score based <u>solely</u> on sensitive environments is limited to a maximum of 60

COMMENTS:

Comment #24. It is documented that 22,731 people either live or work at the Charleston Naval Base Level I contaminants of lead have been detected on base through the air pathway. In considering the worst case scenario, all people who live on base are assumed to be exposed to this contamination (Reference 11).

TABLE 21 POPULATION Actual Contamination				
Contaminant Detected	Concentration Level I or Level II	(A) Population	(B) Level Multiplier*	(A x B)
Lead	Level I	22,731	10	2.27×10^6
* Multipliers • Level I = 10 • Level II = 1	Air Population Targets Actual Contamination Values		8a. Sum (A x B) Level I	2.27×10^6
			8b. Sum (A x B) Level II	

Reference/Comment: Ambient air tested positive for lead. There are 22,731 people documented who either live or work on base (Reference 8, Table 4.3-1, Section 4.3; Reference 1, Table 2-3).

HRS REVIEW SCORE SHEETS

AIR PATHWAY CALCULATIONS

TABLE 22 POPULATION - POTENTIAL CONTAMINATION		
Distance Category (miles)	Population	Distance Weighted Population Values (Table 6-17)
0		
> 0 to 1/4		
> 1/4 to 1/2		
> 1/2 to 1		
> 1 to 2		
> 2 to 3		
> 3 to 4		

Potential Contamination = $\frac{\text{Sum}}{10}$ = 0 *

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.

Reference/Comment: Not evaluated.

TABLE 23
SENSITIVE ENVIRONMENTS
Actual Contamination

Sensitive Environment	(A) Assigned Value (Table 4-23)	Wetlands Acreage	(B) Wetlands Rating Value (Table 6-18)	(Sum A + Sum B)
Least Tern	50	N/A	N/A	
Wetlands	N/A	75	75	
			Sum: 75	
		Air Sensitive Environment Targets Actual Contamination Value		
	Sum: 50			125

Reference/Comment: Please see Comment #25.

HRS REVIEW SCORE SHEETS

COMMENTS:

Comment #25. According to the Heritage Trust Database, the Least Tern is the only endangered or threatened species known to live on base. Wetlands comprising approximately 75 acres are the only other sensitive environment known to occur within the boundary of the base. Since there is an observed release documented for the surficial aquifer, the Least Tern and wetlands on base will be assumed to be exposed (Reference 2; Reference 10).

AIR PATHWAY CALCULATIONS

TABLE 24
SENSITIVE ENVIRONMENTS - POTENTIAL CONTAMINATION

Sensitive Environment	(A) Assigned Rating Value (Table 4-23)	Distance (miles)	(B) Assigned Distance Weight (Table 6-15)	(A x B)	Wetlands Distance (miles)	(C) Assigned Distance Weight (Table 6-15)	Wetlands Acreage	(D) Wetlands Rating Value (Table 6-18)	(C x D)
Big Eared Bat	50	1.5	0.0051	0.255	0	1.0			
Least Tern	50	1.5	0.0051	0.255	> 0 to 1/4	0.25			
Least Tern	50	3.5	0.0014	0.07	> 1/4 to 1/2	0.054			
					> 1/2 to 1	0.016			
					> 1 to 2	0.0051			
					> 2 to 3	0.0023			
					> 3 to 4	0.0014			
			Sum (A x B)	0.58				Sum (C x D)	

Potential Contamination = $\frac{\text{Sum (A x B)} + \text{Sum (C x D)}}{10}$ = 0.058 *

* If < 1, do not round to the nearest integer; if ≥ 1, round to the nearest integer.

Reference/Comment: Please see Comment #26.

HRS REVIEW SCORE SHEETS

COMMENTS:

Comment #26. According to the Heritage Trust Dababase, the Big-Eared Bat and the Least Tern are the only endangered or threatened species documented to live within four miles of the Charleston Naval Base (Reference 2; Reference 10).

3.3 PREscore Score Sheets

NPL Characteristics Data Collection Form
CHARLESTON NAVAL BASE - 07/13/92

Record Information

1. Site Name: CHARLESTON NAVAL BASE
   (as entered in CERCLIS)

2. Site CERCLIS Number: N/A

3. Site Reviewer: CHARLES MASON

4. Date: 06

5. Site Location: CHARLESTON, CHARLESTON AND BERKELEY, SOUTH CAROLINA
   (City/County,State)

6. Congressional District: 01

7. Site Coordinates: Multiple

   Latitude: 32 51'21.0" Longitude: 79

Site Description

1. Setting: Suburban

2. Current Owner: Federal

3. Current Site Status: Active

4. Years of Operation: Active Site , from and to dates: 1901-PRESENT

5. How Initially Identified: Other Federal Program

6. Entity Responsible for Waste Generation:

   - Federal Facility
   - Military

7. Site Activities/Waste Deposition:

   - Industrial Landfill
   - Drum/Container Storage
   - Discharge to Sewer/Surface Water
   - Airborne Release/Incineration

Waste Description

8. Wastes Deposited or Detected Onsite:

- Organic Chemicals
- Solvents
- Acids/Bases
- Paints/Pigments
- Pesticides/Herbicides
- Metals
- Construction Waste
- Lead
- Asbestos
- PCBs

Response Actions

9. Response/Removal Actions:

RCRA Information

10. For All Active Facilities, RCRA Site Status:

- -90 Day Accumulator

Demographic Information

11. Workers Present Onsite: Yes

12. Distance to Nearest Non-Worker Individual: Onsite

13. Residential Population Within 1 Mile: Unknown

14. Residential Population Within 4 Miles: Unknown

Water Use Information

15. Local Drinking Water Supply Source:

- No Water Withdrawals Within Target Distance Limits

16. Total Population Served by Local Drinking Water Supply Source: Not Applic

17. Drinking Water Supply System Type for Local Drinking
Water Supply Sources:

    - Not Applicable

18. Surface Water Adjacent to/Draining Site:

    - Stream
    - Wetland
    - River

HRS DOCUMENTATION RECORD
CHARLESTON NAVAL BASE - 07/13/92

1. Site Name: CHARLESTON NAVAL BASE
   (as entered in CERCLIS)

2. Site CERCLIS Number: N/A

3. Site Reviewer: CHARLES MASON

4. Date: 06

5. Site Location: CHARLESTON, CHARLESTON AND BERKELEY, SOUTH CAROLINA
   (City/County,State)

6. Congressional District: 01

7. Site Coordinates: Multiple

   Latitude: 32 51'21.0" Longitude: 79

	Score
Ground Water Migration Pathway Score (Sgw)	3.33
Surface Water Migration Pathway Score (Ssw)	3.58
Soil Exposure Pathway Score (Ss)	0.65
Air Migration Pathway Score (Sa)	100.00

Site Score	50.06

NOTE

EPA uses the terms "facility," "site," and "release" interchangeably. The term "facility" is broadly defined in CERCLA to include any area where hazardous substances have "come to be located" (CERCLA Section 109(9)), and the listing process is not intended to define or reflect boundaries of such facilities or releases. Site names, and references to specific parcels or properties, are provided for general identification purposes only. Knowledge regarding the extent of sites will be refined as more information is developed during the RI/FS and even during implementation of the remedy.

GROUND WATER MIGRATION PATHWAY SCORESHEET
CHARLESTON NAVAL BASE - 07/13/92

GROUND WATER MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release to an Aquifer Aquifer: SURFICIAL		
1. Observed Release	550	550
2. Potential to Release		
2a. Containment	10	10
2b. Net Precipitation	10	3
2c. Depth to Aquifer	5	5
2d. Travel Time	35	35
2e. Potential to Release [lines 2a(2b+2c+2d)]	500	430
3. Likelihood of Release	550	550
Waste Characteristics		
4. Toxicity/Mobility	*	1.00E+04
5. Hazardous Waste Quantity	*	10000
6. Waste Characteristics	100	100
Targets		
7. Nearest Well	50	0.00E+00
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	0.00E+00
8d. Population (lines 8a+8b+8c)	**	0.00E+00
9. Resources	5	5.00E+00
10. Wellhead Protection Area	20	0.00E+00
11. Targets (lines 7+8d+9+10)	**	5.00E+00
12. Targets (including overlaying aquifers)	**	5.00E+00
13. Aquifer Score	100	3.33
GROUND WATER MIGRATION PATHWAY SCORE (Sgw)	100	3.33

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
CHARLESTON NAVAL BASE - 07/13/92

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors DRINKING WATER THREAT	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	0
2. Potential to Release by Overland Flow		
2a. Containment	10	10
2b. Runoff	25	25
2c. Distance to Surface Water	25	25
2d. Potential to Release by Overland Flow [lines 2a(2b+2c)]	500	500
3. Potential to Release by Flood		
3a. Containment (Flood)	10	10
3b. Flood Frequency	50	25
3c. Potential to Release by Flood (lines 3a x 3b)	500	250
4. Potential to Release (lines 2d+3c)	500	500
5. Likelihood of Release	550	500
Waste Characteristics		
6. Toxicity/Persistence	*	1.00E+04
7. Hazardous Waste Quantity	*	10000
8. Waste Characteristics	100	100
Targets		
9. Nearest Intake	50	0.00E+00
10. Population		
10a. Level I Concentrations	**	0.00E+00
10b. Level II Concentrations	**	0.00E+00
10c. Potential Contamination	**	0.00E+00
10d. Population (lines 10a+10b+10c)	**	0.00E+00
11. Resources	5	5.00E+00
12. Targets (lines 9+10d+11)	**	5.00E+00
13. DRINKING WATER THREAT SCORE	100	3.03

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
CHARLESTON NAVAL BASE - 07/13/92

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors HUMAN FOOD CHAIN THREAT	Maximum Value	Value Assigned
Likelihood of Release		
14. Likelihood of Release (same as line 5)	550	500
Waste Characteristics		
15. Toxicity/Persistence/Bioaccumulation	*	5.00E+08
16. Hazardous Waste Quantity	*	10000
17. Waste Characteristics	1000	1000
Targets		
18. Food Chain Individual	50	0.00E+00
19. Population		
19a. Level I Concentrations	**	0.00E+00
19b. Level II Concentrations	**	0.00E+00
19c. Pot. Human Food Chain Contamination	**	3.43E-02
19d. Population (lines 19a+19b+19c)	**	3.43E-02
20. Targets (lines 18+19d)	**	3.43E-02
21. HUMAN FOOD CHAIN THREAT SCORE	100	0.21

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT SCORESHEET
CHARLESTON NAVAL BASE - 07/13/92

SURFACE WATER OVERLAND/FLOOD MIGRATION COMPONENT Factor Categories & Factors ENVIRONMENTAL THREAT	Maximum Value	Value Assigned
Likelihood of Release		
22. Likelihood of Release (same as line 5)	550	500
Waste Characteristics		
23. Ecosystem Toxicity/Persistence/Bioacc.	*	5.00E+08
24. Hazardous Waste Quantity	*	10000
25. Waste Characteristics	1000	1000
Targets		
26. Sensitive Environments		
26a. Level I Concentrations	**	0.00E+00
26b. Level II Concentrations	**	0.00E+00
26c. Potential Contamination	**	5.58E-02
26d. Sensitive Environments (lines 26a+26b+26c)	**	5.58E-02
27. Targets (line 26d)	**	5.58E-02
28. ENVIRONMENTAL THREAT SCORE	60	0.34
29. WATERSHED SCORE	100	3.58
30. SW: OVERLAND/FLOOD COMPONENT SCORE (Sof)	100	3.58

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
CHARLESTON NAVAL BASE - 07/13/92

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT Factor Categories & Factors DRINKING WATER THREAT	Maximum Value	Value Assigned
Likelihood of Release to Aquifer Aquifer: SURFICIAL		
1. Observed Release	550	550
2. Potential to Release		
2a. Containment	10	10
2b. Net Precipitation	10	3
2c. Depth to Aquifer	5	5
2d. Travel Time	35	35
2e. Potential to Release [lines 2a(2b+2c+2d)]	500	430
3. Likelihood of Release	550	550
Waste Characteristics		
4. Toxicity/Mobility/Persistence	*	1.00E+04
5. Hazardous Waste Quantity	*	10000
6. Waste Characteristics	100	100
Targets		
7. Nearest Intake	50	0.00E+00
8. Population		
8a. Level I Concentrations	**	0.00E+00
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	0.00E+00
8d. Population (lines 8a+8b+8c)	**	0.00E+00
9. Resources	5	5.00E+00
10. Targets (lines 7+8d+9)	**	5.00E+00
11. DRINKING WATER THREAT SCORE	100	3.33

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
CHARLESTON NAVAL BASE - 07/13/92

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT Factor Categories & Factors HUMAN FOOD CHAIN THREAT	Maximum Value	Value Assigned
Likelihood of Release		
12. Likelihood of Release (same as line 3)	550	550
Waste Characteristics		
13. Toxicity/Mobility/Persistence/Bioacc.	*	5.00E+08
14. Hazardous Waste Quantity	*	10000
15. Waste Characteristics	1000	1000
Targets		
16. Food Chain Individual	50	0.00E+00
17. Population		
17a. Level I Concentrations	**	0.00E+00
17b. Level II Concentrations	**	0.00E+00
17c. Pot. Human Food Chain Contamination	**	1.37E-02
17d. Population (lines 17a+17b+17c)	**	1.37E-02
18. Targets (lines 16+17d)	**	1.37E-02
19. HUMAN FOOD CHAIN THREAT SCORE	100	0.09

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT SCORESHEET
CHARLESTON NAVAL BASE - 07/13/92

GROUND WATER TO SURFACE WATER MIGRATION COMPONENT Factor Categories & Factors ENVIRONMENTAL THREAT	Maximum Value	Value Assigned
Likelihood of Release		
20. Likelihood of Release (same as line 3)	550	550
Waste Characteristics		
21. Ecosystem Tox./Mobility/Persist./Bioacc.	*	5.00E+08
22. Hazardous Waste Quantity	*	10000
23. Waste Characteristics	1000	1000
Targets		
24. Sensitive Environments		
24a. Level I Concentrations	**	0.00E+00
24b. Level II Concentrations	**	0.00E+00
24c. Potential Contamination	**	2.23E-02
24d. Sensitive Environments (lines 24a+24b+24c)	**	2.23E-02
25. Targets (line 24d)	**	2.23E-02
26. ENVIRONMENTAL THREAT SCORE	60	0.15
27. WATERSHED SCORE	100	3.57
28. SW: GW to SW COMPONENT SCORE (Sgs)	100	3.57

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

SOIL EXPOSURE PATHWAY SCORESHEET
CHARLESTON NAVAL BASE - 07/13/92

SOIL EXPOSURE PATHWAY Factor Categories & Factors RESIDENT POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
1. Likelihood of Exposure	550	550
Waste Characteristics		
2. Toxicity	*	1.00E+04
3. Hazardous Waste Quantity	*	10
4. Waste Characteristics	100	18
Targets		
5. Resident Individual	50	0.00E+00
6. Resident Population		
6a. Level I Concentrations	**	0.00E+00
6b. Level II Concentrations	**	0.00E+00
6c. Resident Population (lines 6a+6b)	**	0.00E+00
7. Workers	15	5.00E+00
8. Resources	5	0.00E+00
9. Terrestrial Sensitive Environments	***	0.00E+00
10. Targets (lines 5+6c+7+8+9)	**	5.00E+00
11. RESIDENT POPULATION THREAT SCORE	**	4.95E+04

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

SOIL EXPOSURE PATHWAY SCORESHEET
CHARLESTON NAVAL BASE - 07/13/92

SOIL EXPOSURE PATHWAY Factor Categories & Factors NEARBY POPULATION THREAT	Maximum Value	Value Assigned
Likelihood of Exposure		
12. Attractiveness/Accessibility	100	5.00E+00
13. Area of Contamination	100	6.00E+01
14. Likelihood of Exposure	500	5.00E+00
Waste Characteristics		
15. Toxicity	*	1.00E+04
16. Hazardous Waste Quantity	*	10
17. Waste Characteristics	100	18
Targets		
18. Nearby Individual	1	1.00E+00
19. Population Within 1 Mile	**	4.10E+01
20. Targets (lines 18+19)	**	4.20E+01
21. NEARBY POPULATION THREAT SCORE	**	3.78E+03
SOIL EXPOSURE PATHWAY SCORE (Ss)	100	0.65

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.

AIR PATHWAY SCORESHEET
CHARLESTON NAVAL BASE - 07/13/92

AIR MIGRATION PATHWAY Factor Categories & Factors	Maximum Value	Value Assigned
Likelihood of Release		
1. Observed Release	550	550
2. Potential to Release		
2a. Gas Potential to Release	500	250
2b. Particulate Potential to Release	500	280
2c. Potential to Release	500	280
3. Likelihood of Release	550	550
Waste Characteristics		
4. Toxicity/Mobility	*	2.00E+03
5. Hazardous Waste Quantity	*	100
6. Waste Characteristics	100	18
Targets		
7. Nearest Individual	50	5.00E+01
8. Population		
8a. Level I Concentrations	**	2.27E+05
8b. Level II Concentrations	**	0.00E+00
8c. Potential Contamination	**	0.00E+00
8d. Population (lines 8a+8b+8c)	**	2.27E+05
9. Resources	5	0.00E+00
10. Sensitive Environments		
10a. Actual Contamination	***	1.25E+02
10b. Potential Contamination	***	5.80E-02
10c. Sens. Environments(lines 10a+10b)	***	1.25E+02
11. Targets (lines 7+8d+9+10c)	**	2.27E+05
AIR MIGRATION PATHWAY SCORE (Sa)	100	1.00E+02

* Maximum value applies to waste characteristics category.
** Maximum value not applicable.
*** No specific maximum value applies, see HRS for details.

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: #1 DRMO STAGING

a. Wastestream ID	TRAINING AREA
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

Documentation for Constituents:

NOT EVALUATED. INSUFFICIENT DATA AVAILABLE.

Reference:

Documentation for Wastestream Quantity:

NOT EVALUATED. THERE IS NOT ENOUGH DATA AVAILABLE TO GIVE A RELIABLE ESTIMATE.

Reference:

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	#1 DRMO STAGING
b. Source Type	Contaminated Soil
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	52.00 | 2800.00
e. Source Volume/Area Value	2.08E-02
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	2.08E-02

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Barium	< 2	NO	4.9E+03	ppm
Cadmium	< 2	NO	6.6E+00	ppm
Chromium	< 2	NO	4.4E+02	ppm
Lead	< 2	NO	3.5E+03	ppm
Mercury	< 2	NO	7.6E+00	ppm
Nickel	< 2	NO	2.3E+03	ppm
Silver	< 2	NO	4.4E+00	ppm

Documentation for Source Type:

THERE IS DOCUMENTED CONTAMINATION AT THE SURFACE SOILS.

Reference: 1, SECTION 2.6.1

Documentation for Secondary Source Type:

NOT EVALUATED

Reference:

Documentation for Source Hazardous Substances:

SOIL SAMPLES FROM THE DRMO STAGING AREA SHOW CONTAMINATION FOR BARIUM, CADMIUM, CHROMIUM, LEAD, MERCURY, NICKEL, AND SILVER. VALUES FOR ALL CONTAMINANTS CAME FROM APPENDIX D OF REFERENCE 1. THESE VALUES ARE CROSS-REFERENCED IN TABLE 9 OF REFERENCE 17. THE MAXIMUM VALUE FROM EACH SAMPLE LOCATION WAS EVALUATED IN ACCORDANCE WITH THE HRS.

IT MIGHT APPEAR THAT THERE IS A DISCREPANCY IN THE CONSIDERATION OF THIS SITE FOR THE HRS AND THE RECOMMENDATIONS FOR THIS SITE BASED ON THE RISK ASSESSMENT INCLUDED AS REFERENCE 16. HOWEVER, THE HRS REQUIRES THAT CERTAIN ASSUMPTIONS BE MADE THAT ARE NOT FACTORED IN THE RISK ASSESSMENT.

AMONG THE KEY DIFFERENCES IS THE POPULATION CONSIDERED FOR THE HRS. THE HRS ASSUMES THAT THE ENTIRE BASE POPULATION, OR 22,731 PEOPLE, IS EXPOSED TO THE CONTAMINANTS FROM THE DRMO STAGING AREA. THE HRS ASSUMES THAT THIS CONTAMINATION MAY SPREAD THROUGH THE GROUNDWATER, SURFACE WATER, SOIL, AND AIR. THE RISK ASSESSMENT ONLY CONSIDERS "A HYPOTHETICAL FUTURE POPULATION OF ON-SITE RESIDENTS AS THE INDIVIDUALS POTENTIALLY EXPOSED TO THE SOIL AND TO THE CONTAMINANTS OF CONCERN...." (SECTION 2.0 OF REFERENCE 16). IN SUMMARY THE HRS CONSIDERS 22,731 PEOPLE AS EXPOSED TO THIS CONTAMINATION THROUGH FOUR PATHWAYS. THE RISK ASSESSMENT CONSIDERS A HYPOTHETICAL POPULATION EXPOSED THROUGH THE SOIL, AIR, AND INGESTION OF VEGETABLES FROM GARDENS.

THE RISK ASSESSMENT CONSIDERS AVERAGE SOIL CONCENTRATIONS OF EACH CONTAMINANT (SECTION 7.2 OF REFERENCE 16). THE HRS CONSIDERS THE INDIVIDUAL AREAS WITH THE HIGHEST LEVELS OF CONTAMINATION AND BASES THE NUMBER OF PEOPLE EXPOSED TO EACH OF THOSE POINTS. ONE MAY SEE HOW USING THE SAME DATA CAN YIELD ENTIRELY DIFFERENT CONCLUSIONS WHEN USING THE HRS VERSUS ANOTHER METHOD OF ASSESSMENT.

