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MASTER

ACRONYMS

DOW	description of work
EPA	U.S. Environmental Protection Agency
FTL	Field Team Leader
GM	Geiger Mueller
HPT	health physics technician
HWOP	Hazardous Waste Operations Plan
IRM	Interim Remedial Measure
LFI	Limited Field Investigation
RCRA	<i>Resource Conservation and Recovery Act of 1976</i>
RWP	Radiation Work Permit
SSO	site safety officer
VOA	volatile organic analysis
VOC	volatile organic compounds
WIDS	Waste Information Data System

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1.0 INTRODUCTION

The purpose of this Description of Work (DOW) is to provide detailed guidance for implementation of the field activities outlined in the 200-UP-2 Operable Unit Work Plan (DOE/RL 1993). This work plan, in conjunction with the *U Plant Aggregate Area Management Study Report* (DOE/RL 1992) provides the basis for conducting a limited field investigation (LFI) in the 200-UP-2 Operable Unit. This DOW will then outline the protocols and procedures to be utilized in performing the surface soil sampling within the 200-UP-2 Operable Unit.

2.0 OBJECTIVES

As outlined in the Work Plan (DOE/RL 1993), the data to be collected in the LFI will be utilized to determine the need for, and possible selection of, an Interim Remedial Measure (IRM). In order to do that, detailed information on the current nature and extent of contamination in surface soils at selected management units is required for assessment in conjunction with the existing site-specific information. Therefore, samples collected should represent the areas of highest concentration for each unit. Field screening efforts using surface radiation surveys will allow for surface soil samples to be collected from those points that represent the highest contaminant concentrations. Analysis of these samples will provide data on the types and concentrations of the contaminants of concern.

3.0 SCOPE OF WORK

During conduct of operations on waste management units, surface radiation surveys are required to determine potential worker exposure and to assess long-term risk. The information provided by these surveys can also be used as a screening tool to aid in locating contaminated areas for more detailed investigations. Four categories of sites have been selected for investigation: tanks and vaults; cribs; drains and reverse wells; and ponds, ditches, and trenches. Specific waste management units in each category have been selected for further study and are discussed in detail in Section 4.0. At each of these sites, surface radiation surveys will be conducted that will provide detailed maps of the radiological profile for the area (see examples in Figures 1 through 3). These profiles will then be reviewed to determine the locations of elevated readings. The colored profiles and site coordinates will allow for relatively easy location of the most highly contaminated areas. These sites will then be relocated in the field utilizing a hand-held instrument. The specific location for the sample will be verified, and soil for laboratory analysis will be collected from that point.

This procedure should not only ensure that the samples collected are representative of the highest contaminant concentrations, but also that systematic sample selection will aid in reducing sample costs.

Figure 1. Survey Composite Track Map of 216-U-11 Trench.

Figure 2. Radiological Contour of 216-U-11 Trench.

Figure 3. Radiological Profile of the 216-U-11 Trench.

4.0 SITE DESCRIPTION

As described in Section 3.0, four categories of sites have been selected. Table 1 provides a summary of the unit types. Specific waste management units to be studied are outlined in the 200-UP-2 Work Plan (DOE/RL 1993). Maps showing the locations of these facilities are included in Figures 4 through 7. A total of 14 individual waste management units will be investigated as a part of this effort. In some cases, sites will be investigated together because of their proximity or operational history, as indicated in Table 1. Based on a review of the surface radiation surveys, surface soil samples from the units will be collected as outlined in the 200-UP-2 Work Plan (DOE/RL 1993) for an estimated total of 18 (see Table 1). If deemed necessary by determination of the cognizant engineer and field team leader (FTL), this number could be increased.

