150505-0201290006

ON SCENE COORDINATOR (OSC) REPORT

PRS 304

REMOVAL ACTION

MOUND PLANT
MIAMISBURG, OHIO

December 1998

Final

(Revision 0)

Department of Energy

Babcock & Wilcox of Ohio

TABLE OF CONTENTS

EXECUTIVE SUMMARY . . . . . Page E-1

1 SUMMARY OF EVENTS . . . . . Page 1
- 1.1 SITE CONDITIONS AND BACKGROUND . . . . . Page 1
- 1.2 ORGANIZATION OF THE RESPONSE . . . . . Page 3
- 1.3 OBJECTIVES . . . . . Page 4
- 1.4 CHRONOLOGICAL NARRATIVE OF RESPONSE ACTIONS . . . . . Page 4
- 1.5 RESOURCES COMMITTED . . . . . Page 5

2 EFFECTIVENESS OF THE REMOVAL ACTION . . . . . Page 7
- 2.1 ACTIONS TAKEN BY MOUND PERSONNEL . . . . . Page 7
- 2.2 ACTIONS TAKEN BY LOCAL, STATE, AND FEDERAL AGENCIES . . . . . Page 7
- 2.3 ACTIONS TAKEN BY CONTRACTORS . . . . . Page 7

3 DIFFICULTIES ENCOUNTERED . . . . . Page 8
- 3.1 ITEMS THAT AFFECTED THE RESPONSE . . . . . Page 8
- 3.2 ISSUES OF INTERGOVERNMENTAL COORDINATION . . . . . Page 8

4 RECOMMENDATIONS . . . . . Page 9
- 4.1 MEANS TO PREVENT A RECURRENCE OF THE DISCHARGE OR RELEASE . . . . . Page 9

5 REFERENCE LIST OF SUPPLEMENTAL DOCUMENTS . . . . . Page 10

APPENDIX A PHOTOGRAPH DOCUMENTATION . . . . . Page a-1
APPENDIX B SAMPLING RESULTS FOR PRS 304 . . . . . Page b-1

LIST OF FIGURES

FIGURE 1.1 LOCATION OF PRS 304 2

LIST OF TABLES

TABLE 1 ORGANIZATION OF THE RESPONSE 3
TABLE 2 VERIFICATION SAMPLE RESULTS FOR PRS 304 SOILS 4
TABLE 3 MATERIALS AND DISPOSITION 6
TABLE 4 REMOVAL PROJECT COST SUMMARY 6

EXECUTIVE SUMMARY

This removal action was performed at Potential Release Site 304 (also known as the Excavated Materials Disposal Area and as Rader's Hill) of the Department of Energy's Mound Environmental Management Project site.

PRS 304 contained overburden soils excavated during the decontamination and decommissioning of the Waste Transfer Line (PRS 300) and from Area 12 (PRS 273). Soils from these areas were segregated according to thorium concentration. Soils with thorium concentrations greater than 5 pCi/g were boxed and shipped off-site for disposal; those soils with less than 5 pCi/g of thorium were placed in the area of PRS 304/313. In September 1998, a hot spot of thorium contamination was discovered during routine radiological surveys. The core team decided a removal action was warranted. The objective of the removal action was the excavation and disposal of soil contaminated with more than 3 pCi/g of ^{232}Th or 55 pCi/g of ^{239}Pu. In October and November 1998, approximately 6482 ft^3 of soil were excavated and verification sampling was performed. Verification sampling confirmed the clean up goal was achieved.

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Miamisburg, Ohio

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Chicago, Illinois

Brian Nickel, Project Manager
Ohio EPA
Dayton, Ohio

1 SUMMARY OF EVENTS

1.1 SITE CONDITIONS AND BACKGROUND

The Mound Plant is a 305-acre site on the southern border of the city of Miamisburg in Montgomery County, Ohio. The site is approximately 10 miles south-southwest of Dayton and 45 miles north of Cincinnati. This removal action was performed at Potential Release Site 304 (also known as the Excavated Materials Disposal Area and as Rader's Hill). The location of PRS 304 is shown in Figure 1.1.

PRS 304 consisted of the overburden soils excavated during the decontamination and decommissioning of the Waste Transfer Line (PRS 300) and from Area 12 (PRS 273). Soils from these areas were segregated according to thorium concentration. Soils with thorium concentrations greater than 5 pCi/g were boxed and shipped off-site for disposal; those soils with less than 5 pCi/g of thorium were placed in the area of PRS 304/313.

On February 19, 1997, the Core Team consisting of representatives of DOE/MEMP, USEPA, and OEPA recommended No Further Assessment for PRS 304. This recommendation was available for public review and comment from May 8 to June 16, 1997. In September 1998, a hot spot of thorium contamination was discovered during routine radiological surveys. The DOE is obligated to remove hot spots by its implementing rules and regulations for the Atomic Energy Act. The applicable DOE Order is 5400.5. On October 1, 1998, the Core Team signed the Action Memorandum for PRS 304. This was available for public review and comment from October 1 to October 31, 1998.

Since the DOE is the sole responsible party for the clean up of Mound, no other Potentially Responsible Parties (PRPs) were sought to clean up PRS 304.