Reference: 1, SECTION 2.6.1, APPENDIX D; 17, TABLE 9; 16, SECT. 2.0, 7.2

Documentation for Source Volume:

ACORDING TO SECTION 2-11 OF REFERENCE 1, THE SURFACE AREA SAMPLED IS APPROXIMATELY 2800 SQUARE FEET IN AREA. ACCORDING TO SECTION 4.1 OF REFERENCE 8 THE CONTAMINATION IS PRINCIPALLY CONFINED TO THE UPPER ONE-HALF FOOT OF THE SOILS. THIS MEANS THAT APPROXIMATELY 1400 CUBIC FEET IS CONTAMINATED. THIS NUMBER DIVIDED BY 27 EQUALS 52 CUBIC YARDS.

Reference: 1, FIGURE 2-11; 8, SECTION 4.1

Documentation for Source Area:

ACCORDING TO FIGURE 2-11 THE CONTAMINATION IS APPROXIMATELY 70 FEET BY 40 FEET.

Reference: 1, SECTION 2.6.1, FIGURE 2-11

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: #2 LEAD CONTAM AREA

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

Documentation for Constituents:

NOT EVALUATED. THERE IS NOT ENOUGH DATA TO GIVE A RELIABLE ESTIMATE.

Reference:

Documentation for Wastestream Quantity:

NOT EVALUATED. THERE IS NOT ENOUGH DATA AVAILABLE TO GIVE A RELIABLE ESTIMATE.

Reference:

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	#2 LEAD CONTAM AREA	
b. Source Type	Contaminated Soil	
c. Secondary Source Type	N.A.	
d. Source Volume (yd3) | Source Area (ft2)	4840.00	261360.00
e. Source Volume/Area Value	1.94E+00	
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00	
g. Data Complete?	NO	
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00	
i. Data Complete?	NO	
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	1.94E+00	

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Lead	< 2	NO	3.7E+05	ppm

Documentation for Source Type:

ACCORDING TO REFERENCE 1 THE LEAD CONTAMINATION AREA CONSISTS PRIMARILY OF LEAD WHICH HAS MIGRATED THROUGH THE SOILS.

Reference: 1, SECTION 2.6.2

Documentation for Secondary Source Type:

NOT EVALUATED

Reference:

Documentation for Source Hazardous Substances:

LEAD IS THE PRINCIPAL CONTAMINANT NOTED FOR SWMU #2. THE HIGHEST CONCENTRATION OF LEAD REPORTED IN THE SOIL IS 371,000 PARTS PER MILLION. IN ACCORDANCE WITH CONSIDERING THE WORST CASE SCENARIO THIS VALUE WILL BE CONSIDERED.

Reference: 1, SECTION 2.6.2, TABLE 2-2; 8, SECTION 3.2.1, TABLE 4.1-1

Documentation for Source Volume:

CONTAMINATION IS DOCUMENTED TO BE PRINCIPALLY CONFINED TO THE UPPER 0.5 FEET OF THE SOIL. THE AREA OF CONTAMINATION IS DOCUMENTED TO BE SIX ACRES IN AREA. THERE ARE 43,560 SQUARE FEET PER ACRE. THE RESULTING AREA OF 261,360 SQUARE FEET MULTIPLIED BY 0.5 FEET EQUALS 130,680 CUBIC FEET TOTAL AREA OF CONTAMINATION. THIS NUMBER DIVIDED BY 27 EQUALS 4,840 CUBIC YARDS. THIS IS A VERY CONSERVATIVE ESTIMATE SINCE IT IS DOCUMENTED THAT CONTAMINATION HAS SPREAD DEEPER THROUGH THE SOIL.

Reference: 1, SECTION 2.6.2; 8, SECTION 4.1

Documentation for Source Area:

THE SOURCE AREA IS DOCUMENTED TO BE ABOUT SIX ACRES IN AREA. THERE ARE 43,560 SQUARE FEET PER ACRE. THIS GIVES AN AREA OF 261,360 SQUARE FEET.

Reference: 1, SECTION 2.6.2

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: #5 BATTERY TREATMNT

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

Documentation for Constituents:

NOT EVALUATED. THERE IS NOT ENOUGH DATA IS AVAILABLE TO GIVE A RELIABLE ESTIMATE.

Reference:

Documentation for Wastestream Quantity:

NOT EVALUATED. THERE IS NOT ENOUGH DATA TO GIVE A RELIABLE ESTIMATE.

Reference:

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	#5 BATTERY TREATMNT
b. Source Type	Contaminated Soil
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	30.00 | 800.00
e. Source Volume/Area Value	1.20E-02
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	1.20E-02

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Lead	> 2	NO	2.2E+04	ppm

Documentation for Source Type:

THE AREA WAS USED TO NEUTRALIZE BATTERY ACID. THE TANK USED TO DO THIS REPORTEDLY LEAKED. THE SURROUNDING SOIL WAS REPORTEDLY CONTAMINATED.

Reference: 1, SECTION 2.6.5

Documentation for Secondary Source Type:

NOT EVALUATED

Reference:

Documentation for Source Hazardous Substances:

LEAD IS THE ONLY CONTAMINANT REPORTED AT THIS SWMU.
THE HIGHEST VALUE FROM ALL SAMPLING LOCATIONS WAS ENTERED.

Reference: 1, SECTION 2.6.5, TABLE 2-5; 17, TABLE 4

Documentation for Source Volume:

THE AREA OF 800 SQUARE FEET WAS SAMPLED APPROXIMATELY 1 FOOT IN DEPTH. THIS EQUALS APPROXIMATELY 800 CUBIC FEET OF CONTAMINATION. THIS NUMBER DIVIDED BY 27 EQUALS 30 CUBIC YARDS.

Reference: 1, SECTION 2.6.5, FIGURE 2-14, TABLE 2-5

Documentation for Source Area:

BASED ON FIGURE 2-14 AND TABLE 2-5 THE AREA OF CONTAMINATION IS APPROXIMATELY 800 SQUARE FEET.

Reference: 1, SCTION 2.6.5, FIGURE 2-14, TABLE 2-5

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: #6 PUB WKS STOR YD

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

Documentation for Constituents:

NOT EVALUATED. THERE IS NOT ENOUGH DATA PRESENT TO GIVE A RELIABLE ESTIMATE.

Reference:

Documentation for Wastestream Quantity:

NOT EVALUATED. THERE IS NOT ENOUGH DATA AVAILABLE TO GIVE A RELIABLE ESTIMATE.

Reference:

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	#6 PUB WKS STOR YD
b. Source Type	Contaminated Soil
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	694.00 | 37500.00
e. Source Volume/Area Value	2.78E-01
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	2.78E-01

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Barium	< 2	NO	1.7E+02	ppm
Cadmium	< 2	NO	9.4E+00	ppm
Chromium	< 2	NO	5.6E+01	ppm
Lead	< 2	NO	9.8E+02	ppm
Mercury	< 2	NO	2.9E+00	ppm
Nickel	< 2	NO	6.8E+01	ppm
Silver	< 2	NO	8.7E+00	ppm

Documentation for Source Type:

SURFACE SOIL SAMPLES HAVE SHOWN LEAD AND OTHER TYPES OF CONTAMINATION AT OR WITHIN SIX INCHES OF THE SURFACE.

Reference: 1, TABLE 2-5, SECTION 2.6.6

Documentation for Secondary Source Type:

NOT EVALUATED

Reference:

Documentation for Source Hazardous Substances:

MAXIMUM VALUES FOR EACH CONTAMINANT LISTED IN APPENDIX F-2 HAVE BEEN USED. THIS IS BECAUSE ALL SOIL SAMPLES ARE DOCUMENTED TO BE NO DEEPER THAN SIX INCHES BELOW THE SURFACE OF THE SOIL. THESE RESULTS ARE ALSO LISTED IN APPENDIX B OF REFERENCE 17.

Reference: 1, SECTION 2.6.6, APPENDIX F-2; 17, TABLE 3, APPENDIX B

Documentation for Source Volume:

SAMPLING WAS DONE AT A MAXIMUM OF THREE FEET BELOW THE GROUND SURFACE. HOWEVER, THE MAJORITY OF THE SAMPLE LOCATIONS TESTED POSITIVE FOR CONTAMINATION IN THE UPPER HALF-FOOT OF THE SOIL. MULTIPLYING THE AREA OF CONTAMINATION BY ONE-HALF AND DIVIDING BY 27 WILL GIVE THE APPROXIMATE VOLUME OF CONTAMINATION IN CUBIC YARDS.

Reference: 1, SECTION 2.6.6, FIG. 2-16

Documentation for Source Area:

BASED ON THE SAMPLING AREA SHOWN IN FIGURE 2-16 OF REFERENCE 1, THE AREA OF CONTAMINATION IS ESTIMATED TO BE 37,500 SQUARE FEET.

Reference: 1, FIG. 2-16

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: #7 PCB TRANSFORMER

a. Wastestream ID	
b. Hazardous Constituent Quantity (C) (lbs.)	0.00
c. Data Complete?	NO
d. Hazardous Wastestream Quantity (W) (lbs.)	0.00
e. Data Complete?	NO
f. Wastestream Quantity Value (W/5,000)	0.00E+00

Documentation for Constituents:

NOT EVALUATED. THERE IS NOT ENOUGH DATA TO GIVE A RELIABLE ESTIMATE.

Reference:

Documentation for Wastestream Quantity:

NOT EVALUATED. THERE IS NOT ENOUGH DATA TO GIVE A RELIABLE ESTIMATE.

Reference:

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	#7 PCB TRANSFORMER
b. Source Type	Contaminated Soil
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	9250.00 | 18500.00
e. Source Volume/Area Value	3.70E+00
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	0.00E+00
g. Data Complete?	NO
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	0.00E+00
i. Data Complete?	NO
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	3.70E+00

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Arsenic	< 2	NO	1.6E+01	ppm
DDT	< 2	NO	4.0E+01	ppm
PCBs	< 2	NO	6.2E+01	ppm

Documentation for Source Type:

THE AREA CONTAINS CONTAMINATED SOIL FROM OIL AND PESTICIDE SPILLS.

Reference: 1, SECTION 2.6.7

Documentation for Secondary Source Type:

NOT EVALUATED

Reference:

Documentation for Source Hazardous Substances:

THIS INFORMATION WAS RETRIEVED FROM SECTION 2.6.7 AND APPENDIX G. SAMPLES WERE MEASURED IN ug/gm (PARTS PER MILLION). THE SAMPLING LOCATIONS ARE DOCUMENTED TO BE WITHIN SIX INCHES OF THE SURFACE OF THE SOIL. THE SOIL SAMPLES TESTED POSITIVE FOR PCBs, DDT, AND ARSENIC.

Reference: 1, SECTION 2.6.7, APPENDIX G

Documentation for Source Volume:

SOIL SAMPLING REPORTEDLY TOOK PLACE AT A MAXIMUM DEPTH OF 6 INCHES. USING THE SURFACE AREA CALCULATION THIS GIVES AN AREA OF 9,250 CUBIC FEET OF CONTAMINATION.

Reference: 1, SECTION 2.6.7, FIG. 2-17

Documentation for Source Area:

BASED ON THE SAMPLING LOCATIONS DEPICTED IN FIGURE 2-17, THE AREA OF CONTAMINATION IS ESTIMATED TO BE 18,500 SQUARE FEET IN AREA.

Reference: 1, FIG. 2-17

1. WASTESTREAM QUANTITY SUMMARY TABLE, SOURCE: #9 CLOSED LANDFILL

a. Wastestream ID	CLOSED LANDFILL
b. Hazardous Constituent Quantity (C) (lbs.)	73502.85
c. Data Complete?	YES
d. Hazardous Wastestream Quantity (W) (lbs.)	35855050.00
e. Data Complete?	YES
f. Wastestream Quantity Value (W/5,000)	7.17E+03

Wastestream Constituent Hazardous Substances	Concent.	Units	Liquid	Qualifier
Asbestos	2.0E-01	%	NO	
Mercury	5.0E-03	%	NO	

Documentation for Constituents:

THIS PERCENTAGE VALUE WAS ESTIMATED BY DIVIDING THE TOTAL WEIGHT OF THE ASBESTOS AND MERCURY DISPOSED (70,000 POUNDS OF ASBESTOS AND 1,750 POUNDS OF MERCURY) INTO THE LANDFILL OVER THE PERIOD OF 70 YEARS BY THE TOTAL WEIGHT OF INDUSTRIAL WASTE ESTIMATED TO BE DISPOSED OF IN THE LANDFILL OVER THE PERIOD OF 70 YEARS (35,855,050 POUNDS). THE ASBESTOS GENERATED BY THE "SIMA" (REFER TO TABLE 2-8 OF REFERENCE 1) CANNOT BE EVALUATED SINCE THE UNITS OF GENERATION ARE IN YARDS INSTEAD OF POUNDS. THIS WILL YIELD A PERCENTAGE OF TOTAL WEIGHT OF THE TWO COMPOUNDS DISPOSED. THE OTHER COMPOUNDS LISTED CANNOT BE EVALUATED SINCE THERE IS NO DATA INDICATING THE EXACT CONSTITUENTS

Reference: 1, TABLE 2-8

Documentation for Wastestream Quantity:

FROM TABLE 2.8 IT IS ESTIMATED THAT 35,855,050 POUNDS OF INDUSTRIAL WASTES WERE DISPOSED OF IN THE LANDFILL OVER A PERIOD OF UP TO 70 YEARS. EACH AMOUNT OF WASTE GENERATED ANNUALLY WAS MULTIPLIED BY THE YEARS OF DISPOSAL TO GIVE A TOTAL WEIGHT DISPOSED. ALL AMOUNTS WERE ADDED TOGETHER TO YIELD A TOTAL FOR ALL WASTES DISPOSED OF IN THE LANDFILL. ACCORDING TO THE HRS EACH GALLON OF WASTE IS ASSUMED TO WEIGH 10 POUNDS.

Reference: 1, TABLE 2-8

2. SOURCE HAZARDOUS WASTE QUANTITY FACTOR TABLE

a. Source ID	#9 CLOSED LANDFILL
b. Source Type	Landfill
c. Secondary Source Type	N.A.
d. Source Volume (yd3) | Source Area (ft2)	0.00 | 0.00
e. Source Volume/Area Value	0.00E+00
f. Source Hazardous Constituent Quantity (HCQ) Value (sum of 1b)	7.35E+04
g. Data Complete?	YES
h. Source Hazardous Wastestream Quantity (WSQ) Value (sum of 1f)	7.17E+03
i. Data Complete?	YES
k. Source Hazardous Waste Quantity (HWQ) Value (2e, 2f, or 2h)	7.35E+04

Source Hazardous Substances	Depth (feet)	Liquid	Concent.	Units
Acenaphthylene	> 2	NO	1.7E-01	ppm
Acenaphthene	> 2	NO	1.6E-01	ppm
Anthracene	> 2	NO	1.0E-01	ppm
Arsenic	> 2	NO	1.1E+01	ppm
Barium	> 2	NO	1.1E+02	ppm
Benz(a)anthracene	> 2	NO	2.6E-01	ppm
Benzo(a)pyrene	> 2	NO	2.4E-01	ppm
Benzo(k)fluoranthene	> 2	NO	4.7E-01	ppm
Bis (2-ethylhexyl) phthalate	> 2	NO	8.7E+00	ppm
Butylbenzyl phthalate	> 2	NO	3.3E+00	ppm
Chlorobenzene	> 2	NO	1.5E-01	ppm
Chromium	> 2	NO	4.9E+01	ppm
Chrysene	> 2	NO	4.2E-01	ppm
Dichlorobenzene, 1,2-	> 2	NO	2.3E-02	ppm
Dichlorobenzene, 1,4-	> 2	NO	1.0E-01	ppm
Fluorene	> 2	NO	2.1E-01	ppm
Lead	> 2	NO	3.2E+03	ppm
Naphthalene	> 2	NO	7.2E-01	ppm
Phenanthrene	> 2	NO	1.8E+00	ppm
Pyrene	> 2	NO	1.3E+00	ppm

Documentation for Source Type:

SWMU 9 IS DOCUMENTED TO BE A LANDFILL.

Reference: 1, SECTION 2.6.9

Documentation for Secondary Source Type:

NOT EVALUATED

Reference:

Documentation for Source Hazardous Substances:

THE HIGHEST READING OF EACH CONTAMINANT FROM ALL LOCATIONS WAS EVALUATED. THIS AREA IS A LANDFILL AND IS MORE THAN LIKELY COVERED BY A TOPSOIL LAYER THAT IS GREATER THAN 2 FEET THICK. THEREFORE ALL CONTAMINANTS ARE ASSUMED TO BE GREATER THAN 2 FEET DEEP. SECTION 2.6.9 STATES THAT MOST OF THE AREA IS PAVED OVER. ACCORDING TO FIELD OBSERVATIONS MUCH OF THE AREA IS COVERED WITH GRASS, FORESTED AREAS, AND BODIES OF WATER.

Reference: 1, SECTION 2.6.9, TABLE 2-10; 6

Documentation for Source Volume:

NOT EVALUATED

Reference:

Documentation for Source Area:

NOT EVALUATED

Reference:

3. SITE HAZARDOUS WASTE QUANTITY SUMMARY

No.	Source ID	Migration Pathways	Vol. or Area Value (2e)	Constituent or Wastestream Value (2f,2h)	Hazardous Waste Qty. Value (2k)
1	#1 DRMO STAGING	GW-SW-SE-A	2.08E-02	0.00E+00	2.08E-02
2	#2 LEAD CONTAM AREA	GW-SW-SE-A	1.94E+00	0.00E+00	1.94E+00
3	#5 BATTERY TREATMNT	GW-SW	1.20E-02	0.00E+00	1.20E-02
4	#6 PUB WKS STOR YD	GW-SW-A	2.78E-01	0.00E+00	2.78E-01
5	#7 PCB TRANSFORMER	GW-SW-A	3.70E+00	0.00E+00	3.70E+00
6	#9 CLOSED LANDFILL	GW-SW	0.00E+00	7.35E+04	7.35E+04

4. PATHWAY HAZARDOUS WASTE QUANTITY AND WASTE CHARACTERISTICS SUMMARY TABLE

Migration Pathway	Contaminant Values		HWQVs*	WCVs**
Ground Water	Toxicity/Mobility	1.00E+04	10000	100
SW: Overland Flow, DW	Tox./Persistence	1.00E+04	10000	100
SW: Overland Flow, HFC	Tox./Persis./Bioacc.	5.00E+08	10000	1000
SW: Overland Flow, Env	Etox./Persis./Bioacc.	5.00E+08	10000	1000
SW: GW to SW, DW	Tox./Persistence	1.00E+04	10000	100
SW: GW to SW, HFC	Tox./Persis./Bioacc.	5.00E+08	10000	1000
SW: GW to SW, Env	Etox./Persis./Bioacc.	5.00E+08	10000	1000
Soil Exposure:Resident	Toxicity	1.00E+04	10	18
Soil Exposure: Nearby	Toxicity	1.00E+04	10	18
Air	Toxicity/Mobility	2.00E+03	100	18

* Hazardous Waste Quantity Factor Values
** Waste Characteristics Factor Category Values

Note: SW = Surface Water
GW = Ground Water
DW = Drinking Water Threat
HFC = Human Food Chain Threat
Env = Environmental Threat

No.	Aquifer ID	Type	Overlaying No.	Inter-Connected with	Likelihood of Release	Targets
1	SURFICIAL	Non K	0	0	550	5.00E+00

Containment

No.	Source ID	HWQ Value	Containment Value
1	#1 DRMO STAGING	2.08E-02	10
2	#2 LEAD CONTAM AREA	1.94E+00	10
3	#5 BATTERY TREATMNT	1.20E-02	10
4	#6 PUB WKS STOR YD	2.78E-01	10
5	#7 PCB TRANSFORMER	3.70E+00	10
6	#9 CLOSED LANDFILL	7.35E+04	10

Containment Factor 10

Documentation for Ground Water Containment, Source #1 DRMO STAGING :

THE CONTAMINATION HAS NOT BEEN EVALUATED FOR GROUNDWATER. BASED ON FIELD OBSERVATIONS AND SECTION 2.6.1 OF REFERENCE 1 THERE DOES NOT APPEAR TO BE A LINER PRESENT BELOW THE AREA NOR WOULD ONE BE EXPECTED TO BE PRESENT. THE AREA DOES NOT HAVE ANY VEGETATION AND LEAD DUST IS DOCUMENTED TO BE SPREAD VERY EASILY. BASED ON TABLE 3-2 OF THE HRS THIS SITE IS ASSIGNED THE MAXIMUM VALUE.

Reference: 1, SECTION 2.6.1; 6; 24, SECTION 1.3

Documentation for Ground Water Containment, Source #2 LEAD CONTAM AREA:

GROUNDWATER WAS NOT ANALYZED. REFERENCE 1 PROVIDES NO EVIDENCE OF A LINER BELOW THE LEAD CONTAMINATION AREA AND FIELD OBSERVATIONS PROVIDE NO EVIDENCE EITHER. BASED ON THIS THE MAXIMUM CONTAINMENT FACTOR VALUE WAS ASSIGNED.

Reference: 1, SECTION 2.6.2; 6; 24, SECTION 1.3

Documentation for Ground Water Containment, Source #5 BATTERY TREATMNT:

THERE IS NO EVIDENCE OF CONTAMINATION IN THE GROUNDWATER. HOWEVER, THERE IS NO EVIDENCE OF A LINER AND THERE IS DOCUMENTED SOIL CONTAMINATION. THEREFORE THE MAXIMUM VALUE IS ASSIGNED.

Reference: 1, SECTION 2.6.5; 6

Documentation for Ground Water Containment, Source #6 PUB WKS STOR YD:

GROUNDWATER CONTAMINATION HAS NOT BEEN CHARACTERIZED FOR THIS SITE. HOWEVER, THERE IS NO LINER DOCUMENTED FOR THIS AREA AND BASED ON FIELD OBSERVATIONS IT IS DOUBTFUL THAT THERE IS ONE. BASED ON THIS ASSUMPTION AND HRS TABLE 3-2 THIS SITE WILL BE SCORED THE MAXIMUM VALUE.

Reference: 1, SECTION 2.6.6; 6

Documentation for Ground Water Containment, Source #7 PCB TRANSFORMER:

SINCE THERE IS EVIDENCE OF GROUNDWATER CONTAMINATION IN THE UPPERMOST AQUIFER THE MAXIMUM VALUE WILL BE ASSIGNED.

