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**WASTE ACCEPTANCE CRITERIA  
ATTAINMENT REPORT FOR  
THE ADVANCED WASTEWATER  
TREATMENT FACILITY STOCKPILE**

**FERNALD ENVIRONMENTAL MANAGEMENT PROJECT  
FERNALD, OHIO**



**OCTOBER 1999**

**U.S. DEPARTMENT OF ENERGY  
FERNALD AREA OFFICE**

**20500-RP-0002  
REVISION A  
DRAFT**

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## LIST OF ACRONYMS AND ABBREVIATIONS

AWWT	Advanced Wastewater Treatment Facility
ccpm	corrected counts per minute
COCs	constituents of concern
HPGe	high-purity germanium detector
MDC	Minimum Detectable Concentration
mg/kg	milligrams per kilogram
OSDF	On-Site Disposal Facility
pCi/g	picoCuries per gram
ppm	parts per million
PSP	Project Specific Plan
RSS	Radiological Scanning System
WAC	waste acceptance criteria
WAO	Waste Acceptance Organization

**1.0 INTRODUCTION**

This report summarizes the recent sampling and analytical results from the Advanced Wastewater Treatment Facility (AWWT) Stockpile. Soil sampling was conducted to evaluate attainment of the On-Site Disposal Facility (OSDF) waste acceptance criteria (WAC). Excavation of the soil and debris of this stockpile is scheduled to begin in late October - early November 1999. WAC attainment will be visually verified by Waste Acceptance Organization (WAO) personnel during excavation.

Although summaries of the strategies and methods of sampling this stockpile are included in this report, the Project Specific Plan (PSP) for Sampling of the AWWT Soil Stockpile for OSDF WAC Attainment (20500-PSP-0002) should be referenced for the complete background and/or specific details on sampling design and physical sampling activities for the attainment of WAC data.

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## 2.0 STOCKPILE DESCRIPTION AND SAMPLING DESIGN

### 2.1 STOCKPILE DESCRIPTION

The AWWT Stockpile (Material Tracking Location AWT-001) is located in the southern portion of the Former Production Area, south of the AWWT Building and concrete pad, within Soil Remediation Area 7. The stockpile consists of approximately 2,900 cubic yards of soil and soil-like material from Remediation Area 7 and was created in 1993 by consolidating soil generated during the concrete pad construction located south of and adjacent to the AWWT. Approximately 2,860 cubic yards of soil was generated during this construction. An additional 36 cubic yards of mixed soil and gravel in the stockpile was generated from a trench constructed in 1996 near the Slurry Dewatering Building (Building 51b). Written descriptions along with historical photos of the area indicate no evidence of waste material within the area, but debris was visible nearby. The entire stockpile is surrounded by a construction fence. As determined in the PSP, the WAC constituents of concern (COCs) are total uranium and technetium-99.

### 2.2 REAL-TIME SCANNING

A real-time total uranium surface scan of the stockpile was performed using the Radiation Scanning System (RSS). The RSS scan covered as much of the stockpile surface as was practical without jeopardizing worker safety. The steep slope on the south side of the pile could not be scanned by either the RSS or high-purity germanium detector (HPGe).

The RSS detector acquisition time was set to 4 seconds and data was collected at a speed of one mile per hour. The onboard Global Positioning System was used to obtain positioning information with each detector measurement. If any single RSS measurement had exceeded 721 milligrams per kilogram (mg/kg) total uranium, a HPGe measurement would have been taken to confirm the RSS measurement. The highest RSS reading was 79.57 mg/kg therefore, no HPGe measurements were needed for the stockpile.

A Infrared Moisture Meter soil moisture reading was collected in the area covered by the RSS. This moisture reading was necessary to compensate for soil moisture as related to RSS measurements.

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### 2.3 PHYSICAL SAMPLING

The physical sampling strategy for WAC attainment determination for the AWWT Stockpile was a combination of random and biased sampling throughout the stockpile. The number of samples determined to adequately characterize the AWWT stockpile was collectively based on the current data set, process knowledge of the stockpiles, and sampling density in previous soil stockpile sampling projects. Based on these guidelines, ten random samples were collected from the stockpile.

To determine the locations and depths of random samples, a systematic approach was used to establish a sample grid over the stockpile surface. The grid pattern was based on surface area and consisted of 10 grid blocks of approximately equal size. A random sample location (northing and easting) was selected within each block. Depth intervals were randomly selected at each sampling location. Alternate random depths and alternate random locations were also selected in case of refusal at a boring location.