5.0 GENERAL REQUIREMENTS

5.1 HANFORD SITE GENERAL REQUIREMENTS

All personnel working to this DOW will have completed the applicable Hazardous Waste Site Worker Training Program and will perform all work in accordance with the following:

- WHC-CM-7-7, *Environmental Investigations and Site Characterization Manual* (EII) (WHC 1988d)
- WHC-CM-7-5, *Environmental Compliance Manual* (WHC 1988c)
- WHC-CM-1-6, *Radiological Control Manual* (WHC 1993e)
- WHC-IP-0692, *Health Physics Procedures Manual* (WHC 1991)
- WHC-CM-4-11, *ALARA Program* (WHC 1988a)
- WHC-EP-0383, *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan* (WHC 1990)
- WHC-CM-4-3, *Industrial Safety Manual*, Vol. 1 through 4 (WHC 1987)
- WHC-CM-7-8, Vol 2, *Engineering and Geotechnology Functions and Procedures*, Rev. 1 (WHC 1988b)
- Site-specific health and safety plan/radiation work permits/job safety analysis.

Table 1. Summary of Sampling Locations for 200-UP-2 Surface Soils.

Type	Unit	Approximate Area	Surface Stabilized	Estimated Number of Soil Samples
Tanks and Vaults	241-U-361 Settling Tank	7,500 m ²	Y	1
Cribs	216-U-1 216-U-2	7,500 m ²	Y	4
	U-8	5,800 m ²	N	2
Drains and Reverse Wells	216-U-4 Reverse Well 216-U-4a French Drain	21 m ²	Y	1
Ponds, Ditches, and Trenches	216-U-10 Pond 216-U-11 Trench 216-U-9 Ditch 216-U-14 Ditch 216-Z-1D Ditch 216-Z-11 Ditch 216-Z-19 Ditch 216-Z-20 Crib	Total for all = 388,000 m ²	Y	10 (for all sites)

Figure 4. Map of the 216-U-1/U-2 Crib and 241-U-361 Tank.

Figure 5. Map of the 216-U-8 Crib.

Figure 6. Map of the 216-U-4 Reverse Well and 216-U-4A French Drain.

Figure 7. Map of the 216-U-10 Pond and its Associated Ditches.

5.2 200-UP-2 OPERABLE UNIT GENERAL REQUIREMENTS

The requirements and procedures applicable to the 200-UP-2 Operable Unit field activities are specified in the *Environmental Investigations and Site Characterization Manual* (WHC 1988d). Potentially applicable EIIs include the following:

- EII 1.1 "Hazardous Waste Site Entrance Requirements"
- EII 1.5 "Field Logbooks"
- EII 1.13 "Readiness Review"
- EII 2.1 "Preparation of Hazardous Waste Operations Permit"
- EII 3.2 "Calibration and Control of Monitoring Instruments"
- EII 3.4 "Field Screening"
- EII 4.3 "Control of CERCLA and Other Past-Practice Investigation Derived Waste"
- EII 5.1 "Chain of Custody"
- EII 5.2 "Soil and Sediment Sampling"
- EII 5.4 "Field Decontamination of Drilling, Well Development, and Sampling Equipment"
- EII 5.5 "1706 KE Laboratory Decontamination of RCRA/CERCLA Sampling Equipment"
- EII 5.10 "Obtaining Sample Identification Numbers and Accessing HEIS Data"
- EII 5.11 "Sample Packaging and Shipping"
- EII 6.1 "Activity Reports of Field Operations"

Additional requirements and procedures applicable to the 200-UP-Operable Unit can be found in *Engineering and Geotechnology Functions and Procedures*, Vol. 2, specifically, "Test Pit Excavation in Radiological Areas" (WHC 1988b).

Each item on the checklist for tasks requiring readiness review (EII 1.13, "Engineering and Geotechnology Readiness Review" [WHC 1988d]) will be signed and dated by the cognizant engineer or FTL prior to the start of work.

6.0 SAMPLING AND FIELD ACTIVITIES

Task 1--Preparatory Activities

A meeting with Health Physics and Environmental Restoration Operations will be held before the job is to be performed. At this meeting the exclusion and control zone layouts will be determined and appropriate plans will be made for site access.

A pre-job safety meeting, including all personnel associated with the job, will be held prior to the performance of any work.

Any comments and concerns will be addressed and resolved at that time.

A tailgate safety meeting will be held at the job site prior to commencing operations each day.