Reference: 1, SECTION 2.6.7

Documentation for Ground Water Containment, Source #9 CLOSED LANDFILL:

SINCE THERE IS EVIDENCE OF HAZARDOUS SUBSTANCE MIGRATION INTO MONITORING WELLS THIS SITE IS GIVEN THE MAXIMUM VALUE.

Reference: 1, TABLE 2-9

Net Precipitation

Net Precipitation (inches) 0.00

Documentation for Net Precipitation:

NOT EVALUATED, NET PRECIPITATION FACTOR OF 3 WAS USED FROM FIGURE 3-2 OF THE HRS.

Reference: 7, FIGURE 3.2

Aquifer: SURFICIAL

Type of Aquifer: Non Karst

Overlaying Aquifer: 0

Interconnected with: 0

Documentation for SURFICIAL Aquifer:

THE CHARLESTON NAVAL BASE IS LOCATED IN THE LOWER SOUTH CAROLINA COASTAL PLAIN PHYSIOGRAPHIC PROVINCE, ON THE COOPER RIVER SIDE OF THE CHARLESTON PENINSULA. THE CHARLESTON PENINSULA IS FORMED BY THE CONFLUENCE OF THE COOPER AND ASHLEY RIVERS. TOPOGRAPHY OF THE AREA IS TYPICAL OF SOUTH CAROLINA'S LOWER COASTAL PLAIN, HAVING LOW RELIEF PLAINS BROKEN ONLY BY THE MEANDERING COURSES OF SLUGGISH STREAMS AND RIVERS WHICH FLOW TOWARD THE COAST PAST OCCASIONAL MARINE TERRACE ESCARPMENTS. TOPOGRAPHY AT THE NAVAL BASE IS ESSENTIALLY FLAT. ELEVATIONS RANGE FROM JUST OVER 20 FEET ABOVE MEAN SEA LEVEL (MSL) IN THE NORTHWEST PART OF THE BASE TO SEA LEVEL AT THE COOPER RIVER. MOST OF THE ORIGINAL TOPOGRAPHY AT THE NAVAL BASE HAS BEEN MODIFIED BY MAN'S ACTIVITIES. THE SOUTHERN END WAS ORIGINALLY TIDAL MARSH DRAINED BY SHIPYARD CREEK AND ITS TRIBUTARIES. ORIGINALLY, THE OTHER PORTIONS OF THE FACILITY WERE ONLY SLIGHTLY HIGHER IN ELEVATION. THE LAND SURFACE AT THE NAVAL BASE HAS BEEN FILLED WITH BOTH SOLID WASTES AND DREDGED SPOIL IN INCREMENTS OVER THE LAST 70 YEARS. MOST OF THE NAVAL BASE REMAINS WITHIN THE 100-YEAR FLOOD ZONE OR LESS THAN TEN FEET MSL.

GEOLOGY OF THE CHARLESTON AREA IS TYPICAL OF THE SOUTHERN ATLANTIC COASTAL PLAIN. CRETACEOUS AND YOUNGER SEDIMENTS THICKEN SEAWARD AND ARE UNDERLAIN BY OLDER IGNEOUS AND METAMORPHIC BASEMENT ROCK. SURFACE EXPOSURES AT THE NAVAL BASE, IN THE LIMITED AREAS THAT REMAIN UNDISTURBED, CONSIST OF RECENT AND/OR PLEISTOCENE SANDS, SILTS, AND CLAYS OF HIGH ORGANIC CONTENT. THE NAVAL BASE AND THE FOUR-MILE DISTANCE FROM THE BASE IS UNDERLAIN BY PLASTIC CALCAREOUS CLAY KNOWN AS COOPER MARL. THE COOPER MARL IS KNOWN TO VARY BETWEEN 200 AND 250 FEET IN THICKNESS IN THIS AREA. THE COOPER MARL IS UNDERLAIN BY THE SANTEE LIMESTONE AND SEQUENTIALLY OLDER FORMATIONS SUCH AS THE BLACK MINGO FORMATIONS AND THE PEE DEE FORMATION.

SURFACE SOILS AT THE NAVAL BASE HAVE BEEN EXTENSIVELY DISTURBED. ABORIGINAL SOILS WERE THE FINE-GRAINED SILTS, SILTY SANDS, AND CLAY, TYPICAL OF TERRIGENOUS TIDAL MARSH ENVIRONMENTS. SAND LENSES ARE ARE PRESENT IN LOCALIZED AREAS; HOWEVER, THESE ARE ONLY SEVERAL FEET THICK. MUCH OF THE MATERIAL, PARTICULARLY IN THE SOUTHERN PORTION OF THE BASE, HAS BEEN FILLED USING DREDGED SPOIL FROM THE

COOPER RIVER AND SHIPYARD CREEK. THE SPOILS ARE AN UNSORTED MIXTURE OF SANDS, SILTS, AND CLAYS. MOST OF THE REMAINDER OF THE BASE HAS BEEN EITHER FILLED OR REWORKED. PARTS OF THE SOUTHERN PORTION OF THE NAVAL BASE ARE DRAINED BY SHIPYARD CREEK WHILE SOME NORTHERN AREAS ARE DRAINED BY NOISETTE CREEK. BOTH ARE TRIBUTARIES OF THE COOPER RIVER. SURFACE DRAINAGE OVER THE REST OF THE BASE FLOWS DIRECTLY INTO THE COOPER RIVER. THE COOPER RIVER DISCHARGES INTO CHARLESTON HARBOR.

TWO DISTINCT AQUIFERS EXIST BENEATH THE NAVAL BASE, A DEEP CONFINED AQUIFER LOCATED WITHIN THE SANTEE LIMESTONE AND A SHALLOW WATER TABLE AQUIFER LOCATED WIHTHIN THE NEAR SURFACE SEDIMENTS. BOTH THE SHALLOW AQUIFER AND THE SANTEE LIMESTONE FUNCTION AS POTABLE AQUIFERS IN OTHER LOCATIONS. THE SHALLOW AQUIFER IS NOT SIGNIFICANTLY DEVELOPED IN THE NAVAL BASE AREA AND THE FOUR-MILE DISTANCE FROM THE BASE. IT IS NOT DEVELOPED AT ALL AT THE NAVAL STATION. THE WATER QUALITY OF THE SANTEE LIMESTONE IS NOT SUITABLE FOR POTABLE SUPPLY. TOTAL DISSOLVED SOLIDS RANGE FROM 1,000 TO 1,500 PARTS PER MILLION. THE COOPER MARL, IN THE CHARLESTON AREA, IS ESSENTIALLY IMPERMEABLE AND ACTS AS THE UPPER CONFINING UNIT FOR THE SANTEE LIMESTONE. THE TOP OF THE SANTEE LIMESTONE, OCCURS AT -250 FEET MSL IN THE AREA OF THE NAVAL BASE. IT HAS A GROUNDWATER POTENTIOMENTRIC ELEVATION OF APPROXIMATELY 15 FEET MSL. THE HYDRAULIC GRADIENT IS GENERALLY TOWARDS THE SOUTHEAST. SOME WELLS IN THE VICINITY OF THE NAVAL BASE PUMP FROM THE SANTEE LIMESTONE FOR INDUSTRIAL PURPOSES.

GROUNDWATER IN THE SHALLOW AQUIFER BENEATH THE NAVAL BASE FLOWS NORTH-NORTHEAST INTO THE COOPER RIVER AND SOUTH-SOUTHEAST INTO SHIPYARD CREEK DUE TO THE GENTLY SLOPING TOPOGRAPHY AWAY FROM THE CENTER OF THE NAVAL BASE. GROUNDWATER IN THE IMMEDIATE VICINITY OF THE NAVAL BASE FLOWS INTO IT. THE WATER TABLE IS WITHIN THREE TO SEVEN FEET OF THE GROUND SURFACE.

IT APPEARS HIGHLY UNLIKELY THAT THE SURFICAL AQUIFER AND THE SANTEE LIMESTONE ARE INTERCONNECTED DUE TO THE COOPER MARL, WHICH ACTS AS A CONTINUOUS CONFINING UNIT THROUGHOUT THE CHARLESTON NAVAL BASE AND THE FOUR-MILE DISTANCE FROM THE CHARLESTON NAVAL BASE. BASED ON THIS ALL AQUIFERS UNDERNEATH THE SURFICIAL AQUIFER WILL NOT BE CONSIDERED.

GROUND WATER PATHWAY LIKELIHOOD OF RELEASE SURFICIAL AQUIFER
CHARLESTON NAVAL BASE - 07/13/92

Reference: 1, SECTION 2.3; 5,P.1-3; 8, SECTIONS 2.1-2.5;9,SECT.5.3.1-5.3.4

OBSERVED RELEASE

No.	Well ID	Well Type	Distance (miles)	Level of Contamination
1	WOC-1	Monitoring Well	0.000	Level I
2	WOC-2	Monitoring Well	0.000	Level I
3	CSY-FMW-1	Monitoring Well	0.000	Level I
4	CSY-FMW-2	Monitoring Well	0.000	Level I
5	CSY-FMW-3	Monitoring Well	0.000	Level I
6	CSY-FMW-4	Monitoring Well	0.000	Level I
7	LF-1	Monitoring Well	0.000	Level I
8	LF-2	Monitoring Well	0.000	Level II
9	LF-3	Monitoring Well	0.000	Level I

10	LF-4	Monitoring Well	0.000	Level II
11	LF-5	Monitoring Well	0.000	Level II
12	SLF-1	Monitoring Well	0.000	Level II
13	SLF-2	Monitoring Well	0.000	Level II
14	DLF-1	Monitoring Well	0.000	Level II

Well No.	Hazardous Substance	Concent.	MCL	Cancer	RFD	Units
1	Arsenic	1.9E+01	5.0E+01	2.0E-02	1.1E+01	ppb
1	DDT	2.0E-01	0.0E+00	1.0E-01	1.8E+01	ppb
1	PCBs	2.0E-01	0.0E+00	4.5E-03	0.0E+00	ppb
2	Arsenic	1.3E+01	5.0E+01	2.0E-02	1.1E+01	ppb
2	DDT	1.0E-01	0.0E+00	1.0E-01	1.8E+01	ppb
2	Hexachlorocyclohexane, alpha-	1.0E+00	0.0E+00	5.6E-03	0.0E+00	ppb
2	Hexachlorocyclohexane, beta-	1.0E+00	0.0E+00	1.9E-02	0.0E+00	ppb
2	PCBs	6.0E-01	0.0E+00	4.5E-03	0.0E+00	ppb
3	Anthracene	1.1E+00	0.0E+00	0.0E+00	1.1E+04	ppb
3	Antimony	3.0E+00	0.0E+00	0.0E+00	1.4E+01	ppb
3	Benzene	1.9E+00	5.0E+00	1.2E+00	0.0E+00	ppb
3	Chlorobenzene	1.7E+00	0.0E+00	0.0E+00	7.0E+02	ppb
3	Copper	4.0E+01	0.0E+00	0.0E+00	1.3E+03	ppb
3	Dichlorobenzene, 1,4-	3.0E-01	7.5E+01	1.5E+00	0.0E+00	ppb
3	Nickel	4.0E+01	0.0E+00	0.0E+00	7.0E+02	ppb
3	Phenanthrene	1.1E+00	0.0E+00	0.0E+00	0.0E+00	ppb
3	Toluene	2.2E+00	0.0E+00	0.0E+00	7.0E+03	ppb
3	Zinc	6.0E+01	0.0E+00	0.0E+00	7.0E+03	ppb
4	Acenaphthene	1.3E+00	0.0E+00	0.0E+00	2.1E+03	ppb
4	Antimony	4.0E+00	0.0E+00	0.0E+00	1.4E+01	ppb
4	Benzene	2.0E+01	5.0E+00	1.2E+00	0.0E+00	ppb
4	Chlorobenzene	1.4E+01	0.0E+00	0.0E+00	7.0E+02	ppb
4	Copper	3.0E+01	0.0E+00	0.0E+00	1.3E+03	ppb
4	Dichlorobenzene, 1,4-	7.5E+00	7.5E+01	1.5E+00	0.0E+00	ppb
4	Ethyl benzene	2.7E+00	0.0E+00	0.0E+00	3.5E+03	ppb
4	Lead	2.0E+00	5.0E+01	0.0E+00	0.0E+00	ppb
4	Naphthalene	2.2E+00	0.0E+00	0.0E+00	1.4E+02	ppb
4	Nickel	6.0E+01	0.0E+00	0.0E+00	7.0E+02	ppb
4	Selenium	2.0E+00	1.0E+01	0.0E+00	1.8E+02	ppb
4	Toluene	4.6E+00	0.0E+00	0.0E+00	7.0E+03	ppb
4	Trichloroethane, 1,1,1-	8.0E-01	2.0E+02	0.0E+00	3.2E+03	ppb
4	Trichloroethylene	4.0E-01	5.0E+00	3.2E+00	0.0E+00	ppb
4	Zinc	7.0E+01	0.0E+00	0.0E+00	7.0E+03	ppb
5	Benzene	1.5E+00	5.0E+00	1.2E+00	0.0E+00	ppb
5	Chlorobenzene	7.5E+00	0.0E+00	0.0E+00	7.0E+02	ppb
5	Copper	2.0E+01	0.0E+00	0.0E+00	1.3E+03	ppb
5	Dichlorobenzene, 1,4-	1.1E+00	7.5E+01	1.5E+00	0.0E+00	ppb
5	Nickel	4.0E+01	0.0E+00	0.0E+00	7.0E+02	ppb
5	Toluene	1.7E+00	0.0E+00	0.0E+00	7.0E+03	ppb
5	Trichloroethane, 1,1,1-	6.0E-01	2.0E+02	0.0E+00	3.2E+03	ppb
5	Zinc	6.0E+01	0.0E+00	0.0E+00	7.0E+03	ppb
6	Acenaphthene	4.3E+00	0.0E+00	0.0E+00	2.1E+03	ppb

GROUND WATER PATHWAY LIKELIHOOD OF RELEASE SURFICIAL AQUIFER

CHARLESTON NAVAL BASE - 07/13/92

6	Anthracene	3.0E+00	0.0E+00	0.0E+00	1.1E+04	ppb
6	Benzene	6.9E+00	5.0E+00	1.2E+00	0.0E+00	ppb
6	Chlorobenzene	9.6E+00	0.0E+00	0.0E+00	7.0E+02	ppb
6	Copper	2.0E+01	0.0E+00	0.0E+00	1.3E+03	ppb
6	Dichlorobenzene, 1,2-	4.0E-01	0.0E+00	0.0E+00	3.2E+03	ppb
6	Dichlorobenzene, 1,4-	4.8E+00	7.5E+01	1.5E+00	0.0E+00	ppb
6	Fluorene	2.2E+00	0.0E+00	0.0E+00	1.4E+03	ppb
6	Naphthalene	1.2E+00	0.0E+00	0.0E+00	1.4E+02	ppb
6	Nickel	5.0E+01	0.0E+00	0.0E+00	7.0E+02	ppb
6	Phenanthrene	3.0E+00	0.0E+00	0.0E+00	0.0E+00	ppb
6	Selenium	3.0E+00	1.0E+01	0.0E+00	1.8E+02	ppb
6	Toluene	9.0E-01	0.0E+00	0.0E+00	7.0E+03	ppb
6	Trichloroethane, 1,1,1-	6.0E-01	2.0E+02	0.0E+00	3.2E+03	ppb
6	Zinc	5.0E+01	0.0E+00	0.0E+00	7.0E+03	ppb
7	Arsenic	7.0E+01	5.0E+01	2.0E-02	1.1E+01	ppb
7	Chromium	8.2E+00	5.0E+01	0.0E+00	1.8E+02	ppb
7	Fluorine	3.4E-04	0.0E+00	0.0E+00	2.1E+03	ppb
7	Iron	5.8E+01	0.0E+00	0.0E+00	0.0E+00	ppb
7	Mercury	4.0E-01	2.0E+00	0.0E+00	1.1E+01	ppb
7	Sodium	6.0E+00	0.0E+00	0.0E+00	0.0E+00	ppb
8	Fluorine	1.6E-04	0.0E+00	0.0E+00	2.1E+03	ppb
8	Iron	8.0E+01	0.0E+00	0.0E+00	0.0E+00	ppb
8	Sodium	1.2E+00	0.0E+00	0.0E+00	0.0E+00	ppb
9	Arsenic	2.4E+01	5.0E+01	2.0E-02	1.1E+01	ppb
9	Fluorine	2.9E-04	0.0E+00	0.0E+00	2.1E+03	ppb
9	Iron	6.0E+02	0.0E+00	0.0E+00	0.0E+00	ppb
9	Sodium	7.2E+03	0.0E+00	0.0E+00	0.0E+00	ppb
10	Fluorine	5.6E-04	0.0E+00	0.0E+00	2.1E+03	ppb
10	Iron	4.1E+03	0.0E+00	0.0E+00	0.0E+00	ppb
10	Sodium	5.1E+03	0.0E+00	0.0E+00	0.0E+00	ppb
11	Fluorine	5.3E-04	0.0E+00	0.0E+00	2.1E+03	ppb
11	Iron	3.1E+02	0.0E+00	0.0E+00	0.0E+00	ppb
11	Sodium	6.8E+03	0.0E+00	0.0E+00	0.0E+00	ppb
12	Fluorine	5.2E-04	0.0E+00	0.0E+00	2.1E+03	ppb
12	Iron	1.7E+03	0.0E+00	0.0E+00	0.0E+00	ppb
12	Sodium	1.0E+03	0.0E+00	0.0E+00	0.0E+00	ppb
13	Fluorine	2.5E-04	0.0E+00	0.0E+00	2.1E+03	ppb
13	Iron	3.2E+02	0.0E+00	0.0E+00	0.0E+00	ppb
13	Sodium	3.0E+03	0.0E+00	0.0E+00	0.0E+00	ppb
14	Fluorine	1.6E-04	0.0E+00	0.0E+00	2.1E+03	ppb
14	Iron	3.6E+01	0.0E+00	0.0E+00	0.0E+00	ppb
14	Sodium	3.4E+01	0.0E+00	0.0E+00	0.0E+00	ppb

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Observed Release Factor 550

Documentation for Well WOC-1:

THESE SAMPLES ORIGINATED FROM THE PCB TRANSFORMER AREA (SWMU #7). THE SAMPLE RESULTS IN APPENDIX G SHOW CONTAMINATION FOR ARSENIC, PCB, AND DDT.

THERE IS AN INCONSISTENCY IN HOW THE RESULTS ARE PRESENTED IN SECTION 2.6.7 AND APPENDIX G. SECTION 2.6.7 LISTS THE RESULTS IN GRAMS PER LITER AND APPENDIX G LISTS THE RESULTS IN MICRO-GRAMS PER LITER. IT IS SUSPECTED THAT SECTION 2.6.7 CONTAINS SEVERAL TYPOGRAPHICAL ERRORS AND THAT THE MICROGRAMS PER LITER VALUE IS CORRECT.

Reference: 1, APPENDIX G, SECTION 2.6.7

Documentation for Well WOC-2:

PLEASE REFER TO THE DISCUSSION OF WOC-1.

ACCORDING TO THE HAZARDOUS CHEMICALS DATA BOOK (1980) BENZENE HEXACHLORIDE (BHC) IS ALSO KNOWN AS 1,2,3,4,5,6,-HEXACHLOROCYCLOHEXANE.

Reference: 1, APPENDIX G, SECTION 2.6.7

Documentation for Well CSY-FMW-1:

THIS MONITORING WELL WAS PLACED IN THE AREA OF THE CLOSED LANDFILL (SWMU #9).

Reference: 1, SECTION 2.6.9, TABLE 2-11

Documentation for Well CSY-FMW-2:

THIS MONITORING WELL WAS PLACED IN THE AREA OF THE CLOSED LANDFILL (SWMU #9).

Reference: 1, SECTION 2.6.9, TABLE 2-11

Documentation for Well CSY-FMW-3:

THIS MONITORING WELL WAS PLACED IN THE AREA OF THE CLOSED LANDFILL (SWMU #9).

Reference: 1, SECTION 2.6.9, TABLE 2-11

Documentation for Well CSY-FMW-4:

THIS MONITORING WELL WAS PLACED IN THE AREA OF THE CLOSED LANDFILL (SWMU #9).

Reference: 1, SECTION 2.6.9, TABLE 2-11

Documentation for Well LF-1:

THIS MONITORING WELL WAS PLACED IN THE AREA OF THE CLOSED LANDFILL (SWMU #9).

Reference: 1, APPENDIX I

Documentation for Well LF-2:

SEE MONITORING WELL LF-1

Reference: 1, APPENDIX I

Documentation for Well LF-3:

SEE MONITORING WELL LF-1

Reference: 1, APPENDIX I

Documentation for Well LF-4:

SEE MONITORING WELL LF-1

Reference: 1, APPENDIX I

Documentation for Well LF-5:

SEE MONITORING WELL LF-1

Reference: 1, APPENDIX I

Documentation for Well SLF-1:

SEE MONITORING WELL LF-1

Reference: 1, APPENDIX I

Documentation for Well SLF-2:

SEE MONITORING WELL LF-1

Reference: 1, APPENDIX I

Documentation for Well DLF-1:

SEE MONITORING WELL LF-1

Reference: 1, APPENDIX I

POTENTIAL TO RELEASE

Containment

Containment Factor	10	

Net Precipitation

Net Precipitation Factor	3	

Depth to Aquifer

A. Depth of Hazardous Substances	62.00	feet

Documentation for Depth of Hazardous Substances:

ACCORDING TO LITHOLOGIC LOGS THE DEEPEST WELL WITH CONTAMINATION IS 62 FEET BELOW THE SURFACE.

Reference: 1, APPENDIX A; APPENDIX I

B. Depth to Aquifer from Surface	3.00	feet

Documentation for Depth to Aquifer from Surface :

THE WATER TABLE OF THE SURFICIAL AQUIFER IS WITHIN THREE TO SEVEN FEET OF THE SURFACE.