Biased samples were to be collected based on readings from a beta/gamma (Geiger-Mueller) survey meter. Six-inch soil intervals with beta/gamma readings above 400 corrected counts per minute (ccpm), as established in Appendix D of the Area 2, Phase I Integrated Remedial Design Package, would have been collected and analyzed for total uranium. However, no beta/gamma readings exceeded 400 ccpm for this stockpile, so no biased radiological samples were collected.

Soil cores were collected using either a hand auger or the Geoprobe® Model 5400. All physical samples were collected from the original boring locations as defined in the PSP. Nine of the ten original borings were completed to the base of the pile for beta/gamma field screening purposes. Refusal was encountered at boring AWT-001-8. This boring was moved two times within the 3-foot radius in an attempt to complete the boring to the base of the pile, as directed in the PSP. Both moves were unsuccessful and this point was moved to the alternate random location for beta/gamma screening to the base of the pile. The soil sample submitted for analysis was collected from the original location because the random interval fell within the recoverable material before encountering refusal.

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3.0 DATA SUMMARY AND CONCLUSIONS

3.1 REAL-TIME DATA

The RSS measured surface total uranium concentration over 536 points, with the maximum result as 79.57 parts per million (ppm). RSS data are depicted in Figure 3-1. No HPGe measurements were taken.

3.2 BETA/GAMMA RESULTS

All sample locations were taken to the base of the pile and beta/gamma surveyed. All results measured less than background (background was between 40 ccpm and 60 ccpm).

3.3 ANALYTICAL DATA

The laboratory results of the soil samples are summarized in Tables 3-1 and 3-2. Results for total uranium analyses ranged from 4.36 ppm at AWT-001-7 to 20.1 ppm at AWT-001-3. Technetium-99 results ranged from nondetected [at less than 1 picoCuries per gram (pCi/g) at AWT-001-4] to 1.3 pCi/g at AWT-001-7.

3.4 CONCLUSION

The evaluation of the RSS scan results, beta/gamma surveying results, and sampling analytical results indicate the AWWT stockpile meets WAC and can be placed in the OSDF. Based on the low constituent concentrations throughout the pile, real-time scanning with the RSS and/or HPGe and radiological control monitoring will not be necessary during excavation. Visual inspection for prohibited items will be conducted by WAO personnel.

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**TABLE 3-1**  
**SUMMARY OF PHYSICAL SAMPLING TOTAL URANIUM RESULTS**

Sampling Location	Sample Interval	Results	Validation	MDC
AWT-001-1	6	7.54 ppm	-	0.01 ppm
AWT-001-2	23	17.6 ppm	-	0.01 ppm
AWT-001-3	3	20.1 ppm	-	0.01 ppm
AWT-001-4	1	5.09 ppm	-	0.01 ppm
AWT-001-5	7	5.46 ppm	-	0.01 ppm
AWT-001-6	5	6.41 ppm	-	0.01 ppm
AWT-001-7	7	4.36 ppm	-	0.01 ppm
AWT-001-8	5	5.35 ppm	J	0.01 ppm
AWT-001-9	6	6.79 ppm	J	0.01 ppm
AWT-001-10	4	5.51 ppm	J	0.01 ppm

**TABLE 3-2**  
**SUMMARY OF PHYSICAL SAMPLING TECHNETIUM-99 RESULTS**

Sampling Location	Sample Interval	Result	Validation	MDC
AWT-001-1	6	0.102 pCi/g	U	0.94 pCi/g
AWT-001-2	23	0.64 pCi/g	U	1.06 pCi/g
AWT-001-3	3	0.64 pCi/g	U	1.02 pCi/g
AWT-001-4	1	<MDC	U	0.97 pCi/g
AWT-001-5	7	0.76 pCi/g	U	0.99 pCi/g
AWT-001-6	5	0.39 pCi/g	U	1.05 pCi/g
AWT-001-7	7	1.3 pCi/g	J	1.02 pCi/g
AWT-001-8	5	0.46 pCi/g	U	0.96 pCi/g
AWT-001-9	6	0.80 pCi/g	U	1.02 pCi/g
AWT-001-10	4	0.52 pCi/g	U	0.95 pCi/g

U undetected at minimum detectable concentration (MDC)