Task 2--Field Screening and Site Selection

Utilizing the maps generated by the radiation surveys, the areas indicating the highest contamination readings will be relocated. The designated area will then be resurveyed by a Health Physics Technician (HPT) using a portable Geiger-Mueller (GM) counter with a P-11 probe. The specific location for possible sample collection will be marked using a flag or stake. An entry will be made describing the physical condition of the site and the GM reading. Where the survey maps indicate multiple points of elevated contaminant concentrations, enough points will be resurveyed to allow for selection of the highest contamination concentrations for each management unit based on the GM readings. Final sample site selection and collection of soils will be from these sites.

Task 3--Sample Collection

The sample points selected for collection will be permanently marked with a stake and the designated sample number. The site will be photographed prior to sampling. The point to be sampled will comprise an area approximately 1 ft in diameter and not more than 6 in. in depth. The sample will be collected in accordance with EII 5.2, "Soil and Sediment Sampling" (WHC 1988d) using a stainless-steel spoon, trowel, or shovel.

If speck contamination is suspected, the container for radionuclide analysis should be filled first. As indicated in the 200-UP-2 Work Plan (DOE/RL 1993), volatile organic analysis (VOA) will not be conducted for surface soils.

Where unusual conditions may exist, such as surface contamination as the result of radioactive vegetation, samples may be collected of the suspected material (plant, etc.) and soil to allow for verification of the field results. Additionally, where subsurface or surface radioactivity is suspected to result in a false reading due to "shine," samples at one or two of these points should be collected to verify the field determinations.

Following collection, all samples will be labeled, sealed, and placed in a container for preservation on ice or other appropriate cooling medium.

7.0 LABORATORY ANALYSIS

Samples collected for chemical and radiochemical analysis will be analyzed for the 200-UP-2 target analytes. The Level IV CLP method will be used at TMA and Weston to test for the presence of specific analytes (EPA 1986) except radionuclides, which will be analyzed using standard methods defined in the laboratory statement of work. If onsite analysis is necessary due to activity levels, Pacific Northwest Laboratory will be the onsite lab and will use their own testing methods for all analytes. Appendix B identifies the complete list of analytes and the methods utilized for their testing.

8.0 QUALITY ASSURANCE/QUALITY CONTROL REQUIREMENTS

Internal quality control samples shall be collected at each facility by the sampling scientist as specified in the *Quality Assurance Project Plan*, (DOE-RL 1993, Appendix A) with the revisions as outlined below. The sampling shall be documented in the sampling logbook per EII 1.5, "Field Logbooks," (WHC 1988d).

- Field Duplicate Samples--A minimum of one duplicate per every 20 samples shall be collected. Duplicate samples shall be retrieved from the same sampling location using the same equipment and sampling technique and shall be placed in two sets of identically prepared and preserved containers. All field duplicates shall be analyzed independently to provide an indication of the reproducibility of sampling and/or analysis techniques.
- Split Samples--At the direction of the cognizant engineer, and if a laboratory is designated, split samples shall be collected at the same frequency as duplicate samples.
- Field Blanks--Field blanks shall consist of silica sand transferred into clean sample containers at the site. Field blanks are used as a check on environmental contamination and shall be collected in one of every 20 samples.
- Equipment Blanks--Equipment blanks consist of pure silicon sand that is run through decontaminated sampling equipment and placed in clean sample containers. Equipment blanks are used to verify the adequacy of sampling equipment decontamination procedures and shall be collected at the same frequency as field duplicate samples where applicable.

9.0 REFERENCES

- DOE-RL, 1992, *U Plant Source Aggregate Area Management Study Report*, DOE/RL-91-52, Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- DOE-RL, 1993, *200-UP-2 RCRA Facility Investigation/Corrective Measures Study*, DOE/RL-91-19 Rev. 0, U.S. Department of Energy, Richland Operations Office, Richland, Washington.
- EPA, 1986, *Test Methods for Evaluating Solid Wastes*, SW-846, Third Edition, U.S. Environmental Protection Agency/Office of Solid Waste and Emergency Response, Washington, D.C.
- WHC, 1987, *Industrial Safety Manual*, WHC-CM-4-3, Vols. 1 through 3, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1988a, *ALARA Program*, WHC-CM-4-11, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1988b, *Engineering and Geotechnology Functions and Procedures*, Rev. 1, WHC-CM-7-8, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1988c, *Environmental Compliance Manual*, WHC-CM-7-5, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1988d, *Environmental Investigations and Site Characterization Manual*, WHC-CM-7-7, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1988e, *Radiological Control Manual*, WHC-CM-1-6, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1990, *Environmental Engineering, Technology, and Permitting Function Quality Assurance Program Plan*, WHC-EP-0383, Westinghouse Hanford Company, Richland, Washington.
- WHC, 1991, *Health Physics Procedures Manual*, WHC-IP-0692, Westinghouse Hanford Company, Richland, Washington.