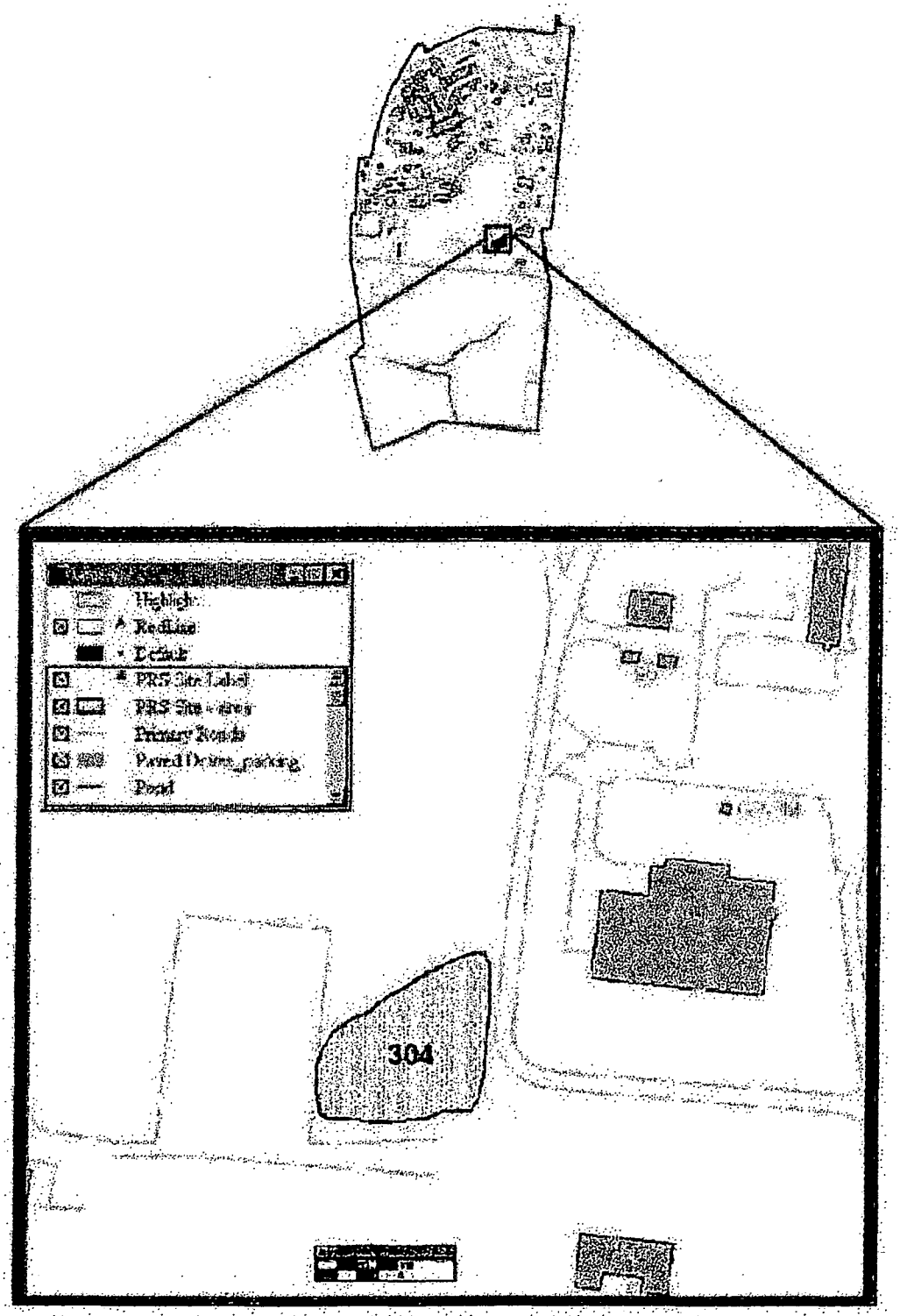


Figure 1.1 Location of PRS 304

1.2 ORGANIZATION OF THE RESPONSE

Table 1 lists the groups responding to this Action, and their responsibilities.

Table 1. Organization of the Response

Agencies or Parties Involved	Contact	Description of Participation
US EPA SRF-5J 77 W. Jackson Blvd. Chicago, IL 60604	Tim Fischer 312-886-5787	Federal agency responsible for response oversight.
Ohio EPA 401 E. Fifth St. Dayton, OH 45402-2911	Brian Nickel 937-285-6468	State agency responsible for response oversight.
DOE-MEMP P.O. Box 66 1 Mound Road Miamisburg, OH 45343-0066	Art Kleinrath 937-865-3597	Lead agency for the response.
BWO 1 Mound Road Miamisburg, OH 45343-3030	John Price 937-865-3954	Performed planning and field work for the response. Provided the OSC with technical assistance, administrative support, photo and site documentation, and preparation of OSC report.

1.3 OBJECTIVES

The Action Memorandum (DOE September, 1998, p 5-2) identified the objective of this removal action as the excavation and disposal at a licensed low level waste disposal facility of soil with contaminant concentrations greater than the clean up objectives (Table 2). The contaminants of concern for soil near PRS 304 were ^{232}Th and ^{238}Pu. The results of verification sampling are included in Appendix B and summarized in Table 2.

Table 2. Verification Sample Results for PRS 304 Soils

Radionuclide	Objective	Verification Sampling Results
^{238}Pu	Not to exceed 55 pCi/g	Did not exceed 2.34 pCi/g.
^{232}Th	Not to exceed 3 pCi/g	Did not exceed 1.09 pCi/g.

1.4 CHRONOLOGICAL NARRATIVE OF RESPONSE ACTIONS

The following is a chronological narrative of events, as they occurred for the PRS 304 Removal Action.

November 1989: Mound Plant is placed on the National Priorities List (NPL).

February 1997: Core team designates PRS 304 for No Further Assessment.

May 1997: The recommendation starts formal public review period.

June 1997: The formal public review period ends.

September 1998: During routine radiological surveys, a thorium hot spot is identified in the vicinity of PRS 304. The core team decides a Removal Action is warranted. An Action Memorandum is written, signed, and sent to public review on October 1, 1998.