J estimated concentration

- no data qualifier for positive result

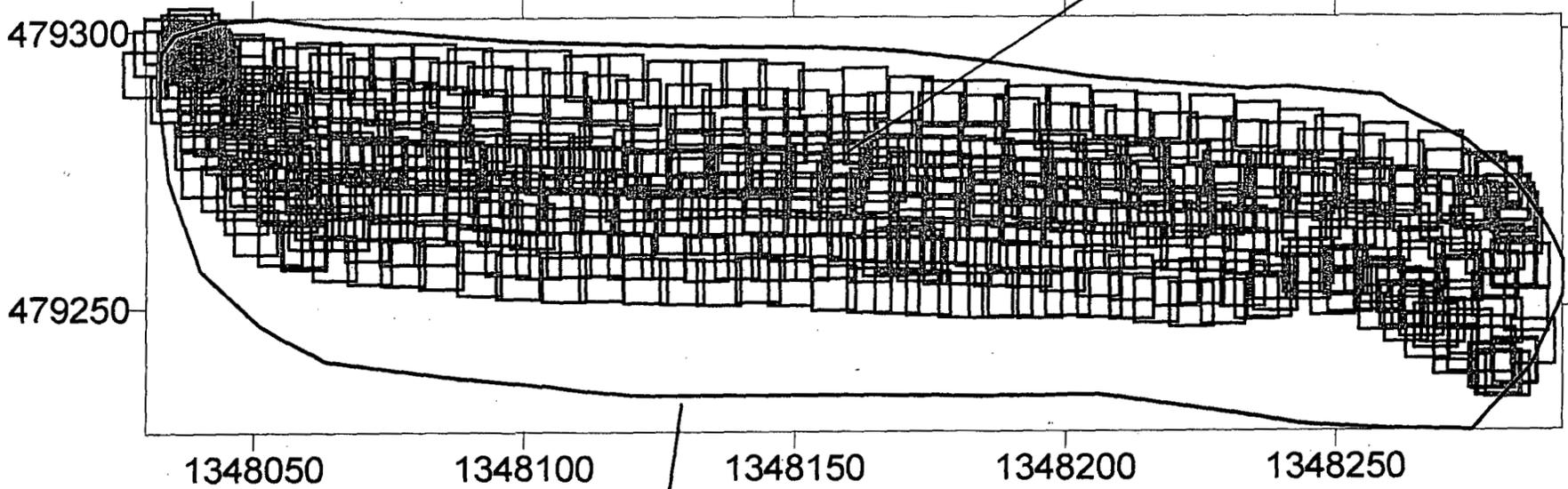
# FIGURE 3-1 AWWT Soil Pile

Moisture Corrected Total Uranium

RSS batch #0359  
Field of View to scale  
One Spectrum, no averaging



Highest Value  
79.57 mg/kg



Boundary of soil pile

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mg/kg Total Uranium	
[Shaded Box]	-67.67 to 100.00
[Shaded Box]	100.00 to 400.00
[Shaded Box]	400.00 to 721.00
[Shaded Box]	721.00 to 100000.00

RTIMP DWG Title: AWT\_001\_WAC\_TU\_1PT\_MC.srf  
Project #: 20500-PSP-0002  
Project Name: Samp of AWWT Stockpile for WAC  
Prepared By: Darren Wessel  
File: AWT\_001\_WAC\_TU\_1PT\_MC.srf  
Date Prepared: 8/26/99

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**APPENDIX A**

**VARIANCE TO THE PROJECT SPECIFIC PLAN  
FOR SAMPLING OF THE ADVANCED  
WASTEWATER TREATMENT FACILITY SOIL  
STOCKPILE FOR OSDF WAC ATTAINMENT**

VARIANCE / FIELD CHANGE NOTICE

V/FCN 20500PSP2-1

BS NO.: PROJECT/DOCUMENT/ECDC #20500-PSP-0002 Rev 0

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PROJECT TITLE: PSP for Sampling of the Advanced Wastewater Treatment Facility Stockpile  
for OSDF WAC Attainment

Date: 9/07/99

VARIANCE / FIELD CHANGE NOTICE (Include justification):

At the planned sample location, AWT-001-8 could only advance three feet into the pile due to possible rock/concrete debris. The sample depth at this location was estimated at 6 feet. Per Section 2.3 (page 2-2), two additional borings were attempted within a 3 foot radius and were also unsuccessful. The randomly identified sample interval was collected and submitted for analysis and beta/gamma screening was completed on the first three feet.

The alternate sample location for location AWT-001-8, listed in Table C-2, will be used for beta/gamma screening to the base of the pile. No physical samples will be collected from this location, unless determined by the beta/gamma screening.

Justification

According to the PSP ten sample borings are to be screened to the base of the pile, one in each gridded area. This additional boring will complete the ten borings required to be scanned to the base of the pile.