APPENDIX A

RADIOLOGICAL SURVEYS FOR THE 200-UP-2 WASTE MANAGEMENT UNITS

200-UP-2 USRADS RADIOLOGICAL SURVEY COMPOSITE TRACK MAP OF TILE FIELD AREA

N135000

N135050

N135100

N135150

E567200

E567250

E567300

E567350

E567400

E567450

USRADS SURVEYS
USRADS SURVEYS

200-UP-2 USRADS RADIOLOGICAL SURVEY RADIOLOGICAL CONTOUR OF TILE FIELD AREA

USRADS SURVEYS
Camp Site Investigation Surveys

200-UP-2 USRADS RADIOLOGICAL SURVEY
RADIOLOGICAL PROFILE OF TILE FIELD AREA
VIEWED FROM THE SOUTHWEST

USRADS SURVEYS
ERP/Site Investigative Surveys

200-UP-2 USRADS RADIOLOGICAL SURVEY COMPOSITE TRACK MAP OF 216-U-8

USRADS SURVEYS

EMP/Site Investigative Surveys

200-UP-2 USRADS SURVEY RADIOLOGICAL CONTOUR OF U8 CRIB & PIPELINE

200-UP-2 USRADS RADIOLOGICAL SURVEY RADIOLOGICAL PROFILE OF U8 CRIB AND PIPELINE

USRADS SURVEYS
EMP/510 Investigation Surveys

200-UP-2 MSCM-11 SURVEY COMPOSITE TRACK MAP OF U11 TRENCH AREA

— SURVEY TRACK
■ ELEVATED READING

MSCM-11 SURVEYS
200/210 Investigative Surveys

200-UP-2 MSCM-11 RADIOLOGICAL SURVEY RADIOLOGICAL CONTOUR OF 216-U-11 AREA

200-UP-2 MSCM-11 RADIOLOGICAL SURVEYS RADIOLOGICAL PROFILE OF 216-U-11 AREA

A-11

MSCM-11 SURVEYS
EMP/Bio Investigative Surveys

200-UP-2 MSCM-11 SURVEY COMPOSITE TRACK MAP OF U10 POND AREA

E566200

E566400

E566600

—	SURVEY TRACK
■	ELEVATED READING

MSCM-11 SURVEYS

EMP/mta Investigative Groups

A-12

NI34800

NI34600

NI34400

200-UP-2 MSCM-II RADIOLOGICAL SURVEY RADIOLOGICAL CONTOUR OF 216-U-10 AREA

MSCM-II SURVEYS
Data Investigative Surveys

200-UP-2 MSCM-11 RADIOLOGICAL SURVEY RADIOLOGICAL PROFILE OF 216-U-10 AREA

MSCM-11 SURVEYS

ERT/810 Investigative Surveys

200-UP-2 MSCM-11 SURVEY COMPOSITE TRACK MAP OF 216-10.11, &19 DITCHES

MSCM-11 SURVEYS
ERMP/Site Investigative Surveys

200-UP-2 MSCM-11 RADIOLOGICAL SURVEYS RADIOLOGICAL CONTOUR OF Z TRENCH AREA

MSCM-11 SURVEYS
200/2100 Investigative Surveys

200-UP-2 MSCM-11 RADIOLOGICAL SURVEY RADIOLOGICAL PROFILE OF Z TRENCH AREA VIEWED FROM THE NORTHWEST

MSCM-11 SURVEYS
 Date Investigation Survey

200-UP-2 MSCM-11 SURVEY COMPOSITE TRACK MAP OF U14 DITCH AREA

MSCM-11 SURVEYS

ERMP/Site Investigative Surveys

200-UP-2 MSCM-II RADIOLOGICAL SURVEY RADIOLOGICAL CONTOUR OF U14 TRENCH

MSCM-II SURVEYS
EMF/ELC Investigative Surveys

200-UP-2 MSCM-11 RADIOLOGICAL SURVEY RADIOLOGICAL PROFILE OF U14 TRENCH

MSCM-11 SURVEYS
ERHP/Site Investigative Surveys

200-UP-2 USRADS SURVEY RADIOLOGICAL CONTOUR OF 207-U AREA

200-UP-2 USRADS SURVEYS RADIOLOGICAL PROFILES OF 207-U AREA

VIEWED FROM SOUTHWEST

VIEWED FROM NORTHEAST

