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SUPPORTING DOCUMENT

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2. Title

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Signature

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7. Abstract

11/24/92 N. Solis

This document provides an assessment of the activities associated with the remedial/feasibility study for the 1100-EM-1 Operable Unit.

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1.0 INTRODUCTION

The 1100-EM-1 Phase 2 remedial investigation/feasibility study (RI/FS) was found to be a general use activity (Kerr 1990). No additional safety documentation is required beyond that required for occupational safety with the following two operational safety limits (OSL) implemented:

1. The maximum amount of soil that may be disturbed at any sample location during the Phase 2 RI/FS is 0.028 m^3 (1 ft^3).
2. Subsurface boring and sampling will be preceded by geophysical surveys in subunits 1100-2, Horn Rapids Landfill (HRL), and the South Pit during Phase 2 operations.

Occupational safety documentation will be provided as part of the project work plan normally associated with remedial investigations [i.e., the Radiation Work Permit (RWP), Hazardous Work Operations Permit, and Job Safety Analysis (JSA)]. The JSA will provide coverage for standard industrial onsite safety and health hazards. The RWP will be used to provide direction to the Health Physics staff in the event radioactive material is found.

2.0 WORK DESCRIPTION

This 1100-EM-1 RI/FS work plan consists of seven subunits; 1) the 1100-1 (Battery Pit); 2) the 1100-2 (Paint and Solvent Pit); 3) the 1100-4 (Antifreeze Tank Site); 4) the UN-1100-6 (Discolored Soil Site); 5) the HRL; 6) the South Pit; and 7) the Ephemeral Pool. The Phase 2 RI provides for the final characterization of the 1100-EM-1 Operable Unit. The results of the Phase 1 RI did not indicate the existence of any imminent or substantial endangerment to site workers, the public or the environment. Phase 1 investigations identified soil chemical contaminants in amounts near background levels. Radioactivity was not found in the soil samples taken. Contamination of alpha and beta radiation and chemical contaminants, emanating from sources outside the 1100-EM-1 Operable Unit, have been detected in the groundwater that flows under this unit.

The basis for this assessment and resulting conclusions are provided by the *Phase 1 Remedial Investigation Report for the Hanford Site 1100-EM-1 Operable Unit* (DOE-RL 1990) and the *Remedial Investigation Phase 2 Supplemental Work Plan for the Hanford Site 1100-EM-1 Operable Unit* (DOE-RL 1991). Section 2.2 of DOE-RL 1991 summarizes the hazardous materials inventory.

The details supporting the hazardous material inventory summary (DOE-RL 1991) are provided in DOE-RL 1990. Additional data regarding the radiochemical analyses of groundwater samples are provided in Tables 1 and 2.

The nonintrusive tasks that are expected to be involved in the Phase 2 RI are the analyses of archived samples from Phase 1: hydraulic pump tests, surface soil chemical and radiation analyses, ground penetrating radar, magnetometry, and electromagnetic surveys. Intrusive tasks are drilling new

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wells for groundwater monitoring, soil gas surveys 1.2 m (4 ft) deep, and subsurface soil chemical and radiation analyses 1.2 m (4 ft) deep.

The concern of a single sample indicating elevated gross-alpha radiation in the groundwater near the 1171 Building in 1100-1 and 1100-4 operable subunits has proved to be an analytical error due to sampling procedures. Subsequent samples and analyses taken over a seven month period (May 1990 through November 1990) demonstrated that gross-alpha is well below exempt quantity values. Tables 1 and 2 provide data supporting these analyses; the exempt quantity values are also taken from these tables.

Table 1. Radiochemical Analyses of Groundwater Monitoring Well Samples. (sheet 1 of 2).

Temperature Well Number	Hanford Well Number	Gross Alpha pCi/l			
		1st Feb. 1990	2nd May 1990	3rd Aug. 1990	4th Nov. 1990
MW-1	S41-E11	8.4	2.0	3.1	0.7
MW-2	S34-E10	4.4	-0.7	1.8	2.0
MW-3	S41-E12	17.0	1.7	0.7	3.5
MW-4	S38-E12A	2.9	ND	4.3	3.8
MW-5	S38-E12B	3.9	1.8	-2.2	-0.2
MW-6	S37-E11	3.6	1.9	1.0	-1.8
MW-7	S38-E11	4.8	0.6	3.3	-1.2
MW-8	S31-E08	3.8	-3.1	2.2	1.9
MW-9	S32-E08	1.3	-1.9	0.8	1.4
MW-10	S30-E10A	11.9	2.2	0.4	4.8
MW-11	S30-E10B	12.2	2.4	6.6	4.2
MW-12	S31-E10A	7.6	4.8	6.7	6.5
MW-13	S31-E10B	9.1	4.1	6.5	5.8
MW-14	S31-E10C	6.3	4.9	9.6	9.2
MW-15	S31-E10D	9.3	1.6	3.7	5.0
MW-17	S41-E10C	2.2	0.9	0.9	1.6
	S27-E14		1.6	5.7	3.2
	S29-E12		1.6	1.1	2.2
	S30-E15A		-1.4	-1.7	1.5
	S31-E13		-0.4	-1.2	2.6
	S32-E13A		-0.5	-0.2	3.3
	S37-E14	2.2	-1.2	-3.5	-2.4
	S40-E14	1.1	-1.1	-3.4	-1.6
	S41-E13A	ND	0.9	-3.3	-2.7
	S41-E13B	6.0	3.7	-0.7	-1.3
	S43-E12	2.6	1.9	1.0	0.8
ANF #14			5.3	22.9	
ANF #15			37.0	36.7	
ANF #16			10.0	4.0	
RWF East		ND	-1.0	2.0	-2.3
RWF West		1.0	-2.0	-0.3	-2.0