October 1998: A Work Plan including the approach to Verification Sampling was prepared and approved by DOE and the regulators. A Health and Safety Plan was prepared and approved by DOE. DOE/OH authorized the field work. On October 20, excavation started. The initial excavation is illustrated in Figure B-1. By October 21, thirteen hauler loads of soil were removed. The first five verification samples were taken (004373, 004374, 004375, 004376, and 004377) The location of these samples is illustrated in Figure B-1 and B-2. These samples were measured at the Mound Soil Screening Lab by gamma-ray spectrometry and at an off-site lab by alpha spectrometry. The measurement results are compiled in

Table B-1. Measurement results reports are also included in Appendix B. On October 21, representatives of DOE/MEMP and OEPA visited the site and identified six additional sampling locations (004378, 004379, 004380, 004381, 004382, and 004383). The location of these samples is illustrated in Figure B-3. These samples were measured at the Mound Soil Screening Lab by gamma-ray spectrometry and the results are included in Table B-1. In addition, four locations were trenched and sampled (004386 through 004400). The trench and sample locations are shown in Figure B-3. The gamma-ray spectrometry results from the Mound Soil Screening Lab are included in Table B-1. In general the excavated soil was returned to the trench locations in approximately the original location. Elevated survey readings were obtained at the center trench (see Figure B-3). Screening results for samples 004396, 004397, 004410, and 00441 confirmed levels above the clean up objective for ^{230}Th of 3 pCi/g. The "Center Trench", "East Pile", and "West Pile" were then excavated on October 26-27, 1998. (See Figure B-3.) Verification samples (004413 and 004416) were taken. The location of these samples is illustrated in Figure B-2 and B-4. These samples were measured at the Mound Soil Screening Lab by gamma-ray spectrometry and an off-site lab by alpha spectrometry. The measurement results are compiled in Table B-1. Measurement results reports are also included in Appendix B. By October 27, the excavation was believed to be complete. Twenty-four hauler loads of soil had been removed. Photographs taken during this removal action are in Appendix A.

November 1998: Results of analysis of verification samples were received from the independent, off-site laboratory (See Appendix B.) One sample exhibited contamination in excess of the clean up objective (sample ID 004416 with 4 pCi/g ^{232}Th). As specified in the Work Plan, this location was excavated further. Approximately 2 ft^3 of additional soil was removed. This location was sampled (Sample ID 004428 and 004429) and the samples analyzed by gamma-ray spectrometry. The results (0.55 pCi/g and 0.52 pCi/g repetitively labeled confirmatory in Table B-1) indicated the ^{232}Th concentration is below the clean up objective.

1.5 RESOURCES COMMITTED

Table 3 summarizes the disposition of materials from PRS 304. The cost summary for the removal action is in Table 4.

Table 3. Materials and Disposition

Waste Type	Volume (cubic f)	Disposal Costs ($)	Destination
Rad debris (concrete & soil)	6482	$53988	Envirocare of Utah
Totals	6482	$53988	

Table 4. Removal Project Cost Summary

Total Clean-up Contractor Costs	$71, 972

2 EFFECTIVENESS OF THE REMOVAL ACTION

2.1 ACTIONS TAKEN BY MOUND PERSONNEL

BWO personnel planned and performed the soil removal, on-site transportation and staging of soil and debris, and site restoration. BWO personnel performed the on-site measurements reported in Appendix B. BWO personnel reviewed these results and the results of the off-site analyses of the Verification samples. As Appendix B indicates, the clean up objectives were met. Table 2 summarizes the clean up goals and the measurement results for the PRS 304 samples. The objectives of the removal action were achieved.

2.2 ACTIONS TAKEN BY LOCAL, STATE, AND FEDERAL AGENCIES

DOE/MEMP was the lead agency for the removal action. US EPA, and OEPA had oversight responsibility for the removal action.

2.3 ACTIONS TAKEN BY CONTRACTORS

Quanterra Environmental Services, Richland Laboratory, performed the analysis of the verification samples.

3 DIFFICULTIES ENCOUNTERED

3.1 ITEMS THAT AFFECTED THE RESPONSE

The extent of soil contamination was uncertain.

The field crew reported that the distribution of contaminated soil encountered was consistent with the distribution of soil by a dump truck. Contamination did not extend below the original surface of the area.

3.2 ISSUES OF INTERGOVERNMENTAL COORDINATION

There were no issues of intergovernmental coordination.

4 RECOMMENDATIONS

4.1 MEANS TO PREVENT A RECURRENCE OF THE DISCHARGE OR RELEASE

This section does not apply at Mound. This removal action was part of the remediation and closure of the Mound Plant.

5 REFERENCE LIST OF SUPPLEMENTAL DOCUMENTS

The following reports and documents are pertinent to the removal action and can be found in the CERCLA public reading room at the Miamisburg Senior Adult Center, 305 Central Avenue, Miamisburg or by contacting Arthur Kleinrath, On-Scene Coordinator PRS 304 Removal Action, at 937-865-3597.

- PRS 304/313 Potential Release Site Package
- Action Memorandum/Removal Site Evaluation, PRS 304 (DOE Final September, 1998)
- PRS 304, Removal Action Work Plan (BWO Final October, 1998)