USRADS SURVEYS
SURFACE/Depth Investigation Surveys

A-23

M35100

M135050

M135023

M134958

E566850

E566900

E566950

E567020

E567050

E567100

ORDER KEY ICENL

USADS SURVEYS
CONDUCTED TO INVESTIGATE SURVEYS

APPENDIX B

ANALYTICAL METHODS FOR TARGET ANALYTES (SOILS)

Table B-1. Analytical Methods for Target Analytes. (sheet 1 of 4)

Analyte ^{a/}	General Analytical Technique ^{b/}	Soil and Sediment Analysis Method ^{c/}	Container and Volume ^{d/}	Comments
Gross Alpha	Gas proportional	h	f	-
Gross Beta				-
Acetone	Volatile Organic Analysis	CLP-VOAs	Gs 250 ml	-
Carbon Tetrachloride				-
Chloroform				Gs 125 ml Weston
Methylene Chloride				-
MIBK (hexone)				-
1,1,1 Trichloroethane				-
Toluene				-
Americium-243 (NP-239)	Gamma Spectrometry	h	f	Am-243 measured by counting NP-239
Cesium-134				-
Cesium-137 (Ba-137m)				Cs-137 measured by counting Ba-137m
Cobalt-60				-
Europium-152				-
Europium-154				-
Europium-155				-
Potassium-40				-
Ruthenium-106				Ru-106 measured by counting Rh-106
Sodium-22				-
Uranium-235 (PA-231)				For most samples U-235 measured by counting Pa-231
Uranium-234/238 (Pa-234m)	Alpha Spectrometry	h	f	For most samples U-234/238 measured by counting Pa-234m

Table B-1. Analytical Methods for Target Analytes. (sheet 2 of 4)

Analyte ^a	General Analytical Technique ^b	Soil and Sediment Analysis Method ^c	Container and Volume ^d	Comments
Americium-241 Curium-244 Neptunium-237 Plutonium-238 Plutonium-239/240 Uranium-234 ^e	Alpha Spectrometry	h	f	May also use gamma spectrometry - - - - -
Uranium-235 ^e Uranium-238 ^e	Alpha Spectrometry	h	f	- -
Iodine-129 Strontium-90 (Y-90) Technetium-99	Beta Counting ^d	h	f	- Sr-90 measured by counting Y-90 -
Barium Beryllium Boron Cadmium Chromium Copper Iron Lead Manganese	ICP Analysis	CLP-Metals	g	- - - - P-500 mL Weston - - - -

Table B-1. Analytical Methods for Target Analytes. (sheet 3 of 4)

Analyte ^v	General Analytical Technique ^v	Soil and Sediment Analysis Method ^v	Container and Volume ^v	Comments
Nickel	ICP Analysis	CLP-Metals	g	—
Silver				—
Titanium				P 500 ml Weston
Vanadium				—
Zinc				—
Arsenic	GFAA	CLP-Metals	g	—
Selenium	GFAA	CLP-Metals	g	—
Cyanide	Colorimetric	CLP-TAL	G 125 ml	G 250 ml Weston
Tributyl Phosphate	GC	CLP-Semi-VOAs	aG 250 ml	aG 500 ml Weston
Selenium-79	Beta Counting ^v	h	f	—
Samarium-151				—
Zirconium-93				—
Mercury	Atomic Adsorption	CLP-Metals	g	—
Kerosene	GCFID	8015 ⁵	Gs 125 ml	—
Nitrate	Colorimetric	353.2	P/G 125 ml	—
Nitrite		353.2		—
Additional Analyses for Water Samples Only				
Fluoride	Ion Chromatography	300	P/G 125 ml	—