Reference: 1, SECTION 2.3.5; 8, SECTION 2.5; 9, SECTION 5.3.4.2

C. Depth to Aquifer (B - A)	0.00	feet
Depth to Aquifer Factor	5	

Travel Time

Are All Layers Karst? NO

Documentation for Karst Layers:

SURFACE SOILS AT THE CHARLESTON NAVAL BASE CONSIST OF FINE-GRAINED SILTS, SILTY SANDS, AND CLAY. SAND LENSES ARE PRESENT IN LOCALIZED AREAS.

Reference: 1, SECTION 2.3; 8, SECTION 2.3; 9, SECTION 2.1

Thickness of Layer(s) with Lowest Conductivity 0.00 feet

Documentation for Thickness of Layers with Lowest Conductivity:

BECAUSE THE DEPTH TO GROUNDWATER IS SHALLOWER THAN THE DEPTH TO CONTAMINATION THIS VALUE IS GIVEN AS ZERO. FOR DIFFERENT SITES AT THE FACILITY THIS MAY NOT HOLD TRUE BUT THIS VALUE WILL BE CONSIDERED IN THE SCORE BECAUSE IT WILL CONSIDER THE WORST CASE SCENARIO.

Reference: 1, APPENDIX A, APPENDIX I;1, SECTION 2.3.5; 8, SECTION 2.5

Hydraulic Conductivity (cm/sec) 1.0E-02

Documentation for Hydraulic Conductivity:

SIEVE ANALYSES WERE PERFORMED ON THE FILL MATERIAL SAMPLED AT MONITORING WELL LF-1 AND ON A SAMPLE OF THE SOFT, GRAY CLAY THAT IS FOUND THROUGHOUT THE SITE. THE PERMEABILITIES WERE CALCULATED TO BE 1 x 10 -2 cm/sec (CENTIMETERS PER SECOND) FOR THE FILL AND

1 x 10 -6 cm/sec FOR THE GRAY CLAY. THE HIGHEST VALUE OF THIS RANGE WAS USED IN PRESCORE BECAUSE IT IS THE MOST CONSERVATIVE.

Reference: 1, SECTION 2.3.3

Travel Time Factor	35

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Potential to Release Factor	430

Source: 1 #1 DRMO STAGING

Source Hazardous Waste Quantity Value: 0.02

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Barium	10000	1.00E-02	1.00E+02
Cadmium	10000	1.00E+00	1.00E+04
Chromium	10000	1.00E-02	1.00E+02
Lead	10000	2.00E-05	2.00E-01
Mercury	10000	2.00E-05	2.00E-01
Nickel	10000	2.00E-05	2.00E-01
Silver	1000	2.00E-07	2.00E-04

GROUND WATER PATHWAY WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 2 #2 LEAD CONTAM AREA

Source Hazardous Waste Quantity Value: 1.94

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Lead	10000	2.00E-05	2.00E-01

Source: 3 #5 BATTERY TREATMNT

Source Hazardous Waste Quantity Value: 0.01

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Lead	10000	2.00E-05	2.00E-01

Source: 4 #6 PUB WKS STOR YD

Source Hazardous Waste Quantity Value: 0.28

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Barium	10000	1.00E-02	1.00E+02
Cadmium	10000	1.00E+00	1.00E+04
Chromium	10000	1.00E-02	1.00E+02
Lead	10000	2.00E-05	2.00E-01
Mercury	10000	2.00E-05	2.00E-01
Nickel	10000	2.00E-05	2.00E-01
Silver	1000	2.00E-07	2.00E-04

Source: 5 #7 PCB TRANSFORMER

Source Hazardous Waste Quantity Value: 3.70

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Arsenic	10000	1.00E-02	1.00E+02
DDT	1000	2.00E-07	2.00E-04
PCBs	10000	2.00E-09	2.00E-05

Source: 6 #9 CLOSED LANDFILL

Source Hazardous Waste Quantity Value: 73502.85

Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
Acenaphthylene	100	2.00E-03	2.00E-01
Acenaphthene	10	2.00E-03	2.00E-02
Anthracene	10	2.00E-07	2.00E-06
Arsenic	10000	1.00E-02	1.00E+02
Asbestos	10000	2.00E-09	2.00E-05
Barium	10000	1.00E-02	1.00E+02
Benz(a)anthracene	1000	2.00E-09	2.00E-06
Benzo(a)pyrene	10000	2.00E-09	2.00E-05
Benzo(k)fluoranthene	100	2.00E-05	2.00E-03
Bis (2-ethylhexyl) phthalate	100	2.00E-07	2.00E-05
Butylbenzyl phthalate	10	2.00E-05	2.00E-04
Chlorobenzene	100	1.00E-02	1.00E+00
Chromium	10000	1.00E-02	1.00E+02
Chrysene	100	2.00E-09	2.00E-07
Dichlorobenzene, 1,2-	100	1.00E-02	1.00E+00
Dichlorobenzene, 1,4-	10	2.00E-03	2.00E-02
Fluorene	100	2.00E-03	2.00E-01
Lead	10000	2.00E-05	2.00E-01
Mercury	10000	2.00E-05	2.00E-01
Naphthalene	1000	2.00E-03	2.00E+00
Phenanthrene	1	2.00E-05	2.00E-05
Pyrene	100	2.00E-09	2.00E-07

GROUND WATER PATHWAY WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Hazardous Substances Found in an Observed Release

Well No.	Observed Release Hazardous Substance	Toxicity Value	Mobility Value	Toxicity/ Mobility Value
1	Arsenic	10000	1.00E+00	1.00E+04
1	DDT	1000	1.00E+00	1.00E+03
1	PCBs	10000	1.00E+00	1.00E+04
2	Arsenic	10000	1.00E+00	1.00E+04
2	DDT	1000	1.00E+00	1.00E+03
2	Hexachlorocyclohexane, alpha-	10000	1.00E+00	1.00E+04
2	Hexachlorocyclohexane, beta-	100	1.00E+00	1.00E+02
2	PCBs	10000	1.00E+00	1.00E+04
3	Anthracene	10	1.00E+00	1.00E+01
3	Antimony	10000	1.00E+00	1.00E+04
3	Benzene	100	1.00E+00	1.00E+02
3	Chlorobenzene	100	1.00E+00	1.00E+02
3	Copper	100	1.00E+00	1.00E+02
3	Dichlorobenzene, 1,4-	10	1.00E+00	1.00E+01
3	Nickel	10000	1.00E+00	1.00E+04
3	Phenanthrene	1	1.00E+00	1.00E+00
3	Toluene	10	1.00E+00	1.00E+01
3	Zinc	10	1.00E+00	1.00E+01
4	Acenaphthene	10	1.00E+00	1.00E+01
4	Antimony	10000	1.00E+00	1.00E+04
4	Benzene	100	1.00E+00	1.00E+02
4	Chlorobenzene	100	1.00E+00	1.00E+02
4	Copper	100	1.00E+00	1.00E+02
4	Dichlorobenzene, 1,4-	10	1.00E+00	1.00E+01
4	Ethyl benzene	10	1.00E+00	1.00E+01
4	Lead	10000	1.00E+00	1.00E+04
4	Naphthalene	1000	1.00E+00	1.00E+03
4	Nickel	10000	1.00E+00	1.00E+04
4	Selenium	100	1.00E+00	1.00E+02
4	Toluene	10	1.00E+00	1.00E+01
4	Trichloroethane, 1,1,1-	10	1.00E+00	1.00E+01
4	Trichloroethylene	10	1.00E+00	1.00E+01
4	Zinc	10	1.00E+00	1.00E+01
5	Benzene	100	1.00E+00	1.00E+02
5	Chlorobenzene	100	1.00E+00	1.00E+02
5	Copper	100	1.00E+00	1.00E+02
5	Dichlorobenzene, 1,4-	10	1.00E+00	1.00E+01
5	Nickel	10000	1.00E+00	1.00E+04
5	Toluene	10	1.00E+00	1.00E+01
5	Trichloroethane, 1,1,1-	10	1.00E+00	1.00E+01
5	Zinc	10	1.00E+00	1.00E+01
6	Acenaphthene	10	1.00E+00	1.00E+01
6	Anthracene	10	1.00E+00	1.00E+01
6	Benzene	100	1.00E+00	1.00E+02
6	Chlorobenzene	100	1.00E+00	1.00E+02

6	Copper	100	1.00E+00	1.00E+02
6	Dichlorobenzene, 1,2-	100	1.00E+00	1.00E+02
6	Dichlorobenzene, 1,4-	10	1.00E+00	1.00E+01
6	Fluorene	100	1.00E+00	1.00E+02
6	Naphthalene	1000	1.00E+00	1.00E+03
6	Nickel	10000	1.00E+00	1.00E+04
6	Phenanthrene	1	1.00E+00	1.00E+00
6	Selenium	100	1.00E+00	1.00E+02
6	Toluene	10	1.00E+00	1.00E+01
6	Trichloroethane, 1,1,1-	10	1.00E+00	1.00E+01
6	Zinc	10	1.00E+00	1.00E+01
7	Arsenic	10000	1.00E+00	1.00E+04
7	Chromium	10000	1.00E+00	1.00E+04
7	Fluorine	10	1.00E+00	1.00E+01
7	Iron	100	1.00E+00	1.00E+02
7	Mercury	10000	1.00E+00	1.00E+04
7	Sodium	100	1.00E+00	1.00E+02
8	Fluorine	10	1.00E+00	1.00E+01
8	Iron	100	1.00E+00	1.00E+02
8	Sodium	100	1.00E+00	1.00E+02
9	Arsenic	10000	1.00E+00	1.00E+04
9	Fluorine	10	1.00E+00	1.00E+01
9	Iron	100	1.00E+00	1.00E+02
9	Sodium	100	1.00E+00	1.00E+02
10	Fluorine	10	1.00E+00	1.00E+01
10	Iron	100	1.00E+00	1.00E+02
10	Sodium	100	1.00E+00	1.00E+02
11	Fluorine	10	1.00E+00	1.00E+01
11	Iron	100	1.00E+00	1.00E+02
11	Sodium	100	1.00E+00	1.00E+02
12	Fluorine	10	1.00E+00	1.00E+01
12	Iron	100	1.00E+00	1.00E+02
12	Sodium	100	1.00E+00	1.00E+02
13	Fluorine	10	1.00E+00	1.00E+01
13	Iron	100	1.00E+00	1.00E+02
13	Sodium	100	1.00E+00	1.00E+02
14	Fluorine	10	1.00E+00	1.00E+01
14	Iron	100	1.00E+00	1.00E+02
14	Sodium	100	1.00E+00	1.00E+02

GROUND WATER PATHWAY WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Toxicity/Mobility Value from Source Hazardous Substances:	1.00E+04
Toxicity/Mobility Value from Observed Release Hazardous Substances:	1.00E+04
Toxicity/Mobility Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	7.35E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	100

GROUND WATER PATHWAY TARGETS FOR AQUIFER SURFICIAL
CHARLESTON NAVAL BASE - 07/13/92

Population by Well

No.	Well ID	Sample Type	Distance (miles)	Level of Contamination	Population
- N/A and/or data not specified					

Level I Population Factor: 0.00

Level II Population Factor: 0.00

GROUND WATER PATHWAY TARGETS FOR AQUIFER SURFICIAL
CHARLESTON NAVAL BASE - 07/13/92

Potential Contamination by Distance Category

Distance Category (miles)	Population	Value
> 0 to 1/4	0.0	0.00E+00
> 1/4 to 1/2	0.0	0.00E+00
> 1/2 to 1	0.0	0.00E+00
> 1 to 2	0.0	0.00E+00
> 2 to 3	0.0	0.00E+00
> 3 to 4	0.0	0.00E+00

Potential Contamination Factor: 0.000

Documentation for Target Population > 0 to 1/4 mile Distance Category:

THE SURFICIAL AQUIFER IS NOT REPORTED TO BE USED AS A DRINKING WATER SOURCE IN THE AREA OF THE CHARLESTON NAVAL BASE. THEREFORE IT IS DOUBTFUL THAT ANY POPULATIONS UTILIZE IT WITHIN A FOUR MILE RADIUS. ACCORDING TO MS. BRENDA HOCKENSMITH AT THE SOUTH CAROLINA WATER RESOURCES COMMISSION THE SURFICIAL AQUIFER IS USED FOR IRRIGATION. BECAUSE OF THE EFFECTIVENESS OF THE COOPER MARL AS A CONFINING UNIT THIS AQUIFER IS NOT THOUGHT TO BE INTERCONNECTED WITH ANY OTHERS. IT IS ESSENTIALLY IMPERMEABLE AND ACTS AS A CONFINING LAYER FOR THE UNDERLYING SANTEE LIMESTONE.

Reference: 1, SECTION 2.3.5; 13

Documentation for Target Population > 1/4 to 1/2 mile Distance Category:

PLEASE REFER TO THE 0 TO 1/4 MILE DISCUSSION.

Reference:

Documentation for Target Population > 1/2 to 1 mile Distance Category:

PLEASE REFER TO THE 0 TO 1/4 MILE DISCUSSION.

Reference:

Documentation for Target Population > 1 to 2 miles Distance Category:

PLEASE REFER TO THE 0 TO 1/4 MILE DISCUSSION.

Reference:

Documentation for Target Population > 2 to 3 miles Distance Category:

PLEASE REFER TO THE 0 TO 1/4 MILE DISCUSSION.

Reference:

Documentation for Target Population > 3 to 4 miles Distance Category:

PLEASE REFER TO THE 0 TO 1/4 MILE DISCUSSION.

Reference:

Nearest Well

Level of Contamination: N.A.

Nearest Well Factor: 0.00E+00

Documentation for Nearest Well:

THERE ARE NOT THOUGHT TO BE ANY DRINKING WATER WELLS IN THE AREA THAT SUPPLY WATER FROM THE SURFICIAL AQUIFER. THE 5-MILE DISTANCE ZONE IS USED SINCE ANY WELLS BEYOND 4 MILES AWAY FROM THE BASE ARE NOT UNDER CONSIDERATION.

Reference: 1, SECTION 2.3.5; 13

Resources

Resource Use: YES

Resource Factor: 5.00E+00

Documentation for Resources:

THE SURFICICAL AQUIFER IS REPORTEDLY USED FOR IRRIGATIONAL USE.

Reference: 1, SECTION 2.3.5; 13

Wellhead Protection Area

No wellhead protection area

Wellhead Protection Area Factor: 0.00E+00

Documentation for Wellhead Protection Area:

NO WELLHEAD PROTECTION AREAS HAVE BEEN IDENTIFIED.

Reference: 1, SECTION 2.3.5

SURFACE WATER PATHWAY SEGMENT SUMMARY
CHARLESTON NAVAL BASE - 07/13/92

No.	Segment ID	Segment Type	Water Type	Start Point (mi)	End Point (mi)	Average Flow (cfs)
1	COOPER RIVER	River	Brack	0.00	4.00	4500
2	CHARLESTON HARBOR	Coastal Ti	Salt	4.00	7.00	N.A.
3	ATLANTIC OCEAN	Deep Zone	Salt	7.00	15.00	N.A.

SURFACE WATER PATHWAY OVERLAND FLOW/FLOOD COMPONENT LIKELIHOOD OF RELEASE
CHARLESTON NAVAL BASE - 07/13/92

OBSERVED RELEASE

No.	Sample ID	Sample Type	Distance (miles)	Level of Contamination DW	HFC	Env
- N/A and/or data not specified						

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POTENTIAL TO RELEASE

Potential to Release by Overland Flow

Containment

No.	Source ID	HWQ Value	Containment Value

Documentation for Observed Release, Sample NONE:

ALTHOUGH THERE IS DOCUMENTED SOIL CONTAMINATION IN AREAS VERY CLOSE TO THE COOPER RIVER, IT WILL NOT BE ASSUMED THAT THESE CONTAMINANTS HAVE BEEN RELEASED INTO THE COOPER RIVER. THERE IS NO ANALYTICAL DATA AVAILABLE TO SUPPORT CONTAMINANT SPREAD INTO THE COOPER RIVER.

Reference:

Containment Factor: 1
Containment Factor: 2
Containment Factor: 3
Containment Factor: 4
Containment Factor: 5
Containment Factor: 6

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Distance to Surface Water

Documentation for Overland Flow Containment, Source #1 DRMO STAGING :

ACCORDING TO FIELD OBSERVATIONS THERE ARE NO STRUCTURES ON SITE THAT MAY CONTAIN A FLOOD.

Reference: 1, SECTION 2.6.1; 6

Documentation for Overland Flow Containment, Source #2 LEAD CONTAM AREA:

BASED ON REFERENCE 1 AND FIELD OBSERVATIONS THERE APPEAR TO BE NO STRUCTURES WHICH MAY CONTROL FLOODING.

Reference: 1, SECTION 2.6.2; 6

Documentation for Overland Flow Containment, Source #5 BATTERY TREATMNT:

THERE IS DOCUMENTED SOIL CONTAMINATION AT THIS SITE. BASED ON FIELD OBSERVATIONS AND SECTION 2.6.5 OF REFERENCE 1 THERE ARE NO STRUCTURES TO CONTAIN SURFACE WATER IN THE AREA.

Reference: 1, SECTION 2.6.5; 6

Documentation for Overland Flow Containment, Source #6 PUB WKS STOR YD:

ACCORDING TO REFERENCE 1 AND FIELD OBSERVATIONS THERE IS NO TYPE OF COVER TO CONTROL THE FLOW OF SURFACE WATER. THEREFORE IT WILL BE GIVEN THE MAXIMUM SCORE ACCORDING TO HRS TABLE 4-2.

Reference: 1, SECTION 2.6.6; 7, TABLE 4-2; 6

Documentation for Overland Flow Containment, Source #7 PCB TRANSFORMER:

SINCE THERE IS CONFIRMED CONTAMINATION IN THE SURFICIAL AQUIFER THE MAXIMUM VALUE WILL BE ASSIGNED.

Reference: 1, SECTION 2.6.7

Documentation for Overland Flow Containment, Source #9 CLOSED LANDFILL:

SINCE THERE IS EVIDENCE OF GROUNDWATER MIGRATION THE MAXIMUM VALUE WILL BE ASSIGNED ACCORDING TO TABLE 4.2 OF REFERENCE 7.

Reference: 1, SECTION 2.6.9, FIGURE 2-19, TABLE 2-11; 6; 7, TABLE 4-2

Distance to Surface Water Factor: 0

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Runoff

Documentation for Distance to Surface Water:

ACCORDING TO FIELD OBSERVATIONS AND THE TOPOGRAPHIC MAPS THE COOPER RIVER IS ADJACENT TO SEVERAL OF THE SWMUS ALONG THE AREA OF THE DRY DOCKS.

Reference: 2; 6

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Documentation for Drainage Area:

PLEASE REFER TO THE TOPOGRAPHIC MAPS WHICH WERE USED TO CALCULATE THE DRAINAGE AREA OF THE BASE. THIS WAS DONE USING A GRID WHICH IS CALIBRATED FOR ACRES.

Reference: 2

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Documentation for Rainfall:

FROM 2 YR 24 HR RAINFALL MAP. THIS AMOUNTS TO 4.5 INCHES IN THE CHARLESTON, SC AREA.

Reference: 12

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Documentation for Soil Group:

ON-SITE LITHOLOGIC LOGS SHOW THE SOIL IN THE DRAINAGE AREA TO BE PREDOMINANTLY SANDY CLAY FOR THE FIRST TWO TO FIFTEEN FEET, FOLLOWED BY MIXTURES OF CLAY AND SAND TO A DEPTH OF 12 TO 25 FEET. DEPTH TO WATER IS GENERALLY THREE TO SEVEN FEET BELOW THE GROUND SURFACE AND IS GENERALLY FOUND IN SANDY CLAY.

Reference: 1, SECTION 2.3.5, APPENDIX A

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Potential to Release by Overland Flow Factor: 25

Potential to Release by Flood

No.	Source ID	HWQ Value	Flood Containment Value	Flood Frequency Value	Potential to Release by Flood
500		6.91E-86	5888	17137	3906

Potential to Release by Flood Factor: 1
Potential to Release by Flood Factor: 2
Potential to Release by Flood Factor: 3
Potential to Release by Flood Factor: 4
Potential to Release by Flood Factor: 5
Potential to Release by Flood Factor: 6

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Documentation for Flood Containment, Source #1 DRMO STAGING :

ACCORDING TO FIELD OBSERVATIONS THERE IS NOTHING PROTECTING THE AREA FROM FLOODING. CONTAMINANTS HAVE REPORTEDLY SPREAD THROUGHOUT THE AREA.

Reference: 1, SECTION 2.6.1; 6

Documentation for Flood Frequency, Source #1 DRMO STAGING :

IT IS DOCUMENTED THAT MOST OF THE CHARLESTON NAVAL BASE LIES IN THE 100 YEAR FLOOD PLAIN.

Reference: 1, SECTION 2.3.1

Documentation for Flood Containment, Source #2 LEAD CONTAM AREA:

THERE APPEAR TO BE NO STRUCTURES WHICH MAY CONTAIN THE AREA AGAINST A FLOOD.

Reference: 1, SECTION 2.6.2; 6

Documentation for Flood Frequency, Source #2 LEAD CONTAM AREA:

IT IS DOCUMENTED THAT MOST OF THE CHARLESTON NAVAL BASE LIES IN THE 100-YEAR FLOOD PLAIN.

Reference: 1, SECTION 2.3.1

Documentation for Flood Containment, Source #5 BATTERY TREATMNT:

BASED ON SECTION 2.6.5 OF REFERENCE 1 AND FIELD OBSERVATIONS THERE DO NOT APPEAR TO BE ANY STRUCTURES TO CONTAIN ANY FLOODING.

Reference: 1, SECTION 2.6.5; 6

Documentation for Flood Frequency, Source #5 BATTERY TREATMNT:

MOST OF THE CHARLESTON NAVAL BASE IS IN THE 100-YEAR FLOOD PLAIN.