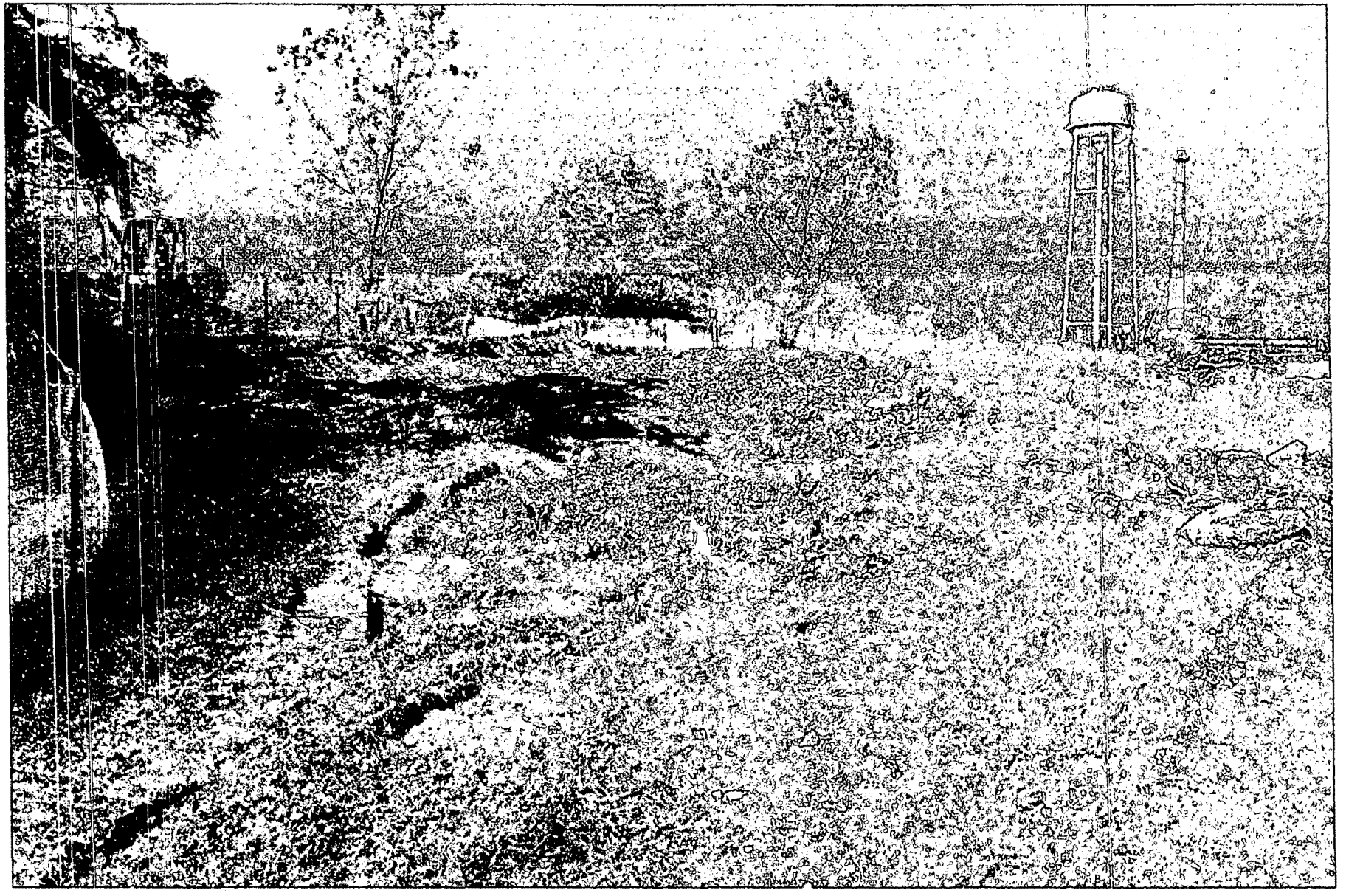
Appendix A

Photographic Documentation

1. PRS 304 prior to excavation, looking northwest, 10/20/98
2. PRS 304 at start of excavation, 10/20/98
3. PRS 304 excavation in progress, looking north, 10/21/98

PRS 304 prior to excavation, looking northwest, 10/20/98

PRS 304 at start of excavation, 10/20/98



PRS 304 excavation in progress, looking north, 10/21/98

Appendix B

Sampling Results For PRS 304

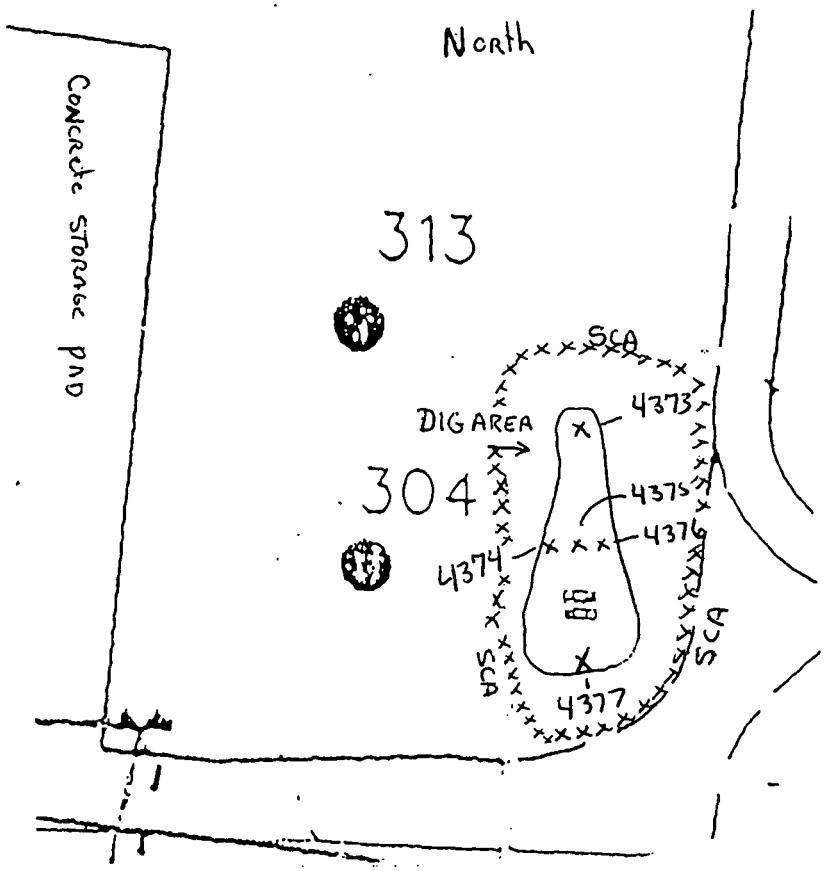
- Figure B-1 Sketch of excavation and verification sample locations (004373 through 004377).
- Figure B-2 Location of verification samples for PRS 304 Removal Action.
- Figure B-3 Sketch of excavation, trenching, and investigatory sampling locations.
- Figure B-4 Sketch of verification (004412 through 004416) and confirmatory (004428 and 004429) locations. "Close-up View" depicts the additional excavation performed around the location of sample 004416.
- Table B-1 Compilation of measurement results.
- Analytical Data Package for verification samples 004373 through 004377.
- Analytical Data Package for verification samples 004413 and 004416 soil screening.
- Confirmatory Measurement Results for samples 004428 and 004429.
- Soil screening measurement results for verification samples 004373 through 004377 and 004413 and 004416.