Table B-1. Analytical Methods for Target Analytes. (sheet 4 of 4)

Analyte ^v	General Analytical Technique ^v	Soil and Sediment Analysis Method ^v	Container and Volume ^v	Comments
Carbon-14	Beta Counting ^v	--	--	Not applicable for soil samples
Tritium		--	--	Not applicable for soil samples

G = Glass; P = Plastic; Gs = Glass septum w/zero headspace; aG = amber Glass

TBD = To Be Determined

M = method modified to include extraction from the solid medium, extraction method is matrix and laboratory-specific

Prescribed Procedures for Measurement of Radioactivity in Drinking Water (EPA 1980a)

Test Methods for Evaluating Solid Waste (SW 846) Third Edition (EPA 1986)

Methods for Chemical Analysis of Water and Waste (EPA 1983)

Radionuclide Method for the Determination of Uranium in Soil and Air (EPA 1980b)

EML Procedures Manual (DOE/EML 1990)

Eastern Environmental Radiation Facility RadioChemistry Procedures Manual (EPA 1984)

High-Resolution Gamma-Ray Spectrometry of Water (ASTM 1985)

^v In addition to the analytes listed in this table, there are many progeny isotopes whose concentrations may be derived from known parent concentrations. Radionuclides related to U-238 include: Th-230, Bi-210, Bi-214, Po-214, and Po-218. Radionuclides related to U-235 include: Th-231, Tl-207, Pb-211, Pb-214, and Bi-211. Nb-93m is related to Zr-93. Pu-241 concentrations are inferred from Pu-238, Pu-239, and Pu-240.

The radionuclides listed in parenthesis under the analyte column are measured as part of the analysis of the adjacent radionuclide.

^v The analytical techniques are listed in the order that they should be performed. Gross alpha, gross beta, and VOA analyses will always be done first. Gamma Spectrometry will be done next because it generally does not require destruction of any sample. Alpha spectrometry, Sr-90 and Tc-99 analyses will next be done if sufficient sample exists. The next priority is to perform ICP analyses. Approximately 2 lbs (1 kg) of material will be required to perform these primary analyses. If more sample exists, then several additional, secondary analyses may be performed. These are shown on the table below the ICP analysis. In borings, additional drive samples should be collected, if possible, to insure that all analyses can be run.

^v These analytical methods should be considered examples of possible analytical techniques to use. Individual labs may have other techniques developed for some analytes.

^v The uranium analyses will be conducted periodically to confirm the uranium concentrations calculated from the Pa-234m or Pa-231 analyses. Two samples from each deep boring and one sample from each test pit or shallow boring will undergo this confirmatory analysis. No uranium analyses will be done on surface soil or sediment samples.

^v Analytes that will be studied by beta counting are listed in the order that they should be analyzed. For instance, the Sr-90 analysis should be made first, followed by the Tc-99 analysis.

^v All samples submitted for radionuclide analysis will be placed in a P/G 750 ml bottle.

^v All samples submitted for CLP-Metals analysis will be placed in a P 250 ml bottle.

^v Analytical methods for radionuclide analysis are laboratory specific. (Examples of standard methods include ASTM D3549, ASTM D3865, ASTM D3972, ASTM D2334.)

^v Samples collected for the 200-UP-2 Limited Field Investigation (LFI) activities that require analysis for kerosene will be analyzed at TMA by SW-846 method 8015. Kerosene is not listed in the SW-846 reference procedure as a compound that is included on the target list for 8015, Non-Halogenated Volatile Organics. Through its contract with HWC, TMA has adapted method 8015 to include kerosene as a target compound using its characteristic "fingerprint."

^v Volumes listed are for TMA except where noted in comment column for split analysis where bottle size differs.

DATE

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END