Reference: 1, SECTION 2.3.1

Documentation for Flood Containment, Source #6 PUB WKS STOR YD:

ACCORDING TO REFERENCE 1 AND FIELD OBSERVATIONS, THE AREA IS NOT CONTAINED FOR ANY FLOOD.

Reference: 1, SECTION 2.6.6; 6

Documentation for Flood Frequency, Source #6 PUB WKS STOR YD:

MOST OF THE CHARLESTON NAVAL BASE LIES IN THE 100-YEAR FLOOD PLAIN.

Reference: 1, SECTION 2.3.1

Documentation for Flood Containment, Source #7 PCB TRANSFORMER:

ACCORDING TO REFERENCE 1 AND FIELD OBSERVATIONS THERE IS NOTHING PRESENT TO CONTROL FLOODING.

Reference: 1, SECTION 2.6.7; 6

Documentation for Flood Frequency, Source #7 PCB TRANSFORMER:

MOST OF THE CHARLESTON NAVAL BASE LIES IN THE 100-YEAR FLOOD PLAIN.

Reference: 1, SECTION 2.3.1

Documentation for Flood Containment, Source #9 CLOSED LANDFILL:

BASED ON FIELD OBSERVATIONS THERE ARE NO STRUCTURES TO CONTAIN THE AREA FROM ANY FLOOD. MOST OF THE CHARLESTON NAVAL BASE LIES IN THE 100-YEAR FLOODPLAIN.

Reference: 1, SECTION 2.3.1, 2.6.9; 6

Documentation for Flood Frequency, Source #9 CLOSED LANDFILL:

MOST OF THE CHARLESTON NAVAL BASE LIES IN THE 100-YEAR FLOODPLAIN.

Reference: 1, SECTION 2.3.1

Source: 1 #1 DRMO STAGING

Source Hazardous Waste Quantity Value: 0.02

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Barium	10000	1.00E+00	1.00E+04
Cadmium	10000	1.00E+00	1.00E+04
Chromium	10000	1.00E+00	1.00E+04
Lead	10000	1.00E+00	1.00E+04
Mercury	10000	1.00E+00	1.00E+04
Nickel	10000	1.00E+00	1.00E+04
Silver	1000	1.00E+00	1.00E+03

Source: 2 #2 LEAD CONTAM AREA

Source Hazardous Waste Quantity Value: 1.94

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Lead	10000	1.00E+00	1.00E+04

Source: 3 #5 BATTERY TREATMNT

Source Hazardous Waste Quantity Value: 0.01

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Lead	10000	1.00E+00	1.00E+04

Source: 4 #6 PUB WKS STOR YD

Source Hazardous Waste Quantity Value: 0.28

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Barium	10000	1.00E+00	1.00E+04
Cadmium	10000	1.00E+00	1.00E+04
Chromium	10000	1.00E+00	1.00E+04
Lead	10000	1.00E+00	1.00E+04
Mercury	10000	1.00E+00	1.00E+04
Nickel	10000	1.00E+00	1.00E+04
Silver	1000	1.00E+00	1.00E+03

Source: 5 #7 PCB TRANSFORMER

Source Hazardous Waste Quantity Value: 3.70

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Arsenic	10000	1.00E+00	1.00E+04
DDT	1000	1.00E+00	1.00E+03
PCBs	10000	1.00E+00	1.00E+04

CHARLESTON NAVAL BASE - 07/13/92

Source: 6 #9 CLOSED LANDFILL

Source Hazardous Waste Quantity Value: 73502.85

Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value
Acenaphthylene	0	1.00E+00	0.00E+00
Acenaphthene	10	4.00E-01	4.00E+00
Anthracene	10	4.00E-01	4.00E+00
Arsenic	10000	1.00E+00	1.00E+04
Asbestos	10000	1.00E+00	1.00E+04
Barium	10000	1.00E+00	1.00E+04
Benz(a)anthracene	1000	1.00E+00	1.00E+03
Benzo(a)pyrene	10000	1.00E+00	1.00E+04
Benzo(k)fluoranthene	0	1.00E+00	0.00E+00
Bis (2-ethylhexyl) phthalate	100	1.00E+00	1.00E+02
Butylbenzyl phthalate	10	1.00E+00	1.00E+01
Chlorobenzene	100	4.00E-01	4.00E+01
Chromium	10000	1.00E+00	1.00E+04
Chrysene	0	1.00E+00	0.00E+00
Dichlorobenzene, 1,2-	100	4.00E-01	4.00E+01
Dichlorobenzene, 1,4-	10	4.00E-01	4.00E+00
Fluorene	100	1.00E+00	1.00E+02
Lead	10000	1.00E+00	1.00E+04
Mercury	10000	1.00E+00	1.00E+04
Naphthalene	1000	4.00E-01	4.00E+02
Phenanthrene	1	4.00E-01	4.00E-01
Pyrene	100	1.00E+00	1.00E+02

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Toxicity Value	Persistence Value	Toxicity/ Persistence Value

- N/A and/or data not specified

Toxicity/Persistence Value from Source Hazardous Substances:	1.00E+04
Toxicity/Persistence Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Persistence Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	7.35E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	100

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

Level I Concentrations

Intake	Distance Along the In-water Segment from the Probable Point of Entry (miles)	Population
- N/A and/or data not specified		

Population Served by Level I Intakes: 0.0

Level I Population Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT DRINKING WATER THREAT TARGETS
CHARLESTON NAVAL BASE - 07/13/92

Level II Concentrations

Intake	Distance Along the In-water Segment from the Probable Point of Entry (miles)	Population
- N/A and/or data not specified		

Population Served by Level II Intakes: 0.0

Level II Population Factor: 0.00E+00

Potential Contamination

Intake ID	Average Annual Flow (cfs)	Population Served
- N/A and/or data not specified		

Documentation for Intake NONE:

THERE IS NO EVIDENCE THAT THE SURFICIAL AQUIFER IS USED AS A SOURCE OF DRINKING WATER IN THE AREA OF THE CHARLESTON NAVAL BASE.

Reference: 1, SECTION 2.3.5; 13

Type of Surface Water Body	Total Population	Dilution-Weighted Population
- N/A and/or data not specified		

Dilution-Weighted Population Served
by Potentially Contaminated Intakes: 0.0

Potential Contamination Factor: 0.0

Nearest Intake

Location of Nearest Drinking Water Intake: N.A.

Nearest Intake Factor: 0.00

Resources

Resource Use: YES

Resource Value: 5.00E+00

Documentation for Resources:

THE SURFACE WATER IS DOCUMENTED TO BE USED FOR IRRIGATION AND OTHER DOMESTIC USES.

Reference: 13

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 1 #1 DRMO STAGING

Source Hazardous Waste Quantity Value: 0.02

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Acenaphthene	10	4.00E-01	5.00E+02	2.00E+03
Anthracene	10	4.00E-01	5.00E+03	2.00E+04
Antimony	10000	1.00E+00	5.00E+02	5.00E+06
Arsenic	10000	1.00E+00	5.00E+02	5.00E+06
Barium	10000	1.00E+00	5.00E-01	5.00E+03
Benzene	100	4.00E-01	5.00E+03	2.00E+05
Cadmium	10000	1.00E+00	5.00E+03	5.00E+07
Chlorobenzene	100	4.00E-01	5.00E+01	2.00E+03
Chromium	10000	1.00E+00	5.00E+02	5.00E+06
Copper	100	1.00E+00	5.00E+04	5.00E+06
DDT	1000	1.00E+00	5.00E+04	5.00E+07
Dichlorobenzene, 1,2-	100	4.00E-01	5.00E+01	2.00E+03
Dichlorobenzene, 1,4-	10	4.00E-01	5.00E+01	2.00E+02
Ethyl benzene	10	4.00E-01	5.00E+01	2.00E+02
Fluorene	100	1.00E+00	5.00E+03	5.00E+05
Fluorine	10	4.00E-01	5.00E-01	2.00E+00
Hexachlorocyclohexane, alpha-	10000	1.00E+00	5.00E+02	5.00E+06
Hexachlorocyclohexane, beta-	100	1.00E+00	5.00E+02	5.00E+04
Iron	0	1.00E+00	5.00E-01	0.00E+00
Lead	10000	1.00E+00	5.00E+03	5.00E+07
Mercury	10000	1.00E+00	5.00E+04	5.00E+08
Naphthalene	1000	4.00E-01	5.00E+00	2.00E+03
Nickel	10000	1.00E+00	5.00E+02	5.00E+06
PCBs	10000	1.00E+00	5.00E+04	5.00E+08
Phenanthrene	1	4.00E-01	5.00E+01	2.00E+01
Selenium	100	1.00E+00	5.00E+01	5.00E+03
Silver	1000	1.00E+00	5.00E+01	5.00E+04
Sodium	0	1.00E+00	5.00E-01	0.00E+00
Toluene	10	4.00E-01	5.00E+01	2.00E+02
Trichloroethane, 1,1,1-	10	4.00E-01	5.00E+00	2.00E+01
Trichloroethylene	10	4.00E-01	5.00E+01	2.00E+02
Zinc	10	1.00E+00	5.00E+04	5.00E+05

Source: 2 #2 LEAD CONTAM AREA

Source Hazardous Waste Quantity Value: 1.94

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Lead	10000	1.00E+00	5.00E+03	5.00E+07

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 3 #5 BATTERY TREATMNT

Source Hazardous Waste Quantity Value: 0.01

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Lead	10000	1.00E+00	5.00E+03	5.00E+07

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 4 #6 PUB WKS STOR YD

Source Hazardous Waste Quantity Value: 0.28

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Barium	10000	1.00E+00	5.00E-01	5.00E+03
Cadmium	10000	1.00E+00	5.00E+03	5.00E+07
Chromium	10000	1.00E+00	5.00E+02	5.00E+06
Lead	10000	1.00E+00	5.00E+03	5.00E+07
Mercury	10000	1.00E+00	5.00E+04	5.00E+08
Nickel	10000	1.00E+00	5.00E+02	5.00E+06
Silver	1000	1.00E+00	5.00E+01	5.00E+04

Source: 5 #7 PCB TRANSFORMER

Source Hazardous Waste Quantity Value: 3.70

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Arsenic	10000	1.00E+00	5.00E+02	5.00E+06
DDT	1000	1.00E+00	5.00E+04	5.00E+07
PCBs	10000	1.00E+00	5.00E+04	5.00E+08

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 6 #9 CLOSED LANDFILL

Source Hazardous Waste Quantity Value: 73502.85

Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value
Acenaphthylene	0	1.00E+00	5.00E+02	0.00E+00
Acenaphthene	10	4.00E-01	5.00E+02	2.00E+03
Anthracene	10	4.00E-01	5.00E+03	2.00E+04
Arsenic	10000	1.00E+00	5.00E+02	5.00E+06
Asbestos	10000	1.00E+00	5.00E-01	5.00E+03
Barium	10000	1.00E+00	5.00E-01	5.00E+03
Benz(a)anthracene	1000	1.00E+00	5.00E+04	5.00E+07
Benzo(a)pyrene	10000	1.00E+00	5.00E+02	5.00E+06
Benzo(k)fluoranthene	0	1.00E+00	5.00E+04	0.00E+00
Bis (2-ethylhexyl) phthalate	100	1.00E+00	5.00E+03	5.00E+05
Butylbenzyl phthalate	10	1.00E+00	5.00E+02	5.00E+03
Chlorobenzene	100	4.00E-01	5.00E+01	2.00E+03
Chromium	10000	1.00E+00	5.00E+02	5.00E+06
Chrysene	0	1.00E+00	5.00E+02	0.00E+00
Dichlorobenzene, 1,2-	100	4.00E-01	5.00E+01	2.00E+03
Dichlorobenzene, 1,4-	10	4.00E-01	5.00E+01	2.00E+02
Fluorene	100	1.00E+00	5.00E+03	5.00E+05
Lead	10000	1.00E+00	5.00E+03	5.00E+07
Mercury	10000	1.00E+00	5.00E+04	5.00E+08
Naphthalene	1000	4.00E-01	5.00E+00	2.00E+03
Phenanthrene	1	4.00E-01	5.00E+01	2.00E+01
Pyrene	100	1.00E+00	5.00E+01	5.00E+03

SW PATHWAY: OVERLAND/FLOOD HUMAN FOOD CHAIN THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Toxicity Value	Persistence Value	Bio-accum. Value	Toxicity/ Persistence/ Bioaccum. Value

- N/A and/or data not specified

Toxicity/Persistence/Bioaccumulation Value from Source Hazardous Substances:	5.00E+08
Toxicity/Persistence/Bioaccumulation Value from Observed Release Hazardous Substances:	0.00E+00
Toxicity/Persistence/Bioaccumulation Factor:	5.00E+08
Sum of Source Hazardous Waste Quantity Values:	7.35E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	1000

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT HUMAN FOOD CHAIN THREAT TARGETS

CHARLESTON NAVAL BASE - 07/13/92

Level I Concentrations

Fishery	Annual Production (pounds)	Human Food Chain Population Value
- N/A and/or data not specified		

Sum of Human Food Chain Population Values: 0.00E+00

Level I Concentrations Factor: 0.00E+00

Level II Concentrations

Fishery	Annual Production (pounds)	Human Food Chain Population Value
- N/A and/or data not specified		

Sum of Human Food Chain Population Values: 0.00E+00

Level II Concentrations Factor: 0.00E+00

Potential Contamination

Fishery	Annnual Production (pounds)	Type of Surface Water Body	Average Annual Flow (cfs)	Pop. Value (Pi)	Dilution Weight (Di)	Pi*Di
2 CHARLESTON HARBOR	270486.0	Coastal	11	310.0	1.00E-04	3.10E-02
3 ATLANTIC OCEAN	648740.0	Deep Zon	0	310.0	5.00E-06	1.55E-03

Sum of (Pi*Di): 3.26E-02

Potential Human Food Chain Contamination Factor: 3.43E-02

Documentation for COOPER RIVER Fishery:

IT HAS BEEN ESTIMATED THAT IN 1986, 676,215 POUNDS OF COMMERCIAL SEAFOOD WAS CAUGHT IN THE COOPER RIVER, ASHLEY RIVER, CHARLESTON HARBOR, LAKE MOULTRIE, AND THE INTERCOASTAL WATERWAY . BASED ON TOPOGRAPHIC MAPS, IT WAS DETERMINED THAT THE MAJORITY OF THE COOPER RIVER USED FOR SEAFOOD FISHING MAKES UP APPROXIMATELY 40% OF THE SURFACE AREA OF THESE BODIES OF WATER. THE CHARLESTON HARBOR ALSO MAKES UP ABOUT 40% AND THE MAJORITY OF THE ASHELY RIVER USED FOR SEAFOOD FISHING MAKES UP ABOUT 20%. LAKE MOULTRIE WAS NOT CONSIDERED SINCE IT IS FRESHWATER AND THE VAST MAJORITY OF THE COMMERCIAL SEAFOOD CAUGHT CAME FROM SALT WATER.

BY MULTIPLYING THE TOTAL POUNDS OF COMMERCIAL SEAFOOD CAUGHT BY 40%, AN ESTIMATE OF THE AMOUNT OF COMMERCIAL SEAFOOD CAUGHT IN THE COOPER RIVER CAN BE FOUND. THUS 676,215 POUNDS OF COMMERCIAL SEAFOOD MULTIPLIED BY 40% GIVES APPROXIMATELY 270,486 POUNDS OF COMMERCIAL SEAFOOD ASSUMED TO BE CAUGHT IN THE COOPER RIVER IN 1986.

Reference: 2; 3

Documentation for CHARLESTON HARBOR Fishery:

PLEASE SEE THE CALCULATIONS DONE FOR ESTIMATING THE POUNDS OF SEAFOOD PRODUCT CAUGHT IN THE COOPER RIVER.

IT HAS BEEN ESTIMATED THAT THE CHARLESTON HARBOR MAKES UP 40% OF

THE SURFACE AREA OF THE COOPER RIVER, ASHELY RIVER, INTERCOASTAL WATERWAY, AND THE CHARLESTON HARBOR.

Reference: 2; 3

Documentation for ATLANTIC OCEAN Fishery:

IT IS ESTIMATED THAT IN 1986, 7,208,217 POUNDS OF COMMERCIAL SEAFOOD WAS CAUGHT IN THE ATLANTIC OCEAN WITHIN 12 MILES OF THE ENTIRE COAST OF SOUTH CAROLINA. THE DISTANCE FROM THE NORTHERN-MOST COASTAL POINT OF THE STATE TO THE SOUTHERN-MOST POINT OF THE STATE IS ESTIMATED TO BE 185 MILES.

THE DISTANCE ARC SURROUNDING THE NAVAL BASE RUNS 8.5 MILES FROM THE BASE IN EITHER DIRECTION ALONG THE COAST. THIS MEANS THAT ABOUT 17 MILES, OR 9% OF SOUTH CAROLINA'S COASTLINE, IS CONSIDERED AS POTENTIALLY EXPOSED TO THE NAVAL BASE.

BY MULTIPLYING THE 7,208,217 POUNDS OF COMMERCIAL SEAFOOD CAUGHT WITHIN THE 12-MILE LIMIT ALONG THE ENTIRE COAST OF SOUTH CAROLINA BY 9% IT IS ESTIMATED THAT 648,740 POUNDS OF COMMERCIAL SEAFOOD WAS CAUGHT IN THIS AREA. THIS VALUE IS USED TO ESTIMATE THE COMMERCIAL CATCH OF THE ATLANTIC OCEAN BODY OF WATER AS POTENTIALLY EXPOSED TO THE NAVAL BASE .

IT SHOULD BE NOTED THAT THIS METHOD OF ESTIMATION IS PRONE TO INACCURACIES. HOWEVER, WHEN CONSIDERING THE DILUTION FACTOR OF THE ATLANTIC OCEAN AND HOW IT MAY AFFECT THE SCORE IN RELATION TO THE COOPER RIVER THE INFLUENCE OF THE ATLANTIC IS NEGLIGIBLE. IN FACT, IF ONE WERE TO CONSIDER SOUTH CAROLINA'S ENTIRE CATCH WITHIN THE 12 MILE LIMIT OF THE ENTIRE COAST AS POTENTIALLY EXPOSED, ITS VALUE WOULD STILL BE A FACTOR OF 1000 LOWER THAN THAT FOR THE COOPER RIVER.

Reference: 2; 3

Food Chain Individual

Location of Nearest Fishery: COOPER RIVER
Distance from the Probable Point of Entry: 0.00 miles
Type of Surface Water Body: River
Dilution Weight: 0.0010000
Level of Contamination: Potential

Food Chain Individual Factor: 0.00

Documentation for COOPER RIVER :

THROUGH A CONTRACT WITH THE ARMY CORPS OF ENGINEERS, 4500 CFS IS DISCHARGED INTO THE COOPER RIVER.

DISTANCES WERE ESTIMATED FROM THE TOPOGRAPHIC MAPS.