REQUESTED BY: Deanna Diallo

DATE: 9/01/99

X IF REQD	VARIANCE/FCN APPROVAL	DATE	X IF REQD	VARIANCE/FCN APPROVAL	DATE
	QUALITY ASSURANCE <i>Frank Thompson</i>	<i>10-12-99</i>	X	AREA PROJECT MANAGER <i>[Signature]</i>	<i>9-7-99</i>
	DATA QUALITY MANAGEMENT			Real-time Program Mgr	
	ANALYTICAL CUSTOMER SUPPORT		X	AWWT Characterization Lead <i>Deanna Diallo</i>	<i>9/7/99</i>
X	Sampling Manager <i>Mike Fink</i>	<i>10/1/99</i>	X	WAO <i>Linda Barton</i>	<i>9/7/99</i>
VARIANCE/FCN APPROVED [X]YES [ ]NO			REVISION REQUIRED: [ ]YES [x]NO		

DISTRIBUTION

PROJECT MANAGER:	DOCUMENT CONTROL: Jeannie Rosser	OTHER:
QUALITY ASSURANCE:	OTHER:	OTHER: <i>11</i>

<b>FIELD ACTIVITY LOG</b>	CONTROL No.:	PROJECT NAME/No.: 20500-15P-0002 AWWT Soil Pile	PAGE 1 of 1
	PREPARED BY: [REDACTED]	BADGE No.: 77508	DATE: 10/7/99
	REVIEWED BY:	2562	BADGE No.: DATE:

FIELD ACTIVITY SUBJECT: Soil sampling w/ hand auger	GENERAL LOCATION: AWWT Soil Pile
WEATHER CONDITIONS: Clear and Sunny	TEMPERATURE: 57°F
	LOCATION ID: AWNT-001-08

COMPLETE THE FOLLOWING PRIOR TO FIELD ACTIVITY:  
NOTE: IF "NO" IS INDICATED FOR ANY ITEM, CONTACT FIELD SUPERVISOR.

	YES	NO	NA		YES	NO
1) FIELD DATA PACKAGE AVAILABLE?	✓			8) FIELD EQUIPMENT CHECKLIST REVIEWED?	✓	
2) PROJECT SPECIFIC PLAN AVAILABLE?	✓			9) PERMIT EXPIRATION DATES VALID?	✓	
3) HEALTH AND SAFETY DOCUMENT AVAILABLE?	✓			10) EXCLUSION ZONE ESTABLISHED AND POSTED?	✓	
4) CONTROLLED PROCEDURES AVAILABLE?	✓			11) DAILY SAFETY MEETING CONDUCTED AND DOCUMENTED?	✓	
5) CONTROL/COMMUNICATIONS CENTER CONTACTED?	✓			12) LOCATION ON MARKER AGREES WITH PROJECT SPECIFIC PLAN?	✓	
6) EYEWASH AT ACCEPTABLE PRESSURE?			✓	13) BOREHOLE LOCATION ON PENETRATION PERMIT?	✓	
7) EYEWASH INSPECTED WITHIN 7 DAYS?			✓	14) WASTE CONTAINERS PRESENT AND LABELED?	✓	

TIME: DESCRIPTION OF ACTIVITY: NOTE: IF ADDITIONAL SPACE IS REQUIRED, COMPLETE FS-F-3682-1, FIELD ACTIVITY LOG (CONTINUATION PAGE).

1015	Safety briefing
1034	Arrive at AWWT soil pile, confirm point AWNT-001-08.
1040	Waiting to hear from T. Buhrlage on how deep to auger.
1041	J. Capannari will resurvey point to determine correct elevation.
1056	J. Capannari determined native soil is 2.2' below surface. Will will auger to 2.8' to take our required rad survey.
1101	Began augering.
1115	2.2'-2.8' interval is surveyed, reading is below background. Background is 50 cpm. No samples will be collected.
1120	Depart field.

End TR 10/7/99

WATER QUALITY METER				PHOTOIONIZATION DETECTOR			
MFR:	ID. No.: N/A	INITIALS:	TIME:	MFR:	ID. No.:	INITIALS:	TIME:
CALIBRATION SOLUTION				PHOTOIONIZATION DETECTOR (CONT) N/A			
MFR:	LOT No.:	EXP. DATE:		MFR:	LAMP eV:	MFR:	MFR DATE:
<input type="checkbox"/> ALPHA <input checked="" type="checkbox"/> BETA/GAMMA METER				SPAN GAS			
MODEL: 3	SERIAL No.: 97061	CAL. DUE DATE: 03/00		MFR:	MFR DATE:	TYPE:	CONC:

TEAM MEMBERS:	TEAM LETTER:	BADGE #:	VISITORS:	TIME:
LEAD: [REDACTED]		8872	NAME: Jim Capannari	ARRIVE: 1041
		77508	ORGANIZATION: Surveying & Mapping	DEPART: 1058
		72068		

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