Source: 40 CFR 141
 ND = Not detected

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Table 1. Radiochemical Analyses of Groundwater Monitoring Well Samples.
(sheet 2 of 2)

Temperature Well Number	Hanford Well Number	Gross Beta pCi/l			
		1st Feb. 1990	2nd May 1990	3rd Aug 1990	4th Nov. 1990
MW-1	S41-E11	12.7	3.5	12.1	9.2
MW-2	S34-E10	8.2	7.3	9.3	11.9
MW-3	S41-E12	14.7	7.9	12.5	15.0
MW-4	S38-E12A	7.4	ND	10.6	3.1
MW-5	S38-E12B	6.5	6.1	6.4	8.9
MW-6	S37-E11	ND	-1.4	4.1	10.4
MW-7	S38-E11	6.1	1.4	7.9	9.1
MW-8	S31-E08	5.3	2.4	9.4	6.1
MW-9	S32-E08	6.4	1.6	7.6	2.7
MW-10	S30-E10A	30.2	85.2	5.6	88.9
MW-11	S30-E10B	35.2	86.5	74.7	81.0
MW-12	S31-E10A	34.6	87.6	91.0	77.6
MW-13	S31-E10B	28.8	71.0	81.2	85.8
MW-14	S31-E10C	35.1	89.4	90.8	89.0
MW-15	S41-E10D	23.2	51.4	63.6	57.6
MW-17	S41-E10C	5.6	0.9	2.9	8.1
	S27-E14		19.7	31.5	14.9
	S29-E12		1.0	10.5	6.3
	S30-E15A		2.5	4.7	2.1
	S31-E13		2.4	7.4	7.3
	S32-E13A		1.9	11.0	7.9
	S37-E14	ND	-1.9	1.7	3.9
	S40-E14	ND	-2.5	1.2	0.3
	S41-E13A	0.9	1.3	4.6	5.0
	S41-E13B	4.9	9.4	11.2	2.8
	S43-E12	8.8	8.3	10.5	13.8
	ANF #14		6.5	58.9	
	ANF #15		126.7	98.4	
	ANF #16		58.4	19.1	
	RWF East	ND	-2.5	8.1	2.6
	RWF West	ND	-3.6	7.2	4.2

ND = Not detected

The radionuclide maximum contaminant levels are provided in 40 CFR 141.

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Table 2. Analyses of Volatile Organic Compounds in Groundwater Samples.

Hanford Well Number	Analysis (p/b)			
	Trichloroethene			
	1st	2nd	3rd	4th
MW-1	ND	ND	ND	ND
MW-2	ND	ND	ND	ND
MW-3	ND	ND	ND	ND
MW-4	ND	ND	ND	ND
MW-5	ND	ND	ND	ND
MW-6	ND	ND	ND	ND
MW-7	ND	ND	ND	ND
MW-8	ND	ND	ND	ND
MW-9	ND	ND	ND	ND
MW-10	0.6	2	2	ND
MW-11	0.9	3	2	3
MW-12	92	110	80	74
MW-13	90	91	81	68
MW-14	40	73	60	66
MW-15	84	80	82	59
MW-17	ND	ND	ND	ND
S27-E14	ND	ND	0.9	1
S29-E12	ND	ND	ND	ND
S30-E15A	ND	ND	ND	ND
S31-E13	ND	ND	ND	ND
S32-E13A	ND	ND	ND	ND
S37-E14	ND	ND	ND	ND
S40-E14	ND	ND	ND	ND
S41-E13A	ND	ND	ND	ND
S41-E13B	ND	ND	ND	ND
S43-E12	ND	ND	ND	ND
RWF East	ND	ND	ND	ND
RWF West	ND	ND	ND	ND
ANF #14	--	22	--	--
ANF #15	--	58	--	--
ANF #16	--	53	--	--

Contaminants have a very low probability of being released due to the actions of Phase 2 activities assuming the sampling equipment is hand operated and does not involve motorized earth-moving equipment such as dozers, backhoes, etc. Further, the soil sample volumes 250 cm³ (15.3 in³) taken will be small, reducing the potential source term further. The use of motorized earth moving or excavating equipment presents potential hazards that were not evaluated during the assessment.

Subsurface boring and sampling must be preceded by ground penetrating radar, magnetometry and electromagnetic surveys to identify the location of underground objects. This will assure that buried materials are not disturbed, potentially releasing hazardous materials.