Reference: 2; 25, P. 2 OF CONTRACT NO. DACW60-77-C-0005

Source: 1 #1 DRMO STAGING

Source Hazardous Waste Quantity Value: 0.02

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Acenaphthene	10000	4.00E-01	5.00E+02	2.00E+06
Anthracene	10000	4.00E-01	5.00E+03	2.00E+07
Antimony	0	1.00E+00	5.00E+02	0.00E+00
Arsenic	100	1.00E+00	5.00E+02	5.00E+04
Barium	1	1.00E+00	5.00E-01	5.00E-01
Benzene	10000	4.00E-01	5.00E+04	2.00E+08
Cadmium	1000	1.00E+00	5.00E+03	5.00E+06
Chlorobenzene	1000	4.00E-01	5.00E+03	2.00E+06
Chromium	10	1.00E+00	5.00E+02	5.00E+03
Copper	1000	1.00E+00	5.00E+04	5.00E+07
DDT	10000	1.00E+00	5.00E+04	5.00E+08
Dichlorobenzene, 1,2-	100	4.00E-01	5.00E+01	2.00E+03
Dichlorobenzene, 1,4-	10	4.00E-01	5.00E+01	2.00E+02
Ethyl benzene	1000	4.00E-01	5.00E+01	2.00E+04
Fluorene	1000	1.00E+00	5.00E+03	5.00E+06
Fluorine	0	4.00E-01	5.00E-01	0.00E+00
Hexachlorocyclohexane, alpha-	1000	1.00E+00	5.00E+02	5.00E+05
Hexachlorocyclohexane, beta-	0	1.00E+00	5.00E+03	0.00E+00
Iron	10	1.00E+00	5.00E-01	5.00E+00
Lead	1000	1.00E+00	5.00E+03	5.00E+06
Mercury	10000	1.00E+00	5.00E+04	5.00E+08
Naphthalene	1000	4.00E-01	5.00E+03	2.00E+06
Nickel	1000	1.00E+00	5.00E+02	5.00E+05
PCBs	10000	1.00E+00	5.00E+04	5.00E+08
Phenanthrene	1000	4.00E-01	5.00E+01	2.00E+04
Selenium	100	1.00E+00	5.00E+01	5.00E+03
Silver	10000	1.00E+00	5.00E+01	5.00E+05
Sodium	0	1.00E+00	5.00E-01	0.00E+00
Toluene	100	4.00E-01	5.00E+01	2.00E+03
Trichloroethane, 1,1,1-	10	4.00E-01	5.00E+00	2.00E+01
Trichloroethylene	10	4.00E-01	5.00E+01	2.00E+02
Zinc	100	1.00E+00	5.00E+04	5.00E+06

SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 2 #2 LEAD CONTAM AREA

Source Hazardous Waste Quantity Value: 1.94

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Lead	1000	1.00E+00	5.00E+03	5.00E+06

Source: 3 #5 BATTERY TREATMNT

Source Hazardous Waste Quantity Value: 0.01

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Lead	1000	1.00E+00	5.00E+03	5.00E+06

Source: 4 #6 PUB WKS STOR YD

Source Hazardous Waste Quantity Value: 0.28

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Barium	1	1.00E+00	5.00E-01	5.00E-01
Cadmium	1000	1.00E+00	5.00E+03	5.00E+06
Chromium	10	1.00E+00	5.00E+02	5.00E+03
Lead	1000	1.00E+00	5.00E+03	5.00E+06
Mercury	10000	1.00E+00	5.00E+04	5.00E+08
Nickel	1000	1.00E+00	5.00E+02	5.00E+05
Silver	10000	1.00E+00	5.00E+01	5.00E+05

SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS

CHARLESTON NAVAL BASE - 07/13/92

Source: 5 #7 PCB TRANSFORMER

Source Hazardous Waste Quantity Value: 3.70

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Arsenic	100	1.00E+00	5.00E+02	5.00E+04
DDT	10000	1.00E+00	5.00E+04	5.00E+08
PCBs	10000	1.00E+00	5.00E+04	5.00E+08

SW PATHWAY: OVERLAND FLOW/FLOOD ENVIRONMENTAL THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 6 #9 CLOSED LANDFILL

Source Hazardous Waste Quantity Value: 73502.85

Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value
Acenaphthylene	0	1.00E+00	5.00E+02	0.00E+00
Acenaphthene	10000	4.00E-01	5.00E+02	2.00E+06
Anthracene	10000	4.00E-01	5.00E+03	2.00E+07
Arsenic	100	1.00E+00	5.00E+02	5.00E+04
Asbestos	0	1.00E+00	5.00E-01	0.00E+00
Barium	1	1.00E+00	5.00E-01	5.00E-01
Benz(a)anthracene	10000	1.00E+00	5.00E+04	5.00E+08
Benzo(a)pyrene	1000	1.00E+00	5.00E+02	5.00E+05
Benzo(k)fluoranthene	0	1.00E+00	5.00E+04	0.00E+00
Bis (2-ethylhexyl) phthalate	1000	1.00E+00	5.00E+04	5.00E+07
Butylbenzyl phthalate	1000	1.00E+00	5.00E+02	5.00E+05
Chlorobenzene	1000	4.00E-01	5.00E+03	2.00E+06
Chromium	10	1.00E+00	5.00E+02	5.00E+03
Chrysene	0	1.00E+00	5.00E+02	0.00E+00
Dichlorobenzene, 1,2-	100	4.00E-01	5.00E+01	2.00E+03
Dichlorobenzene, 1,4-	10	4.00E-01	5.00E+01	2.00E+02
Fluorene	1000	1.00E+00	5.00E+03	5.00E+06
Lead	1000	1.00E+00	5.00E+03	5.00E+06
Mercury	10000	1.00E+00	5.00E+04	5.00E+08
Naphthalene	1000	4.00E-01	5.00E+03	2.00E+06
Phenanthrene	1000	4.00E-01	5.00E+01	2.00E+04
Pyrene	0	1.00E+00	5.00E+01	0.00E+00

Hazardous Substances Found in an Observed Release

Sample No.	Observed Release Hazardous Substance	Eco-toxicity Value	Persistence Value	Bio-accum. Value	Ecotoxicity/ Persistence/ Bioaccum. Value

- N/A and/or data not specified

Ecotoxicity/Persistence/Bioaccummulation Value from Source Hazardous Substances:	5.00E+08
Ecotoxicity/Persistence/Bioaccummulation Value from Observed Release Hazardous Substances:	0.00E+00
Ecotoxicity/Persistence/Bioaccummulation Factor:	5.00E+08
Sum of Source Hazardous Waste Quantity Values:	7.35E+04
Hazardous Waste Quantity Factor:	10000
Waste Characteristics Factor Category:	1000

Level I Concentrations

- N/A and/or data not specified

Level II Concentrations

- N/A and/or data not specified

Most Distant Level I Sample

- N/A and/or data not specified

Most Distant Level II Sample

- N/A and/or data not specified

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS

CHARLESTON NAVAL BASE - 07/13/92

Level I Concentrations

Sensitive Environment	Distance from Probable Point of Entry to Sensitive Env. (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Sum of Sensitive Environments Values: 0

Wetlands

Wetland	Distance from Probable Point of Entry to Wetland (miles)	Wetlands Frontage (miles)
- N/A and/or data not specified		

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level I Concentrations Factor: 0.00E+00

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
CHARLESTON NAVAL BASE - 07/13/92

Level II Concentrations

Sensitive Environment	Distance from Probable Point of Entry to Sensitive Env. (miles)	Sensitive Environment Value
- N/A and/or data not specified		

Sum of Sensitive Environments Values: 0

Wetlands

Wetland	Distance from Probable Point of Entry to Wetland (miles)	Wetlands Frontage (miles)
- N/A and/or data not specified		

Total Wetlands Frontage: 0.00 Miles Total Wetlands Value: 0

Sum of Sensitive Environments Value + Wetlands Value: 0.00E+00

Level II Concentrations Factor: 0.00E+00

Potential Contamination

Sensitive Environments

Type of Surface Water Body	Sensitive Environment	Sensitive Environment Value
Coastal Tidal Area	1 SHORTNOSE STURGEON	75

Wetlands

Type of Surface Water Body	Sensitive Environment	Wetlands Frontage	Wetlands Value
River	2 WETLANDS DOWNSTREAM	30.00	500

Documentation for Sensitive Environment SHORTNOSE STURGEON:

PLEASE REFER TO THE DISCUSSION OF SENSITIVE ENVIRONMENT 1, THE LEAST TERN.

THE SHORTNOSE STURGEON, A FEDERALLY ENDANGERED SPECIES, HAS BEEN DOCUMENTED TO OCCUR APPROXIMATELY FIVE MILES DOWNSTREAM FROM THE CHARLESTON NAVAL BASE.

Reference: 2; 10

Documentation for Sensitive Environment WETLANDS DOWNSTREAM:

THE AREA DOWNSTREAM FROM THE CHARLESTON NAVAL BASE IS OVERLAPPED BY PALUSTRINE, ESTUARINE, LACUSTRINE, AND MARINE WETLANDS FROM THE BORDER OF THE BASE TO THE 15-MILE DOWNSTREAM DISTANCE LIMIT. THEREFORE, THE ENTIRE DISTANCE DOWNSTREAM FROM THE BASE WILL BE

CONSIDERED AS CONTIGUOUS WETLANDS. THE WETLAND FRONTAGE IS DOUBLED TO 30 MILES SINCE THE WETLANDS OCCUR ON EITHER SIDE OF THE COOPER RIVER WITHIN THE ENTIRE 15-MILE DOWNSTREAM DISTANCE LIMIT.

Reference: 20

SW PATHWAY: OVERLAND FLOW/FLOOD COMPONENT ENVIRONMENTAL THREAT TARGETS
CHARLESTON NAVAL BASE - 07/13/92

Type of Surface Water Body	Sum of Sens. Environment Values(Sj)	Sum of Wetland Frontage Values(Wj)	Dilution Weight (Dj)	Dj(Wj+Sj)
Large Stream to River	0	500	1.00E-03	5.00E-01
Coastal Tidal Waters	75	0	1.00E-04	7.50E-03

Sum of Dj(Wj+Sj): 5.07E-01
Sum of Dj(Wj+Sj)/10: 5.07E-02

Potential Contamination Sensitive Environment Factor: 5.58E-02

Likelihood of Exposure

No.	Source ID	Level of Contamination
1	#1 DRMO STAGING	Level II
2	#2 LEAD CONTAM AREA	Level II
4	#6 PUB WKS STOR YD	Level II
5	#7 PCB TRANSFORMER	Level I

Likelihood of Exposure Factor: 550

Documentation for Area of Contamination, Source #1 DRMO STAGING :

BASED ON FIGURE 2-11 OF REFERENCE 1 THE EXTENT OF CONTAMINATION FROM THE DRMO STAGING AREA IS APPROXIMATELY 2,800 SQUARE FEET IN SIZE.

Reference: 1, SECTION 2.6.1, FIGURE 2-11

Documentation for Area of Contamination, Source #2 LEAD CONTAM AREA:

THE AREA ENCOMPASSED BY THE 1,000 MG/KG ZONE OF LEAD CONTAMINATION IS APPROXIMATLEY SIX ACRES. THERE ARE APPROXIMATELY 43,560 SQUARE FEET PER ACRE.

Reference: 1, SECTION 2.6.2, FIGURE 2-12; 24, SECTION 1.3

Documentation for Area of Contamination, Source #5 BATTERY TREATMNT:

BASED ON THE SAMPLING LOCATIONS THAT TESTED POSITIVE FOR CONTAMINATION, THE AREA OF CONTAMINATION OF THE BATTERY ELECTROLYTE TREATMENT AREA IS APPROXIMATELY 800 SQUARE FEET IN SIZE.

Reference: 1, SECTION 2.6.5, FIGURE 2-14

Documentation for Area of Contamination, Source #6 PUB WKS STOR YD:

BASED ON THE SAMPLING LOCATIONS OF FIGURE 2-16 THE AREA OF CONTAMINATION OF THE PUBLIC WORKS STORAGE YARD IS APPROXIMATLEY 50,000 SQUARE FEET IN SIZE.

Reference: 1, SECTION 2.6.6, FIGURE 2-16

Documentation for Area of Contamination, Source #7 PCB TRANSFORMER:

BASED ON FIGURE 2-17 FROM REFERENCE 1 THE AREA OF CONTAMINATION OF THE PCB TRANSFORMER STORAGE AREA IS APPROXIMATELY 18,500 SQUARE FEET IN SIZE.

Reference: 1, SECTION 2.6.7, FIGURE 2-17

Documentation for Area of Contamination, Source #9 CLOSED LANDFILL:

SINCE THERE IS DATA INDICATING THE AMOUNT OF MATERIAL DISPOSED OF IN THE LANDFILL THIS SECTION WILL NOT BE EVALUATED. IN ADDITION, THERE IS NO DATA INDICATING THAT CONTAMINATION IS SHALLOWER THAN TWO FEET. THEREFORE IT IS NOT POSSIBLE FOR ANYONE TO BE EXPOSED TO IT.

Reference: 1, TABLE 2-8

Source No.	Hazardous Substance	Depth (ft.)	Concent.	Cancer	RFD	Units
1	Barium	< 2	4.9E+03	0.0E+00	4.1E+04	ppm
1	Cadmium	< 2	6.6E+00	0.0E+00	2.9E+02	ppm
1	Chromium	< 2	4.4E+02	0.0E+00	2.9E+03	ppm
1	Lead	< 2	3.5E+03	0.0E+00	0.0E+00	ppm
1	Mercury	< 2	7.6E+00	0.0E+00	1.7E+02	ppm
1	Nickel	< 2	2.3E+03	0.0E+00	1.2E+04	ppm
1	Silver	< 2	4.4E+00	0.0E+00	1.7E+03	ppm
2	Lead	< 2	3.7E+05	0.0E+00	0.0E+00	ppm
4	Barium	< 2	1.7E+02	0.0E+00	4.1E+04	ppm

4	Cadmium	< 2	9.4E+00	0.0E+00	2.9E+02	ppm
4	Chromium	< 2	5.6E+01	0.0E+00	2.9E+03	ppm
4	Lead	< 2	9.8E+02	0.0E+00	0.0E+00	ppm
4	Mercury	< 2	2.9E+00	0.0E+00	1.7E+02	ppm
4	Nickel	< 2	6.8E+01	0.0E+00	1.2E+04	ppm
4	Silver	< 2	8.7E+00	0.0E+00	1.7E+03	ppm
5	Arsenic	< 2	1.6E+01	3.3E-01	1.7E+02	ppm
5	DDT	< 2	4.0E+01	1.7E+00	2.9E+02	ppm
5	PCBs	< 2	6.2E+01	7.6E-02	0.0E+00	ppm

Documentation for Source #1 DRMO STAGING , Contaminants:

SOIL SAMPLES FROM THE DRMO STAGING AREA SHOW CONTAMINATION FOR BARIUM, CADMIUM, CHROMIUM, LEAD, MERCURY, NICKEL, AND SILVER. VALUES FOR ALL CONTAMINANTS CAME FROM APPENDIX D OF REFERENCE 1. THESE VALUES ARE CROSS-REFERENCED IN TABLE 9 OF REFERENCE 17. THE MAXIMUM VALUE FROM EACH SAMPLE LOCATION WAS EVALUATED IN ACCORDANCE WITH THE HRS.

IT MIGHT APPEAR THAT THERE IS A DISCREPANCY IN THE CONSIDERATION OF THIS SITE FOR THE HRS AND THE RECOMMENDATIONS FOR THIS SITE BASED ON THE RISK ASSESSMENT INCLUDED AS REFERENCE 16. HOWEVER, THE HRS REQUIRES THAT CERTAIN ASSUMPTIONS BE MADE THAT ARE NOT FACTORED IN THE RISK ASSESSMENT.

AMONG THE KEY DIFFERENCES IS THE POPULATION CONSIDERED FOR THE HRS. THE HRS ASSUMES THAT THE ENTIRE BASE POPULATION, OR 22,731 PEOPLE, IS EXPOSED TO THE CONTAMINANTS FROM THE DRMO STAGING AREA. THE HRS ASSUMES THAT THIS CONTAMINATION MAY SPREAD THROUGH THE GROUNDWATER, SURFACE WATER, SOIL, AND AIR. THE RISK ASSESSMENT ONLY CONSIDERS "A HYPOTHETICAL FUTURE POPULATION OF ON-SITE RESIDENTS AS THE INDIVIDUALS POTENTIALLY EXPOSED TO THE SOIL AND TO THE CONTAMINANTS OF CONCERN...." (SECTION 2.0 OF REFERENCE 16). IN SUMMARY THE HRS CONSIDERS 22,731 PEOPLE AS EXPOSED TO THIS CONTAMINATION THROUGH FOUR PATHWAYS. THE RISK ASSESSMENT CONSIDERS A HYPOTHETICAL POPULATION EXPOSED THROUGH THE SOIL, AIR, AND INGESTION OF VEGETABLES FROM GARDENS.

THE RISK ASSESSMENT CONSIDERS AVERAGE SOIL CONCENTRATIONS OF EACH CONTAMINANT (SECTION 7.2 OF REFERENCE 16). THE HRS CONSIDERS THE INDIVIDUAL AREAS WITH THE HIGHEST LEVELS OF CONTAMINATION AND BASES THE NUMBER OF PEOPLE EXPOSED TO EACH OF THOSE POINTS. ONE MAY SEE HOW USING THE SAME DATA CAN YIELD ENTIRELY DIFFERENT CONCLUSIONS WHEN USING THE HRS VERSUS ANOTHER METHOD OF ASSESSMENT.

Reference: 1, SECTION 2.6.1, APPENDIX D; 17, TABLE 9; 16, SECT. 2.0, 7.2

Documentation for Source #2 LEAD CONTAM AREA, Contaminants:

LEAD IS THE PRINCIPAL CONTAMINANT NOTED FOR SWMU #2. THE HIGHEST CONCENTRATION OF LEAD REPORTED IN THE SOIL IS 371,000 PARTS PER MILLION. IN ACCORDANCE WITH CONSIDERING THE WORST CASE SCENARIO THIS VALUE WILL BE CONSIDERED.

Reference: 1, SECTION 2.6.2, TABLE 2-2; 8, SECTION 3.2.1, TABLE 4.1-1

Documentation for Source #5 BATTERY TREATMNT, Contaminants:

LEAD IS THE ONLY CONTAMINANT REPORTED AT THIS SWMU.
THE HIGHEST VALUE FROM ALL SAMPLING LOCATIONS WAS ENTERED.

Reference: 1, SECTION 2.6.5, TABLE 2-5; 17, TABLE 4

Documentation for Source #6 PUB WKS STOR YD, Contaminants:

MAXIMUM VALUES FOR EACH CONTAMINANT LISTED IN APPENDIX F-2 HAVE BEEN USED. THIS IS BECAUSE ALL SOIL SAMPLES ARE DOCUMENTED TO BE NO DEEPER THAN SIX INCHES BELOW THE SURFACE OF THE SOIL. THESE RESULTS ARE ALSO LISTED IN APPENDIX B OF REFERENCE 17.

Reference: 1, SECTION 2.6.6, APPENDIX F-2; 17, TABLE 3, APPENDIX B

Documentation for Source #7 PCB TRANSFORMER, Contaminants:

THIS INFORMATION WAS RETRIEVED FROM SECTION 2.6.7 AND APPENDIX G. SAMPLES WERE MEASURED IN ug/gm (PARTS PER MILLION). THE SAMPLING LOCATIONS ARE DOCUMENTED TO BE WITHIN SIX INCHES OF THE SURFACE OF THE SOIL. THE SOIL SAMPLES TESTED POSITIVE FOR PCBs, DDT, AND ARSENIC.

Reference: 1, SECTION 2.6.7, APPENDIX G

Documentation for Source #9 CLOSED LANDFILL, Contaminants:

THE HIGHEST READING OF EACH CONTAMINANT FROM ALL LOCATIONS WAS EVALUATED. THIS AREA IS A LANDFILL AND IS MORE THAN LIKELY COVERED BY A TOPSOIL LAYER THAT IS GREATER THAN 2 FEET THICK. THEREFORE ALL CONTAMINANTS ARE ASSUMED TO BE GREATER THAN 2 FEET DEEP. SECTION 2.6.9 STATES THAT MOST OF THE AREA IS PAVED OVER. ACCORDING TO FIELD OBSERVATIONS MUCH OF THE AREA IS COVERED WITH GRASS, FORESTED AREAS, AND BODIES OF WATER.

Reference: 1, SECTION 2.6.9, TABLE 2-10; 6

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 1 #1 DRMO STAGING

Source Hazardous Waste Quantity Value: 0.08

Hazardous Substance	Toxicity Value
Barium	10000
Cadmium	10000
Chromium	10000
Lead	10000
Mercury	10000
Nickel	10000
Silver	1000

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 2 #2 LEAD CONTAM AREA

Source Hazardous Waste Quantity Value: 7.69

Hazardous Substance	Toxicity Value
Lead	10000

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 4 #6 PUB WKS STOR YD

Source Hazardous Waste Quantity Value: 1.10

Hazardous Substance	Toxicity Value
Barium	10000
Cadmium	10000
Chromium	10000
Lead	10000
Mercury	10000
Nickel	10000
Silver	1000

SOIL EXPOSURE PATHWAY RESIDENT POPULATION THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 5 #7 PCB TRANSFORMER

Source Hazardous Waste Quantity Value: 0.54

Hazardous Substance	Toxicity Value
Arsenic	10000
DDT	1000
PCBs	10000

Toxicity Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	9.42E+00
Hazardous Waste Quantity Factor:	10
Waste Characteristics Factor Category:	18

Targets

Level I Population: 0.0 Value: 0.00

Documentation for Level I Population:

MR. BILL BOOK OF THE CHARLESTON NAVAL BASE STATED THAT HE DOES NOT KNOW OF ANYONE WHO LIVES OR GOES TO SCHOOL OR DAYCARE WITHIN 200 FEET OF ANY SWMU ON BASE.

Reference: 14

Level II Population: 0.0 Value: 0.00

Documentation for Level II Population:

MR. BILL BOOK OF THE CHARLESTON NAVAL BASE STATED THAT HE DOES NOT KNOW OF ANYONE WHO LIVES OR GOES TO SCHOOL OR DAYCARE WITHIN 200 FEET OF ANY SWMU ON BASE.

Reference: 14

Workers: 33.0 Value: 5.00

Documentation for Workers:

ACCORDING TO INFORMATION SUBMITTED BY MR. BILL BOOK OF THE CHARLESTON NAVAL BASE, THERE ARE NO MORE THAN 33 WORKERS WHO MAY BE EXPOSED TO THE SIX SWMUS CONSIDERED IN THE HRS SCORING. SWMU #1 IS DOCUMENTED TO HAVE 24 WORKERS ON OR WITHIN 200 FEET OF IT. SWMU #2 IS DOCUMENTED TO HAVE LESS THAN 10. SWMUS #5, #6, AND #7 ARE ALL ENCLOSED BY FENCES AND ACCESS IS REPORTEDLY RESTRICTED. SWMU #9 DOES NOT HAVE ANY REPORTED CONTAMINATION SHALLOWER THAN 2 FEET BELOW THE SURFACE AND WILL NOT BE CONSIDERED IN THIS PATHWAY.

BE ASSUMED TO HAVE 24 WORKERS ON OR WITHIN 200 FEET OF IT. SWMU #2 WILL BE ASSUMED TO HAVE NINE WORKERS ON OR WITHIN 200

Reference: 14

Resident Individual:	Potentia	Value:	0.00
Resources:	NO	Value:	0.00

Documentation for Resources:

NO RESOURCES HAVE BEEN IDENTIFIED ON BASE.

Reference: 6

Terrestial Sensitive Environment	Value
- N/A and/or data not specified	

Terrestrial Sensitive Environments Factor: 0.00

Documentation for Terrestrial Environment NONE:

IT HAS NOT BEEN POSITIVELY DETERMINED THAT ANY ENDANGERED SPECIES LIVE WITHIN 200 FEET OF ANY AREA OF OBSERVED SOIL CONTAMINATION AT THE CHARLESTON NAVAL BASE. THEREFORE A VALUE CANNOT BE ACCURATELY ASSIGNED. THE VALUE WILL BE CONSIDERED ZERO.

IT HAS BEEN REPORTED THAT THERE IS A POPULATION OF LEAST TERNS (A STATE THREATENED SPECIES) PRESENT ON THE ROOF OF THE COMMISSARY ON BASE. HOWEVER, WHEN CONSULTING THE TOPOGRAPHIC MAPS AND THE BASE MAPS THIS AREA DOES NOT APPEAR TO BE WITHIN 200 FEET OF ANY SWMU UNDER CONSIDERATION.

Reference: 1, FIGURE 2-10; 2; 20; 21

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT LIKELIHOOD OF EXPOSURE
CHARLESTON NAVAL BASE - 07/13/92

Likelihood of Exposure

No.	Source ID	Level of Contamination	Attractiveness/ Accessibility	Area of Contam. (sq. feet)
1	#1 DRMO STAGING	Level II	5	2800
2	#2 LEAD CONTAM AREA	Level II	5	261360

Highest Attractiveness/Accessibility Value: 5
Sum of Eligible Areas Of Contamination (sq. feet): 264160
Area of Contamination Value: 60

Likelihood of Exposure Factor Category: 5

Documentation for Attractiveness/Accessibility, Source #1 DRMO STAGING :

THE CONTAMINATION HAS BEEN DOCUMENTED IN THE SURFACE SOIL. THE CHARLESTON NAVAL BASE IS SURROUNDED BY A MAINTAINED FENCE AND IS GUARDED AT ALL TIMES.