RADIOLOGICAL SURVEY DATA SHEET

LOCATION: (BLDG./AREA/ROOM) PRS 304 Rader's Hill	SURVEY NO. 98-LS-055
PURPOSE: TAKE 5 VERIFICATION SAMPLES AFTER CLEAN-UP OF CONTAMINATED SOIL	RWP NO. LS-001-98
	DATE: 10-21-98
	TIME: ≅ 1400

MAP/DRAWING

COPY



LEGEND: # = mrem/hr (γ) whole body
E = mrem/hr (β+η+γ) extremity on contact
= mrem/hr neutron
= air sample number
= swipe number
#/α or /β = direct cont. measurement in dpm/100cm²

INSTRUMENTS USED

Instrument	Serial Number	Cal. Due Date
FIDLER	3714 / 3541	N/A
	N/A	

Comp[redacted]	HP# 5520	Date: 10-28-98
Completed By: (Print Name) [redacted]		
Counted by: (Signature)		Date:
Counted by: (Print Name) SEE ATTACHED RESULTS		
[redacted]	HP# 5996	Date: 11-3-98

ML-9620 (2-98)

Figure B-1 Sketch of excavation and verification sample locations (004373 through 004377)

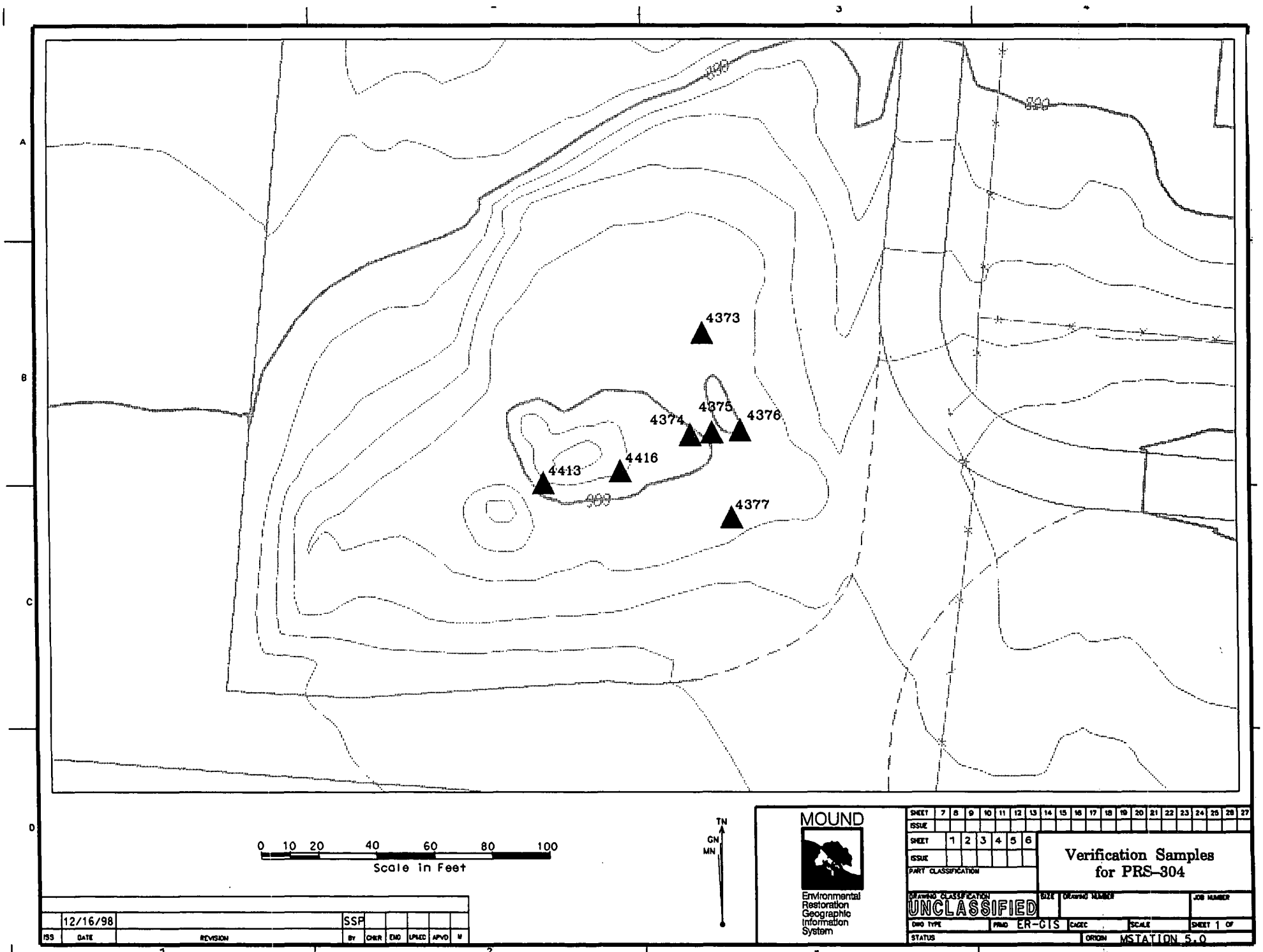


Figure B-2 Location of verification samples for PRS 304 Removal Action.