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There are two OSLs to assure the validity of this safety assessment (see Section 3.0. These OSLs apply to the amount of soil that is allowed to be disturbed at each sample location and preceding any subsurface boring or sampling during the geophysical surveys of the involved areas.

The conclusion leading to the general use hazard classification (defined in Kerr 1990) is based on the small amount of potential contaminants that could be involved and exposed to the environment in each sampling or drilling operation. Further, there will be little (if any) potential for releasing toxic materials not identified in the Phase 1 investigation or this evaluation to the environment with the implementation of the two OSLs provided in Section 3.0.

3.0 OPERATIONAL SAFETY LIMITS

Operational Safety Limit 1

- 1.0 **Title** - The amount of soil that is allowed to be disturbed at each sample point is limited.
- 1.1 **Applicability** - This limit applies to Phase 2 activities at Operable Unit 1100-EM-1 subunits 1100-2, HRL, and the South Pit.
- 1.2 **Objective** - To assure that only small amounts of soil are disturbed, thus reducing the potential for a significant amount of contaminants to be released to the environment.
- 1.3 **Requirement** - The maximum amount of soil that may be disturbed at any sample location during Phase 2 is 0.028 m³ (1 ft³). Phase 2 Project work documents will reflect this requirement.
- 1.4 **Surveillance** - Project documents will specifically limit the amount of soil that is allowed to be disturbed at any one sample location in subunits 1100-2, HRL, and the South Pit. Log records of the Environmental Engineering group will confirm the use of hand tools; i.e., shovels, post hole diggers, etc.
- 1.5 **Recovery** - In the event that the requirements of this OSL are not complied with, all operations at the subunit(s) where the noncompliance occurred will cease until the violation is reviewed by Occupational Health and Safety and a recovery plan is developed by Environmental Engineering and appropriately reviewed/approved by Health and Safety Assurance.
- 1.6 **Audit Point** - Project work documents and documented records of Environmental Engineering site surveillances.
- 1.7 **Basis** - Contaminants identified in Phase 1 have a very low probability of being released due to the actions of Phase 2 activities assuming sampling equipment is hand-operated, soil sample volumes are approximately 250 cm³ (15.25 cm³), and the amount of soil disturbed at each sample location does not exceed 0.028 m³ (1 ft³).

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Operational Safety Limit 2

- 2.0 **Title** - Geophysical surveys must precede intrusive boring or sampling.
- 2.1 **Applicability** - This limit applies to Phase 2 activities at Operable Unit 1100-EM-1, subunits 1100-2, HRL, and the South Pit.
- 2.2 **Objective** - This limit will assure that buried materials are located prior to subsurface boring or intrusive sampling. This will assist in assuring that buried material are not disturbed, potentially releasing hazardous materials.
- 2.3 **Requirement** - Subsurface intrusive tasks must be preceded by geophysical surveys (i.e., ground penetrating radar, magnetometry and electromagnetic surveys) to identify and avoid disturbing underground objects. Phase 2 work documents will reflect this requirement.
- 2.4 **Surveillance** - Project work documents will specifically require geophysical surveys to identify underground objects prior to any subsurface intrusive tasks such as boring or sampling.
- 2.5 **Recovery** - In the event that the requirements of this OSL are not complied with, all operations at the subunit(s) where the noncompliance occurred will cease until the violation is reviewed by Occupational Health and Safety and a recovery plan is developed by Environmental Engineering and appropriately reviewed and approved by Health and Safety Assurance.
- 2.6 **Audit Point** - Project work documents and documented records of Environmental Engineering site surveillances.
- 2.7 **Basis** - Contaminants identified in Phase 1 have a very low probability of being released due to the actions of Phase 2 activities. Control is required to assure that new hazardous materials, not a part of this safety assessment, are not released to the environment. Geophysical surveys will provide the information necessary to avoid disturbing underground objects when conducting subsurface intrusive tasks.

4.0 REFERENCES

40 CFR, 1991, "National Primary Drinking Water Regulations," *Code of Federal Regulations*, as amended.

DOE-RL, 1990, *Phase 1 Remedial Investigation Report for the Hanford Site 1100-EM-1 Operable Unit*, DOE-RL 90-18, Vol. 1 and 2, U.S. Department of Energy, Richland Field Office, Richland, Washington.

DOE-RL, 1991, *Remedial Investigation, Phase 2 Supplemental Work Plan for the Hanford Site 1100-EM-1 Operable Unit*, DOE-RL 90-37, Draft A, U.S. Department of Energy, Richland Field Office, Richland, Washington.

Kerr, N.R., 1990, *Implementation Guideline for Hazard Documentation*, WHC-SD-GN-ER-301, REV 0, Westinghouse Hanford Company, Richland, Washington.

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E. G. Hess	R3-09	X		
M. G. Lauterbach	H4-55	X		
R. D. Lichfield	L6-57	X		
A. R. Schade	B1-35	X		
M. A. Tredway	R3-54	X		
J. J. Zimmer	N1-83	X		
Central Files (Original + 2)	L8-04	X		
EDMC 1100-EM-1 Admin. Rcd	H4-22	X		
ERSS File (3)	N1-75	X		
Docket File (2)	A3-11	X		
Information Release Administration	H4-17	X		