Reference: 1, SECTION 2.6.1; 6

Documentation for Attractiveness/Accessibility, Source #2 LEAD CONTAM AREA:

CONTAMINATION IS DOCUMENTED TO BE SHALLOWER THAN TWO FEET DEEP. THEREFORE, THIS SOURCE IS GIVEN THE MAXIMUM VALUE. PLEASE SEE THE DISCUSSION OF SWMU 1.

Reference: 1, SECTION 2.6.2, FIGURE 2-12, TABLE 2-2

Documentation for Attractiveness/Accessibility, Source #5 BATTERY TREATMNT:

SURFACE SOIL CONTAMINATION IS DOCUMENTED TO BE SHALLOWEST AT THE FLOOR OF THE TREATMENT UNIT (FIVE AND A HALF FEET BELOW THE SURFACE). THEREFORE NO ONE WILL BE CONSIDERED AS EXPOSED THROUGH THE SOIL AT THIS SWMU.

Reference: 1, SECTION 2.6.5, FIG. 2-14, TABLE 2-5; 14

Documentation for Attractiveness/Accessibility, Source #6 PUB WKS STOR YD:

THE CONTAMINATION IS DOCUMENTED TO BE SHALLOWER THAN TWO FEET. THE CHARLESTON NAVAL BASE IS SURROUNDED BY A MAINTAINED FENCE AND IS GUARDED AT ALL TIMES. THIS SWMU IS ALSO REPORTEDLY SURROUNDED BY A MAINTAINED FENCE AND ACCESS IS REPORTED TO BE VERY LIMITED. THEREFORE NO ONE WILL BE CONSIDERED EXPOSED THROUGH THE SOIL AT THIS SWMU.

Reference: 1, SECTION 2.6.6; 6; 14

Documentation for Attractiveness/Accessibility, Source #7 PCB TRANSFORMER:

CONTAMINATION IS DOCUMENTED TO BE SHALLOWER THAN 2 FEET. BOTH THE CHARLESTON NAVAL BASE AND THE PCB TRANSFORMER AREAS ARE SURROUNDED BY A MAINTAINED FENCE. ACCESS IS REPORTED TO BE VERY LIMITED. THEREFORE NO ONE WILL BE CONSIDERED AS EXPOSED THROUGH THE SOIL AT THIS SWMU.

Reference: 1, SECTION 2.6.7; 6; 14

Documentation for Attractiveness/Accessibility, Source #9 CLOSED LANDFILL:

THERE IS NO DATA INDICATING WHETHER THE SOIL CONTAMINATION IS SHALLOWER THAN 2 FEET. HOWEVER, MOST LANDFILLS ARE COVERED BY A LAYER OF TOPSOIL THAT IS GREATER THAN 2 FEET THICK. SECTION 2.6.9 INDICATES THAT SOME OF THE AREA IS NOW COVERED BY A PARKING LOT. BASED ON THIS AND FIELD OBSERVATIONS THE POPULATION WILL NOT BE CONSIDERED EXPOSED BY THE SOIL PATHWAY.

Reference: 1, SECTION 2.6.9; 6

Source No.	Hazardous Substance	Depth (ft.)	Concent.	Cancer	RFD	Units
1	Barium	< 2	4.9E+03	0.0E+00	4.1E+04	ppm
1	Cadmium	< 2	6.6E+00	0.0E+00	2.9E+02	ppm
1	Chromium	< 2	4.4E+02	0.0E+00	2.9E+03	ppm
1	Lead	< 2	3.5E+03	0.0E+00	0.0E+00	ppm
1	Mercury	< 2	7.6E+00	0.0E+00	1.7E+02	ppm
1	Nickel	< 2	2.3E+03	0.0E+00	1.2E+04	ppm
1	Silver	< 2	4.4E+00	0.0E+00	1.7E+03	ppm
2	Lead	< 2	3.7E+05	0.0E+00	0.0E+00	ppm

Documentation for Source #1 DRMO STAGING , Contaminants:

SOIL SAMPLES FROM THE DRMO STAGING AREA SHOW CONTAMINATION FOR BARIUM, CADMIUM, CHROMIUM, LEAD, MERCURY, NICKEL, AND SILVER. VALUES FOR ALL CONTAMINANTS CAME FROM APPENDIX D OF REFERENCE 1. THESE VALUES ARE CROSS-REFERENCED IN TABLE 9 OF REFERENCE 17. THE MAXIMUM VALUE FROM EACH SAMPLE LOCATION WAS EVALUATED IN ACCORDANCE WITH THE HRS.

IT MIGHT APPEAR THAT THERE IS A DISCREPANCY IN THE CONSIDERATION OF THIS SITE FOR THE HRS AND THE RECOMMENDATIONS FOR THIS SITE BASED ON THE RISK ASSESSMENT INCLUDED AS REFERENCE 16. HOWEVER, THE HRS REQUIRES THAT CERTAIN ASSUMPTIONS BE MADE THAT ARE NOT FACTORED IN THE RISK ASSESSMENT.

AMONG THE KEY DIFFERENCES IS THE POPULATION CONSIDERED FOR THE HRS. THE HRS ASSUMES THAT THE ENTIRE BASE POPULATION, OR 22,731 PEOPLE, IS EXPOSED TO THE CONTAMINANTS FROM THE DRMO STAGING AREA. THE HRS ASSUMES THAT THIS CONTAMINATION MAY SPREAD THROUGH THE GROUNDWATER, SURFACE WATER, SOIL, AND AIR. THE RISK ASSESSMENT ONLY CONSIDERS "A HYPOTHETICAL FUTURE POPULATION OF ON-SITE RESIDENTS AS THE INDIVIDUALS POTENTIALLY EXPOSED TO THE SOIL AND TO THE CONTAMINANTS

OF CONCERN...." (SECTION 2.0 OF REFERENCE 16). IN SUMMARY THE HRS CONSIDERS 22,731 PEOPLE AS EXPOSED TO THIS CONTAMINATION THROUGH FOUR PATHWAYS. THE RISK ASSESSMENT CONSIDERS A HYPOTHETICAL POPULATION EXPOSED THROUGH THE SOIL, AIR, AND INGESTION OF VEGETABLES FROM GARDENS.

THE RISK ASSESSMENT CONSIDERS AVERAGE SOIL CONCENTRATIONS OF EACH CONTAMINANT (SECTION 7.2 OF REFERENCE 16). THE HRS CONSIDERS THE INDIVIDUAL AREAS WITH THE HIGHEST LEVELS OF CONTAMINATION AND BASES THE NUMBER OF PEOPLE EXPOSED TO EACH OF THOSE POINTS. ONE MAY SEE HOW USING THE SAME DATA CAN YIELD ENTIRELY DIFFERENT CONCLUSIONS WHEN USING THE HRS VERSUS ANOTHER METHOD OF ASSESSMENT.

Reference: 1, SECTION 2.6.1, APPENDIX D; 17, TABLE 9; 16, SECT. 2.0, 7.2

Documentation for Source #2 LEAD CONTAM AREA, Contaminants:

LEAD IS THE PRINCIPAL CONTAMINANT NOTED FOR SWMU #2. THE HIGHEST CONCENTRATION OF LEAD REPORTED IN THE SOIL IS 371,000 PARTS PER MILLION. IN ACCORDANCE WITH CONSIDERING THE WORST CASE SCENARIO THIS VALUE WILL BE CONSIDERED.

Reference: 1, SECTION 2.6.2, TABLE 2-2; 8, SECTION 3.2.1, TABLE 4.1-1

Documentation for Source #5 BATTERY TREATMNT, Contaminants:

LEAD IS THE ONLY CONTAMINANT REPORTED AT THIS SWMU.
THE HIGHEST VALUE FROM ALL SAMPLING LOCATIONS WAS ENTERED.

Reference: 1, SECTION 2.6.5, TABLE 2-5; 17, TABLE 4

Documentation for Source #6 PUB WKS STOR YD, Contaminants:

MAXIMUM VALUES FOR EACH CONTAMINANT LISTED IN APPENDIX F-2 HAVE BEEN USED. THIS IS BECAUSE ALL SOIL SAMPLES ARE DOCUMENTED TO BE NO DEEPER THAN SIX INCHES BELOW THE SURFACE OF THE SOIL. THESE RESULTS ARE ALSO LISTED IN APPENDIX B OF REFERENCE 17.

Reference: 1, SECTION 2.6.6, APPENDIX F-2; 17, TABLE 3, APPENDIX B

Documentation for Source #7 PCB TRANSFORMER, Contaminants:

THIS INFORMATION WAS RETRIEVED FROM SECTION 2.6.7 AND APPENDIX G. SAMPLES WERE MEASURED IN ug/gm (PARTS PER MILLION). THE SAMPLING LOCATIONS ARE DOCUMENTED TO BE WITHIN SIX INCHES OF THE SURFACE OF THE SOIL. THE SOIL SAMPLES TESTED POSITIVE FOR PCBs, DDT, AND ARSENIC.

Reference: 1, SECTION 2.6.7, APPENDIX G

Documentation for Source #9 CLOSED LANDFILL, Contaminants:

THE HIGHEST READING OF EACH CONTAMINANT FROM ALL LOCATIONS WAS EVALUATED. THIS AREA IS A LANDFILL AND IS MORE THAN LIKELY COVERED BY A TOPSOIL LAYER THAT IS GREATER THAN 2 FEET THICK. THEREFORE ALL CONTAMINANTS ARE ASSUMED TO BE GREATER THAN 2 FEET DEEP. SECTION 2.6.9 STATES THAT MOST OF THE AREA IS PAVED OVER. ACCORDING TO FIELD OBSERVATIONS MUCH OF THE AREA IS COVERED WITH GRASS, FORESTED AREAS, AND BODIES OF WATER.

Reference: 1, SECTION 2.6.9, TABLE 2-10; 6

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS

CHARLESTON NAVAL BASE - 07/13/92

Source: 1 #1 DRMO STAGING

Source Hazardous Waste Quantity Value: 0.08

Hazardous Substance	Toxicity Value
Barium	10000
Cadmium	10000
Chromium	10000
Lead	10000
Mercury	10000
Nickel	10000
Silver	1000

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 2 #2 LEAD CONTAM AREA

Source Hazardous Waste Quantity Value: 7.69

Hazardous Substance	Toxicity Value
Lead	10000

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 4 #6 PUB WKS STOR YD

Source Hazardous Waste Quantity Value: 1.10

Hazardous Substance	Toxicity Value
Barium	10000
Cadmium	10000
Chromium	10000
Lead	10000
Mercury	10000
Nickel	10000
Silver	1000

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 5 #7 PCB TRANSFORMER

Source Hazardous Waste Quantity Value: 0.54

Hazardous Substance	Toxicity Value
Arsenic	10000
DDT	1000
PCBs	10000

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Toxicity Factor:	1.00E+04
Sum of Source Hazardous Waste Quantity Values:	7.77E+00
Hazardous Waste Quantity Factor:	10
Waste Characteristics Factor Category:	18

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT TARGETS
CHARLESTON NAVAL BASE - 07/13/92

Nearby Individual

Population within 1/4 mile: 22731.0

Nearby Individual Value: 1.0

Population Within 1 Mile

Travel Distance Category	Number of People	Value
> 0 to 1/4 mile	22731.0	40.8
> 1/4 to 1/2 mile	0.0	0.0
> 1/2 to 1 mile	0.0	0.0

Population Within 1 Mile Factor: 41.0

Documentation for Population > 0 to 1/4 mile Distance Category:

ACCORDING TO BILL BOOK OF THE CHARLESTON NAVAL BASE, THERE ARE 22,371 PEOPLE WHO LIVE AND WORK AT THE CHARLESTON NAVAL BASE. THERE WAS
MITCHELL OF THE PUBLIC AFFARIS OFFICE OF THE CHARLESTON NAVAL BASE (INCLUDED AS REFERENCE 4). MR. BOOK STATED THAT MS. MITCHELL'S ESTIMATE WAS NOT ACCURATE BECAUSE IT CONSIDERED OFF-BASE HOUSING AND PERSONNEL OUT AT SEA. MR. BOOK CLAIMS THAT HIS ESTIMATE IS THE MOST ACCURATE. BECAUSE OF THAT IT WILL BE CONSIDERED FOR THE HRS.

Reference: 4; 13

Documentation for Population > 1/4 to 1/2 mile Distance Category:

THE GENERAL POPULATION IN THIS AREA DOES NOT HAVE ACCESS TO THE BASE SINCE IT IS SURROUNDED BY A MAINTAINED FENCE AND GUARDED AT ALL TIMES.

Reference: 6

SOIL EXPOSURE PATHWAY NEARBY POPULATION THREAT TARGETS
CHARLESTON NAVAL BASE - 07/13/92

Documentation for Population > 1/2 to 1 mile Distance Category:

THE GENERAL POPULATION IN THIS AREA HAS NO ACCESS TO THE BASE SINCE IT IS SURROUNDED BY A MAINTAINED FENCE AND GUARDED AT ALL TIMES. NO ONE IN THIS AREA IS CONSIDERED.

Reference: 6

OBSERVED RELEASE

No.	Sample ID	Distance (miles)	Level of Contamination
1	HVD2-1	0.000	Level I
2	HVD2-2	0.000	Level II

Sample No.	Hazardous Substance	Concent.	NAAQS	Cancer	RFD	Units
1	Lead	2.0E+00	1.5E+00	0.0E+00	0.0E+00	g/m3
2	Lead	1.0E+00	1.5E+00	0.0E+00	0.0E+00	g/m3

Observed Release Factor: 550

Documentation for Sample HVD2-1:

AMBIENT AIR WAS REPORTEDLY SAMPLED DURING THE SITE INVESTIGATION (DECEMBER 9-12, 1985). BASED ON THE "FINAL CONTAMINATION AND EXPOSURE ASSESSMENT FOR THE LEAD CONTAMINATION WITHIN THE DEFENSE REUTILIZATION AND MANAGEMENT OFFICE" (REFERENCE 8) THERE WERE TWO OUTDOOR AIR SAMPLES WHICH TESTED POSITIVE FOR LEAD CONTAMINATION. SAMPLE HVD2-1 SHOWED LEAD IN A CONCENTRATION OF 2 ug/m3. THIS IS ABOVE THE NATIONAL AMBIENT AIR QUALITY STANDARD OF 1.5 ug/m3.

FROM THESE SAMPLES IT IS NOT POSSIBLE TO DETERMINE HOW PERVASIVE LEAD DUST CONTAMINATION IS IN THE AREA OF THE CHARLESTON NAVAL BASE. BASED ON THE WORST CASE SCENARIO THE ENTIRE BASE POPULATION OF 22,731 PEOPLE WILL BE CONSIDERED EXPOSED TO THE LEVEL I CONTAMINANTS FOUND IN THIS AREA.

THE DATA USED TO CALCULATE THE AIR PATHWAY SCORE IS SIX YEARS OLD AND MAY BE UNREPRESENTATIVE OF CURRENT CONDITIONS. ADDITIONAL AMBIENT AIR ANALYSIS FROM THE SAME SITE AND AT THE SAME LOCATIONS WILL BE PERFORMED. THE DATA WILL BE FORWARDED WITHIN SIX TO EIGHT WEEKS FOR INCORPORATION INTO THE HRS II PACKAGE.

Reference: 1, TABLE 2-3; 8, SECTION 4.3, TABLE 4.3-1

Documentation for Sample HVD2-2:

SAMPLE HVD2-2 SHOWED LEAD CONTAMINATION AT 1 ug/m3. THE SAME ASSUMPTIONS MADE FOR SAMPLE HVD2-1 APPLY IN THIS CASE.

Reference: 8, TABLE 4.3-1

Documentation for Sample HVD1-1:

SAMPLES WERE DOCUMENTED TO HAVE BEEN TAKEN DURING DECEMBER 9-12 1985. THIS SAMPLE DID NOT TEST FOR LEAD CONTAMINATION ABOVE THE DETECTION LIMIT.

Reference: 1, TABLE 2-3; 8, SECTION 4.3, TABLE 4.3-1

Documentation for Sample HVD1-2:

SAMPLES WERE DOCUMENTED TO HAVE BEEN TAKEN BETWEEN DECEMBER 9-12 1985. THIS SAMPLE DID NOT TEST POSITIVE FOR LEAD CONTAMINATION ABOVE THE DETECTION LIMIT.

Reference: 1, TABLE 2-3; 8, SECTION 4.3, TABLE 4.3-1

Gas Migration Potential

GAS POTENTIAL TO RELEASE

Source ID	Source Type	Gas Contain. Value (A)	Gas Source Type Value (B)	Gas Migrtn. Potent. Value (C)	Sum (B+C)	Gas Potential to Rel. Value A(B+C)
#1 DRMO STAGING	Contaminated Soil	10	0	11	11	110
#6 PUB WKS STOR YD	Contaminated Soil	10	0	11	11	110
#7 PCB TRANSFORMER	Contaminated Soil	10	19	6	25	250

Gas Potential to Release Factor: 250

Documentation for Gas Containment, Source #1 DRMO STAGING :

THE AREA IS REPORTEDLY CONTAMINATED AT THE SURFACE. IT IS NOT VEGETATED, AND CONTAMINATION IS THOUGHT TO SPREAD THROUGH THE WIND VERY EASILY. BASED ON THIS THE MAXIMUM VALUE IS ASSIGNED.

Reference: 1, SECTION 2.6.1; 6; 8, SECTION 4.0

Documentation for Source Type, Source #1 DRMO STAGING :

THERE IS DOCUMENTED CONTAMINATION AT THE SURFACE SOILS.

Reference: 1, SECTION 2.6.1

Documentation for Secondary Source Type, #1 DRMO STAGING :

NOT EVALUATED

Reference:

Documentation for Gas Containment, Source #2 LEAD CONTAM AREA:

THIS SWMU HAS SIMILAR CHARACTERISTICS TO SWMU #1. THEREFORE IT IS ASSIGNED THE SAME VALUE.

Reference: 1, SECTION 2.6.2; 6; 8, SECTION 4.0

Documentation for Source Type, Source #2 LEAD CONTAM AREA:

ACCORDING TO REFERENCE 1 THE LEAD CONTAMINATION AREA CONSISTS PRIMARILY OF LEAD WHICH HAS MIGRATED THROUGH THE SOILS.

Reference: 1, SECTION 2.6.2

Documentation for Secondary Source Type, #2 LEAD CONTAM AREA:

NOT EVALUATED

Reference:

Documentation for Gas Containment, Source #5 BATTERY TREATMNT:

CONTAMINATION IS DOCUMENTED TO BE SHALLOWEST AT 5.5 FEET. ACCORDING TO FIELD OBSERVATIONS THE AREA IS MOSTLY PAVED WITH LITTLE EXPOSED SOIL. BASED ON THIS THE MINIMUM VALUE IS ASSIGNED.

Reference: 1, SECTION 2.6.5; 6

Documentation for Source Type, Source #5 BATTERY TREATMNT:

THE AREA WAS USED TO NEUTRALIZE BATTERY ACID. THE TANK USED TO DO THIS REPORTEDLY LEAKED. THE SURROUNDING SOIL WAS REPORTEDLY CONTAMINATED.

Reference: 1, SECTION 2.6.5

Documentation for Secondary Source Type, #5 BATTERY TREATMNT:

NOT EVALUATED

Reference:

Documentation for Gas Containment, Source #6 PUB WKS STOR YD:

THE CONTAMINATION IS DOCUMENTED TO BE AT THE SURFACE OF THE SOIL. THE SOURCE IS NOT HEAVILY VEGETATED ACCORDING TO REFERENCE 1 AND FIELD OBSERVATIONS. THE MAXIMUM VALUE WILL BE ASSIGNED.

Reference: 1, SECTION 2.6.6; 6

Documentation for Source Type, Source #6 PUB WKS STOR YD:

SURFACE SOIL SAMPLES HAVE SHOWN LEAD AND OTHER TYPES OF CONTAMINATION AT OR WITHIN SIX INCHES OF THE SURFACE.

Reference: 1, TABLE 2-5, SECTION 2.6.6

Documentation for Secondary Source Type, #6 PUB WKS STOR YD:

NOT EVALUATED

Reference:

Documentation for Gas Containment, Source #7 PCB TRANSFORMER:

THE SOIL IS REPORTED TO BE CONTAMINATED AT THE SURFACE. CONTAMINANTS WERE REPORTEDLY RELEASED DIRECTLY ON THE ADJACENT CONCRETE PAD AND SURROUNDING SOILS. THEREFORE THE MAXIMUM VALUE WILL BE ASSIGNED.

Reference: 1, SECTION 2.6.7

Documentation for Source Type, Source #7 PCB TRANSFORMER:

THE AREA CONTAINS CONTAMINATED SOIL FROM OIL AND PESTICIDE SPILLS.

Reference: 1, SECTION 2.6.7

Documentation for Secondary Source Type, #7 PCB TRANSFORMER:

NOT EVALUATED

Reference:

Documentation for Gas Containment, Source #9 CLOSED LANDFILL:

COMBUSTIBLE WASTES WERE REPORTEDLY BURNED ON A REGULAR BASIS. THIS MAY HAVE INCLUDED SUCH COMPOUNDS AS MERCURY, ASBESTOS, AND VARIOUS OTHER WASTE SLUDGES. HOWEVER, SINCE THIS SITE HAS REPORTEDLY BEEN OUT OF OPERATION SINCE 1973, IT WILL NO LONGER BE CONSIDERED TO RELEASE THROUGH THE AIR PATHWAY BY DIRECT BURNING OF COMPOUNDS. INSTEAD IT WILL BE GIVEN A CONTAINMENT VALUE OF ZERO BECAUSE THE LANDFILL IS DOCUMENTED TO BE VEGETATED, HAS EXPOSED SOIL ONLY IN CERTAIN AREAS, AND MORE THAN LIKELY HAS A COVER OF SOIL GREATER THAN TWO FEET THICK.