COPY

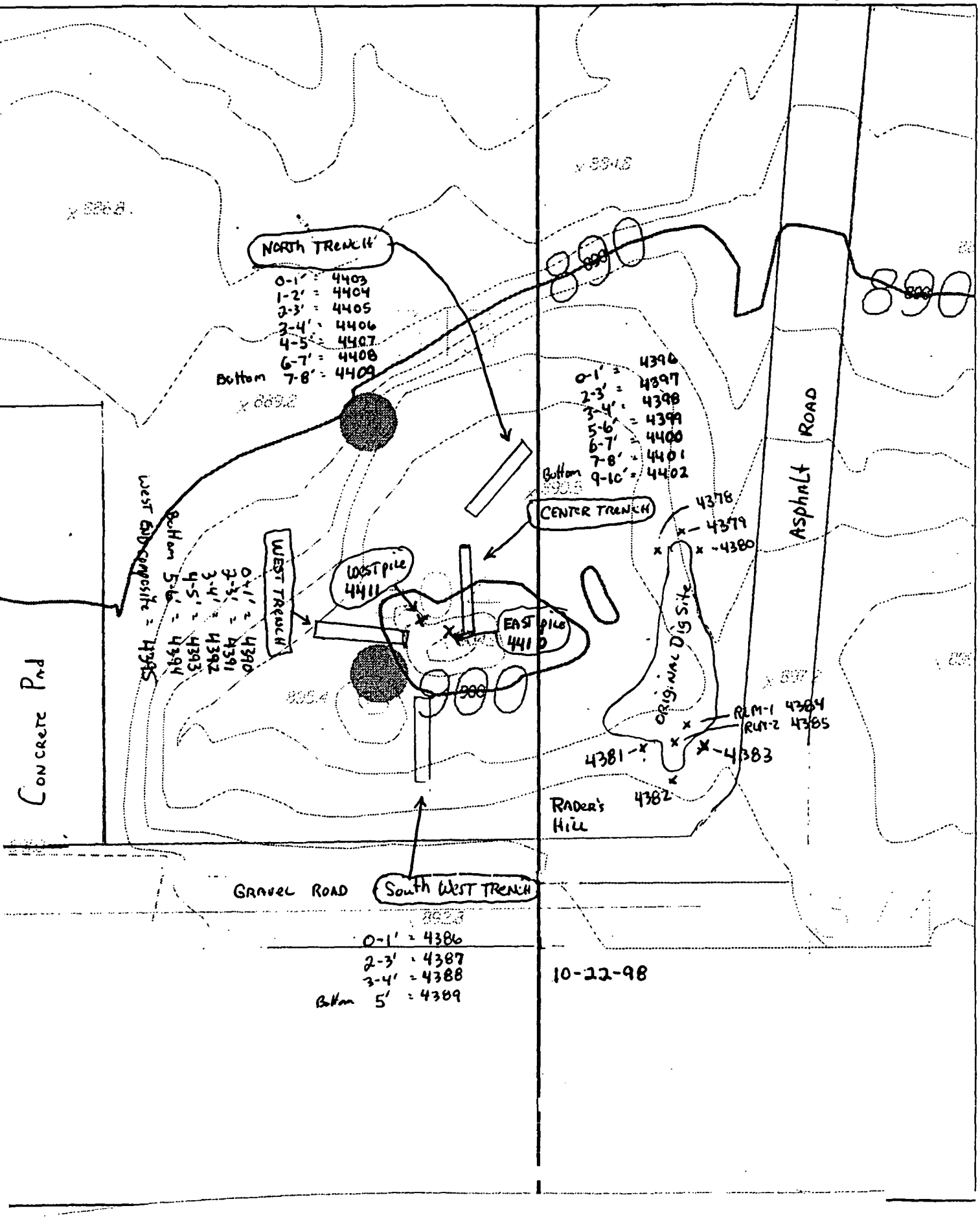


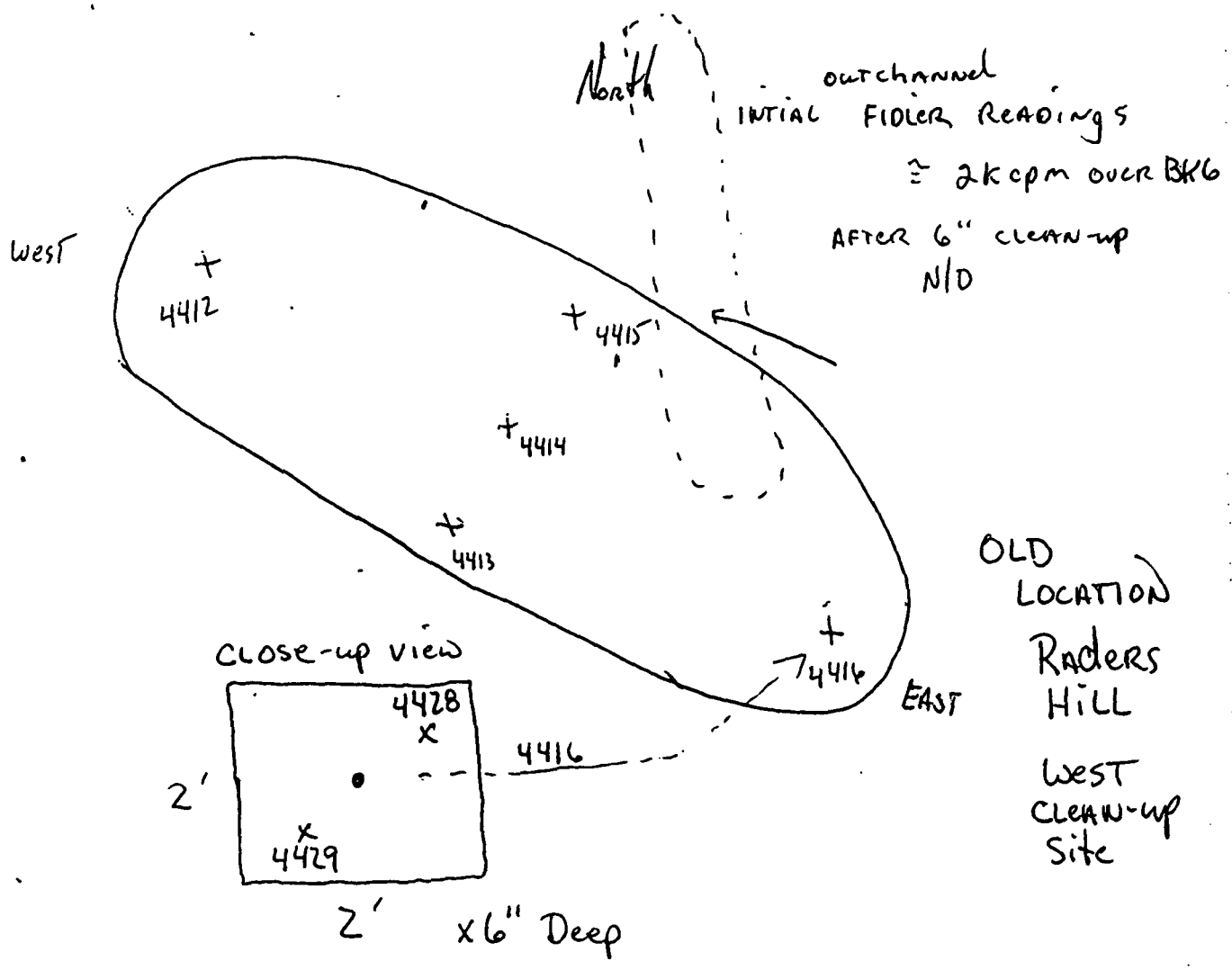
Figure B-3 Sketch of excavation, trenching, and investigatory sampling locations.

RADIOLOGICAL SURVEY DATA SHEET

LOCATION: (BLDG./AREA/ROOM) PRS 304 RADERS HILL	SURVEY NO. 98-LS-076
PURPOSE: Clean-up of Location 4416	RWP NO. LS-001-98
	DATE: 12-3-98
	TIME: 1400 Finished

MAP/DRAWING

COPY



LEGEND: # = mrem/hr (γ) whole body
E = mrem/hr (β+η+γ) extremity on contact
△# = mrem/hr neutron
[#] = air sample number
(#) = swipe number
(#/α) or /β = direct cont. measurement in dpm/100cm²

INSTRUMENTS USED

Instrument	Serial Number	Cal. Due Date
FIDLER	3714 / 3541	N/A

Con[redacted]	HP# 5520	Date: 12-7-98
Comp[redacted]		
Cou[redacted]	HP# 5520	Date: 12-3-98
Contact[redacted]	See ATTACHED FOR Soil Samples	
[redacted]	HP# 5001	Date: 12-7-98

Figure B-4 Sketch of verification (004412 through 004416) and confirmatory (004428 and 004429) locations. "Close-up View" depicts the additional excavation performed around the location of sample 004416.