Reference: 1, SECTION 2.6.9; 6

Documentation for Source Type, Source #9 CLOSED LANDFILL:

SWMU 9 IS DOCUMENTED TO BE A LANDFILL.

Reference: 1, SECTION 2.6.9

Documentation for Secondary Source Type, #9 CLOSED LANDFILL:

NOT EVALUATED

Reference:

Source: #1 DRMO STAGING

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value
Mercury	11

Average of Gas Migration Potential Value for 3 Hazardous Substances: 11.000

Gas Migration Potential Value From Table 6-7: 11

Source: #2 LEAD CONTAM AREA

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value

Average of Gas Migration Potential Value for 3 Hazardous Substances: 0.000

Gas Migration Potential Value From Table 6-7: 0

Source: #5 BATTERY TREATMNT

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value

Average of Gas Migration Potential Value for 3 Hazardous Substances: 0.000

Gas Migration Potential Value From Table 6-7: 0

AIR PATHWAY LIKELIHOOD OF RELEASE
CHARLESTON NAVAL BASE - 07/13/92

Source: #6 PUB WKS STOR YD

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value
Mercury	11

Average of Gas Migration Potential Value for 3 Hazardous Substances: 11.000

Gas Migration Potential Value From Table 6-7: 11

Source: #7 PCB TRANSFORMER

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value
DDT	6

Average of Gas Migration Potential Value for 3 Hazardous Substances: 6.000

Gas Migration Potential Value From Table 6-7: 6

AIR PATHWAY LIKELIHOOD OF RELEASE
CHARLESTON NAVAL BASE - 07/13/92

Source: #9 CLOSED LANDFILL

Gaseous Hazardous Substance	Hazardous Substance Gas Migration Potential Value
Acenaphthylene	11
Acenaphthene	11
Anthracene	6
Benz(a)anthracene	6
Benzo(a)pyrene	6
Benzo(k)fluoranthene	6
Bis (2-ethylhexyl) phthalate	6
Butylbenzyl phthalate	6
Chlorobenzene	17
Chrysene	6
Dichlorobenzene, 1,2-	17
Dichlorobenzene, 1,4-	17
Fluorene	11
Mercury	11
Naphthalene	11
Phenanthrene	11
Pyrene	6

Average of Gas Migration Potential Value for 3 Hazardous Substances: 17.000

Gas Migration Potential Value From Table 6-7: 17

Particulate Migration Potential

PARTICULATE POTENTIAL TO RELEASE

Source ID	Source Type	Partic. Contain. Value (A)	Partic. Source Type Value (B)	Partic. Migrtn. Potent. Value (C)	Sum (B+C)	Partic. Potential to Rel. Value A(B+C)
#1 DRMO STAGING	Contaminated Soil	10	0	6	6	60
#2 LEAD CONTAM AREA	Contaminated Soil	10	22	6	28	280
#6 PUB WKS STOR YD	Contaminated Soil	10	0	6	6	60
#7 PCB TRANSFORMER	Contaminated Soil	10	22	6	28	280

Particulate Potential to Release Factor: 280

Documentation for Particulate Containment, Source #1 DRMO STAGING :

THE AREA IS REPORTEDLY CONTAMINATED AT THE SURFACE. IT IS NOT VEGETATED, AND CONTAMINATION IS THOUGHT TO SPREAD BY THE WIND.

Reference: 1, SECTION 2.6.1; 6; 8, SECTION 4.0

Documentation for Source Type, Source #1 DRMO STAGING :

THERE IS DOCUMENTED CONTAMINATION AT THE SURFACE SOILS.

Reference: 1, SECTION 2.6.1

Documentation for Secondary Source Type, #1 DRMO STAGING :

NOT EVALUATED

Reference:

Documentation for Particulate Containment, Source #2 LEAD CONTAM AREA:

THIS SWMU HAS SIMILAR CHARACTERISTICS TO SWMU #1. THEREFORE IT IS ASSIGNED THE SAME VALUE.

Reference: 1, SECTION 2.6.2; 6; 8, SECTION 4.0

Documentation for Source Type, Source #2 LEAD CONTAM AREA:

ACCORDING TO REFERENCE 1 THE LEAD CONTAMINATION AREA CONSISTS PRIMARILY OF LEAD WHICH HAS MIGRATED THROUGH THE SOILS.

Reference: 1, SECTION 2.6.2

Documentation for Secondary Source Type, #2 LEAD CONTAM AREA:

NOT EVALUATED

Reference:

Documentation for Particulate Containment, Source #5 BATTERY TREATMNT:

SINCE THE CONTAMINATION IS DOCUMENTED TO BE SHALLOWEST AT 5.5 FEET AND THERE IS AN ASPHALT COVER OVER MOST OF THE AREA THE MINIMUM VALUE IS ASSIGNED.

Reference: 1, SECTION 2.6.5; 6

Documentation for Source Type, Source #5 BATTERY TREATMNT:

THE AREA WAS USED TO NEUTRALIZE BATTERY ACID. THE TANK USED TO DO THIS REPORTEDLY LEAKED. THE SURROUNDING SOIL WAS REPORTEDLY CONTAMINATED.

Reference: 1, SECTION 2.6.5

Documentation for Secondary Source Type, #5 BATTERY TREATMNT:

NOT EVALUATED

Reference:

Documentation for Particulate Containment, Source #6 PUB WKS STOR YD:

CONTAMINATION IS DOCUMENTED TO BE AT THE SURFACE OF THE SOIL. SINCE THE AREA IS NOT HEAVILY VEGETATED IT IS ASSIGNED THE MAXIMUM VALUE.

Reference: 1, SECTION 2.6.6; 6

Documentation for Source Type, Source #6 PUB WKS STOR YD:

SURFACE SOIL SAMPLES HAVE SHOWN LEAD AND OTHER TYPES OF CONTAMINATION AT OR WITHIN SIX INCHES OF THE SURFACE.

Reference: 1, TABLE 2-5, SECTION 2.6.6

Documentation for Secondary Source Type, #6 PUB WKS STOR YD:

NOT EVALUATED

Reference:

Documentation for Particulate Containment, Source #7 PCB TRANSFORMER:

THE SURFACE OF THE SOIL IS REPORTED TO BE CONTAMINATED. THERE IS ALSO CONTAMINATION DOCUMENTED ON THE CONCRETE PAD AND SURROUNDING SOILS. THEREFORE THE MAXIMUM VALUE IS ASSIGNED.

Reference: 1, SECTION 2.6.7; 6

Documentation for Source Type, Source #7 PCB TRANSFORMER:

THE AREA CONTAINS CONTAMINATED SOIL FROM OIL AND PESTICIDE SPILLS.

Reference: 1, SECTION 2.6.7

Documentation for Secondary Source Type, #7 PCB TRANSFORMER:

NOT EVALUATED

Reference:

Documentation for Particulate Containment, Source #9 CLOSED LANDFILL:

PLEASE SEE THE EXPLANATION FOR THE GAS CONTAINMENT PATHWAY FOR THIS SWMU.

Reference: 1, SECTION 2.6.9; 6

Documentation for Source Type, Source #9 CLOSED LANDFILL:

SWMU 9 IS DOCUMENTED TO BE A LANDFILL.

Reference: 1, SECTION 2.6.9

Documentation for Secondary Source Type, #9 CLOSED LANDFILL:

NOT EVALUATED

Reference:

Documentation for Particulate Migration Potential:

REFERENCED FROM FIGURE 6-2 OF THE HRS MANUAL.

Reference: 7, FIGURE 6-2

Source: #1 DRMO STAGING

Particulate Hazardous Substance
Barium
Cadmium
Chromium
Lead
Mercury
Nickel
Silver

Source: #2 LEAD CONTAM AREA

Particulate Hazardous Substance
Lead

Source: #5 BATTERY TREATMNT

Particulate Hazardous Substance
Lead

Source: #6 PUB WKS STOR YD

Particulate Hazardous Substance
Barium
Cadmium
Chromium
Lead
Mercury
Nickel
Silver

Source: #7 PCB TRANSFORMER

Particulate Hazardous Substance
Arsenic
DDT
PCBs

Source: #9 CLOSED LANDFILL

Particulate Hazardous Substance
Acenaphthylene
Acenaphthene
Anthracene
Arsenic
Asbestos
Barium
Benz(a)anthracene
Benzo(a)pyrene
Benzo(k)fluoranthene
Bis (2-ethylhexyl) phthalate
Butylbenzyl phthalate
Chromium
Chrysene
Fluorene
Lead
Mercury
Naphthalene
Phenanthrene
Pyrene

AIR PATHWAY WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 1 #1 DRMO STAGING

Source Hazardous Waste Quantity Value: 0.02

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Barium	10000	NA	8.00E-04	8.00E+00
Cadmium	10000	NA	8.00E-04	8.00E+00
Chromium	10000	NA	8.00E-04	8.00E+00
Lead	10000	NA	8.00E-04	8.00E+00
Mercury	10000	2.00E-01	8.00E-04	2.00E+03
Nickel	10000	NA	8.00E-04	8.00E+00
Silver	1000	NA	8.00E-04	8.00E-01

AIR PATHWAY WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 2 #2 LEAD CONTAM AREA

Source Hazardous Waste Quantity Value: 1.94

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Lead	10000	NA	8.00E-04	8.00E+00

AIR PATHWAY WASTE CHARACTERISTICS
CHARLESTON NAVAL BASE - 07/13/92

Source: 4 #6 PUB WKS STOR YD

Source Hazardous Waste Quantity Value: 0.28

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Barium	10000	NA	8.00E-04	8.00E+00
Cadmium	10000	NA	8.00E-04	8.00E+00
Chromium	10000	NA	8.00E-04	8.00E+00
Lead	10000	NA	8.00E-04	8.00E+00
Mercury	10000	2.00E-01	8.00E-04	2.00E+03
Nickel	10000	NA	8.00E-04	8.00E+00
Silver	1000	NA	8.00E-04	8.00E-01

Source: 5 #7 PCB TRANSFORMER

Source Hazardous Waste Quantity Value: 3.70

Hazardous Substance	Toxicity Value	Gas Mobility Value	Particulate Mobility Value	Toxicity/ Mobility Value
Arsenic	10000	NA	8.00E-04	8.00E+00
DDT	1000	2.00E-03	8.00E-04	2.00E+00
PCBs	10000	NA	8.00E-04	8.00E+00

Hazardous Substances Found in an Observed Release

Sample ID	Observed Release Hazardous Substance	Particulate Toxicity/ Mobility Value	Gas Toxicity/ Mobility Value
1	Lead	N.A.	2.00E+02
2	Lead	N.A.	2.00E+02

Documentation for Particulate Mobility:

REFERENCED FROM FIGURE 6-3 OF THE HRS MANUAL.

Reference: 7, FIGURE 6-3

AIR PATHWAY WASTE CHARACTERISTICS

CHARLESTON NAVAL BASE - 07/13/92

Toxicity/Mobility Value from Source Hazardous Substances:	2.00E+03
Toxicity/Mobility Value from Observed Release Hazardous Substances:	2.00E+02
Toxicity/Mobility Factor:	2.00E+03
Sum of Source Hazardous Waste Quantity Values:	5.93E+00
Hazardous Waste Quantity Factor:	100
Waste Characteristics Factor Category:	18

Actual Contamination

No.	Sample ID	Distance (miles)	Level of Contamination
1	HVD2-1	0.000	Level I
2	HVD2-2	0.000	Level II

Sample No.	Hazardous Substance	Concent.	NAAQS	Cancer	RFD	Units
1	Lead	2.0E+00	1.5E+00	0.0E+00	0.0E+00	g/m3
2	Lead	1.0E+00	1.5E+00	0.0E+00	0.0E+00	g/m3

Documentation for Sample HVD2-1:

AMBIENT AIR WAS REPORTEDLY SAMPLED DURING THE SITE INVESTIGATION (DECEMBER 9-12, 1985). BASED ON THE "FINAL CONTAMINATION AND EXPOSURE ASSESSMENT FOR THE LEAD CONTAMINATION WITHIN THE DEFENSE REUTILIZATION AND MANAGEMENT OFFICE" (REFERENCE 8) THERE WERE TWO OUTDOOR AIR SAMPLES WHICH TESTED POSITIVE FOR LEAD CONTAMINATION. SAMPLE HVD2-1 SHOWED LEAD IN A CONCENTRATION OF 2 ug/m3. THIS IS ABOVE THE NATIONAL AMBIENT AIR QUALITY STANDARD OF 1.5 ug/m3.

FROM THESE SAMPLES IT IS NOT POSSIBLE TO DETERMINE HOW PERVASIVE LEAD DUST CONTAMINATION IS IN THE AREA OF THE CHARLESTON NAVAL BASE. BASED ON THE WORST CASE SCENARIO THE ENTIRE BASE POPULATION OF 22,731 PEOPLE WILL BE CONSIDERED EXPOSED TO THE LEVEL I CONTAMINANTS FOUND IN THIS AREA.

THE DATA USED TO CALCULATE THE AIR PATHWAY SCORE IS SIX YEARS OLD AND MAY BE UNREPRESENTATIVE OF CURRENT CONDITIONS. ADDITIONAL AMBIENT AIR ANALYSIS FROM THE SAME SITE AND AT THE SAME LOCATIONS WILL BE PERFORMED. THE DATA WILL BE FORWARDED WITHIN SIX TO EIGHT WEEKS FOR INCORPORATION INTO THE HRS II PACKAGE.

Reference: 1, TABLE 2-3; 8, SECTION 4.3, TABLE 4.3-1

Documentation for Sample HVD2-2:

SAMPLE HVD2-2 SHOWED LEAD CONTAMINATION AT 1 ug/m3. THE SAME ASSUMPTIONS MADE FOR SAMPLE HVD2-1 APPLY IN THIS CASE.

Reference: 8, TABLE 4.3-1

Documentation for Sample HVD1-1:

SAMPLES WERE DOCUMENTED TO HAVE BEEN TAKEN DURING DECEMBER 9-12 1985. THIS SAMPLE DID NOT TEST FOR LEAD CONTAMINATION ABOVE THE DETECTION LIMIT.

Reference: 1, TABLE 2-3; 8, SECTION 4.3, TABLE 4.3-1

Documentation for Sample HVD1-2:

SAMPLES WERE DOCUMENTED TO HAVE BEEN TAKEN BETWEEN DECEMBER 9-12 1985. THIS SAMPLE DID NOT TEST POSITIVE FOR LEAD CONTAMINATION ABOVE THE DETECTION LIMIT.

Reference: 1, TABLE 2-3; 8, SECTION 4.3, TABLE 4.3-1

Distance Categories Subject to Level I	Population	Value
Onsite	22731.0	227310.0
Level I Contaminantion Factor:		227310.0

Distance Categories Subject to Level II	Population	Value
- N/A and/or data not specified		
Level II Contaminantion Factor:		0.0

Potential Contamination

Distance Categories Subject to Potential Contamination	Population	Value
> 0 to 1/4 mile	0.0	0.0000
> 1/4 to 1/2 mile	0.0	0.0000
> 1/2 to 1 mile	0.0	0.0000
> 1 to 2 miles	0.0	0.0000
> 2 to 3 miles	0.0	0.0000

> 3 to 4 miles	0.0	0.0000

Potential Contaminantion Factor: 0.0000

Documentation for Population Onsite Distance Category:

ACCORDING TO MR. BILL BOOK OF THE CHARLESTON NAVAL BASE, THERE ARE A TOTAL OF 22,371 PEOPLE WHO LIVE AND WORK ON BASE. EVERYONE WHO LIVES AND WORKS ON BASE WILL BE ASSUMED EXPOSED TO THE LEVEL I CONTAMINANT LEVELS FROM THE DRMO AREA.

Reference: 11

Documentation for Population > 0 to 1/4 mile Distance Category:

THE MAXIMUM SCORE OF 100 IS REACHED FOR THE AIR PATHWAY WHEN ONLY CONSIDERING THE POPULATION ON BASE. THEREFORE CONSIDERING THE POPULATION OUTSIDE OF THE BASE IS NOT NECESSARY.

Reference:

Documentation for Population > 1/4 to 1/2 mile Distance Category:

PLEASE SEE THE 0 TO 1/4 MILE NOTE.

Reference:

Documentation for Population > 1/2 to 1 mile Distance Category:

PLEASE SEE THE 0 TO 1/4 MILE NOTE.

Reference:

Documentation for Population > 1 to 2 miles Distance Category:

PLEASE SEE THE 0 TO 1/4 MILE NOTE.

Reference:

Documentation for Population > 2 to 3 miles Distance Category:

PLEASE SEE THE 0 TO 1/4 MILE NOTE.

Reference:

Documentation for Population > 3 to 4 miles Distance Category:

PLEASE SEE THE 0 TO 1/4 MILE NOTE.

Reference:

Nearest Individual Factor

Level of Contamination: Level I
Distance in miles: 0 to 1/8

Nearest Individual Value: 50

Documentation for Nearest Individual:

THE CHARLESTON NAVAL BASE HAS RESIDENCES AND WORK AREAS ON BASE THAT ARE REGULARLY OCCUPIED BY PEOPLE. SINCE THE WHOLE BASE IS CONSIDERED AS ONE AREA THE NEAREST INDIVIDUAL IS GIVEN A ZERO DISTANCE VALUE.

Reference: 11

Resources

Resource Use: NO

Resource Value: 0

Documentation for Resources:

NO RESOURCES HAVE BEEN IDENTIFIED WITHIN A HALF-MILE DISTANCE OF THE CHARLESTON NAVAL BASE. THE SURROUNDING AREA IS PRIMARILY SUBURBAN. THERE WERE NO MAJOR OR DESIGNATED RECREATION AREAS NOTED WITHIN THE HALF-MILE DISTANCE. NO AGRICULTURAL OR FORESTRY ACTIVITIES WERE NOTED WITHIN THE HALF-MILE DISTANCE.

Reference: 2; 6

Actual Contamination, Sensitive Environments

Sensitive Environment	Distance (miles)	Sensitive Environment Value
LEAST TERN	0.000	50
Sum of Sensitive Environments Values:		50

Actual Contamination, Wetlands

Distance Category	Wetland Acreage	Wetland Acreage Value
Onsite	75.000	75.000
Sum of Wetland Acreages:	75.000	

Sum of Wetland Acreage Values: 75.000

Sensitive Environments Actual Contamination Factor: 125.000
(Sum of Sensitive Environments + Wetlands Values)

Potential Contamination, Sensitive Environments

Sensitive Environment	Distance (miles)	Sensitive Environment Value	Distance Weight	Weighted Value/10
BIG EARED BAT	1.500	50	0.0051	0.026
LEAST TERN	1.500	50	0.0051	0.026
LEAST TERN	3.500	50	0.0014	0.007

Sum of Sensitive Environments Weighted Values/10: 0.058

Potential Contamination, Wetlands

Distance Category	Wetland Acreage	Wetland Acreage Value	Distance Weight	Weighted Value/10
- N/A and/or data not specified				

Sensitive Environment Potential Contamination Factor: 0.058

Documentation for Sensitive Environment LEAST TERN:

ACCORDING TO MS. KATHY BOYLE OF THE HERITAGE TRUST DATABASE THERE ARE SEVERAL ENDANGERED OR THREATENED SPECIES THAT ARE KNOWN TO LIVE WITHIN A FOUR-MILE DISTANCE OF THE CHARLESTON NAVAL BASE. THESE SPECIES ARE SHOWN BY NUMBERS ON THE TOPOGRAPHIC MAP AND ARE DESCRIBED IN REFERENCE 10.

IN THIS CASE THE LEAST TERN IS DOCUMENTED TO LIVE AND BREED ON THE ROOF OF THE COMMISSARY OF THE NAVAL BASE ITSELF. IT IS LISTED AS A STATE THREATENED SPECIES. SINCE THERE IS LEVEL I AIR CONTAMINATION DOCUMENTED ON BASE THE LEAST TERN WILL BE ASSUMED EXPOSED TO IT. THERE IS NO DATA TO REFUTE THIS ASSUMPTION, THE WORST CASE SCENARIO IS CONSIDERED.

Reference: 2; 10

Documentation for Sensitive Environment BIG EARED BAT:

THE BIG EARED BAT WAS REPORTEDLY FOUND WITHIN A TWO-MILE LIMIT OF THE CHARLESTON NAVAL BASE. THIS IS LISTED AS A STATE ENDANGERED SPECIES.

Reference: 2; 10

Documentation for Sensitive Environment LEAST TERN:

THE LEAST TERN IS REPORTEDLY LOCATED WITHIN A 2-MILE LIMIT OF THE CHARLESTON NAVAL BASE. THIS IS LISTED AS A STATE THREATENED SPECIES.

Reference: 2; 10

Documentation for Sensitive Environment LEAST TERN:

THE LEAST TERN IS ALSO REPORTEDLY LOCATED WITHIN A FOUR-MILE LIMIT OF THE CHARLESTON NAVAL BASE. IT IS LISTED AS A STATE THREATENED SPECIES.

Reference: 2; 10

Documentation for Sensitive Environment WETLANDS:

BASED ON THE WETLAND INVENTORY MAPS THERE ARE ESTIMATED TO BE 75 ACRES OF WETLANDS ON THE CHARLESTON NAVAL BASE. SINCE THERE IS CONFRIMED LEVEL I CONTAMINATION OF THE AIR THESE WETLANDS ON BASE ARE ASSUMED EXPOSED TO IT. SINCE THERE IS NO DATA AVAILABLE TO REFUTE THIS ASSUMPTION THE WORST CASE SCENARIO IS CONSIDERED.

NO OTHER WETLANDS IN THE OTHER DISTANCE ZONES WERE ESTIMATED SINCE THE SCORE FOR THIS PATHWAY IS ALREADY AT ITS MAXIMUM.

Reference: 20

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