DATE	Fieldsampid	DESCRIPTION	Comments	CO60	CO60MDA	CS137	CS137MDA	PB210	PB210MDA	RA226	RA226MDA	AC227	AC227MDA	TH230	TH230MDA	TH232	TH232MDA	PU238	PU238MDA	AM241	AM241MDA
10/21/98	004373	PRS304 Sample 1	Investigation	0.05	0.05	0.11	0.05	0.10	0.70	1.32	0.70	0.14	0.20	0.00	6.77	0.66	0.18	8.55	14.50	0.05	0.07
	004373	PRS304 Sample 1 - External Lab	Verification													1.08	0.02	1.04	0.01		
10/21/98	004374	PRS304 Sample 2	Investigation	0.02	0.06	0.03	0.06	0.90	0.59	1.56	0.76	0.00	0.25	1.73	6.18	0.63	0.24	0.00	17.07	0.04	0.07
	004374	PRS304 Sample 2 - External Lab	Verification													0.93	0.03	0.82	0.01		
10/21/98	004375	PRS304 Sample 3	Investigation	0.00	0.09	0.03	0.05	0.46	0.72	2.05	0.73	0.08	0.29	2.24	6.70	0.70	0.20	0.00	16.89	0.04	0.07
	004375	PRS304 Sample 3 - External Lab	Verification													0.74	0.02	0.45	0.02		
10/21/98	004376	PRS304 Sample 4	Investigation	0.03	0.06	0.08	0.05	0.55	0.61	1.78	0.84	0.24	0.32	4.66	6.42	0.75	0.23	6.88	17.19	0.03	0.07
	004376	PRS304 Sample 4 - External Lab	Verification													0.90	0.02	0.36	0.01		
10/21/98	004377	PRS304 Sample 5	Investigation	0.02	0.06	0.07	0.05	0.88	0.48	1.37	0.60	0.14	0.22	0.00	5.91	0.64	0.17	1.99	14.16	0.04	0.05
	004377	PRS304 Sample 5 - External Lab	Verification													1.05	0.02	0.91	0.02		
10/22/98	004378	PRS-304 NORTH #1	Investigation	0.01	0.02	0.12	0.01	1.76	0.24	0.82	0.13	0.03	0.11	2.68	2.28	0.79	0.05	13.96	29.90	0.01	0.03
10/22/98	004379	PRS-304 NORTH #2	Investigation	0.01	0.02	0.09	0.01	1.69	0.23	0.88	0.13	0.04	0.06	0.60	1.91	0.62	0.04	0.00	24.10	0.00	0.02
10/22/98	004380	PRS-304 NORTH #3	Investigation	0.01	0.01	0.07	0.01	1.93	0.27	1.01	0.17	0.09	0.12	0.00	2.89	0.66	0.03	10.74	30.34	0.01	0.03
10/22/98	004381	PRS-304 SOUTH #1	Investigation	0.00	0.11	0.07	0.05	1.31	0.92	2.19	0.82	0.00	0.32	3.24	7.40	0.58	0.30	6.56	18.47	0.04	0.08
10/22/98	004382	PRS-304 SOUTH #2	Investigation	0.00	0.11	0.25	0.06	1.67	0.82	2.39	0.82	0.04	0.27	0.00	9.09	0.55	0.28	0.00	19.60	0.09	0.07
10/22/98	004383	PRS-304 SOUTH #3	Investigation	0.00	0.10	0.07	0.06	0.95	0.78	1.25	0.96	0.14	0.25	3.30	7.35	0.60	0.23	0.00	21.70	0.00	0.09
10/25/98	004384	PRS-304 RLM-1	Investigation	0.00	0.12	0.00	0.08	1.30	0.75	2.66	0.81	0.23	0.25	0.00	9.25	0.96	0.23	5.57	20.05	0.00	0.09
10/25/98	004385	PRS-304 RLM-2	Investigation	0.03	0.06	0.16	0.06	1.50	0.66	2.07	0.79	0.16	0.25	0.00	8.16	0.70	0.22	1.26	18.76	0.05	0.08
10/25/98	004386	PRS-304 S.W. 0-1'	Investigation	0.00	0.09	0.07	0.04	0.91	0.59	1.72	0.67	0.18	0.29	7.51	5.60	0.65	0.16	2.91	14.34	0.00	0.07
10/25/98	004388	PRS-304 S.W. 0-1'	Investigation	0.01	0.02	0.02	0.02	0.70	0.20	1.54	0.23	0.02	0.07	0.93	1.98	0.66	0.07	0.00	5.30	0.00	0.02
10/25/98	004387	PRS-304 S.W. 2-3'	Investigation	0.00	0.08	0.05	0.05	0.45	0.67	1.49	0.76	0.00	0.25	1.69	6.21	0.76	0.21	0.00	15.52	0.00	0.07
10/25/98	004388	PRS-304 S.W. 3-4'	Investigation	0.00	0.09	0.04	0.05	1.12	0.70	1.59	0.88	0.00	0.28	4.44	7.08	0.94	0.18	0.00	19.19	0.00	0.08
10/25/98	004388	PRS-304 SW 3-4'	Investigation	0.00	0.02	0.04	0.02	1.05	0.38	1.22	0.20	0.06	0.10	0.72	3.56	0.93	0.06	0.00	43.30	0.00	0.04
10/25/98	004389	PRS-304 S.W. @ 5' Bottom	Investigation	0.00	0.08	0.04	0.05	1.07	0.62	1.99	0.75	0.23	0.21	0.00	7.42	0.84	0.25	0.00	19.71	0.00	0.08
10/25/98	004390	PRS-304 West #1 @ 0-1'	Investigation	0.02	0.05	0.07	0.04	0.67	0.53	1.37	0.56	0.00	0.21	4.54	4.92	0.81	0.14	2.68	13.24	0.00	0.07
10/25/98	004390	PRS-304 West #1 @ 0-1'	Investigation	0.03	0.04	0.04	0.02	0.29	0.50	0.72	0.35	0.08	0.23	1.28	4.85	0.79	0.10	0.00	56.63	0.01	0.05
10/25/98	004391	PRS-304 West #2 @ 2-3'	Investigation	0.04	0.05	0.02	0.06	0.54	0.59	1.62	0.65	0.00	0.25	0.00	7.09	0.74	0.18	0.00	16.87	0.00	0.07
10/25/98	004392	PRS-304 WEST #3 @ 3 - 4'	Investigation	0.04	0.05	0.04	0.04	0.07	0.64	0.86	0.70	0.06	0.22	0.00	6.74	0.57	0.17	0.00	13.74	0.00	0.06
10/25/98	004393	PRS-304 WEST #4 @ 4-5'	Investigation	0.01	0.06	0.05	0.04	0.49	0.54	1.29	0.63	0.00	0.23	2.00	5.63	0.17	0.24	1.08	13.70	0.01	0.06
10/25/98	004394	PRS-304 WEST #5 @ 5-6'	Investigation	0.00	0.08	0.03	0.05	0.33	0.60	1.26	0.65	0.02	0.22	0.26	5.79	0.61	0.21	4.50	14.50	0.00	0.06
10/25/98	004395	PRS-304 WEST #6 @ COMPOSITE END	Investigation	0.00	0.06	0.01	0.05	0.82	0.47	1.68	0.56	0.00	0.22	2.47	5.17	0.51	0.19	0.00	14.60	0.00	0.07
10/25/98	004396	PRS-304 CENTER @ 0 - 1'	Investigation	0.04	0.06	0.13	0.06	0.00	0.90	0.92	1.13	0.00	0.35	0.00	9.81	3.30	0.21	0.00	23.56	0.10	0.10
10/25/98	004397	PRS-304 CENTER @ 2-3'	Investigation	0.00	0.11	0.06	0.09	0.83	1.02	2.68	1.16	0.05	0.51	5.84	11.80	4.85	0.24	0.00	26.50	0.03	0.12
10/25/98	004397	PRS-304 CENTER @ 2-3'	same sample as above; re-run for lower Th-230 MDA	0.00	0.01	0.09	0.01	0.50	0.36	1.39	0.23	0.11	0.17	2.93	4.41	4.83	0.04	17.22	38.08	0.01	0.05
10/25/98	004398	PRS-304 CENTER @ 3-4'	Investigation	0.00	0.09	0.02	0.06	0.75	0.61	1.39	0.74	0.10	0.23	0.00	7.18	1.14	0.14	0.00	15.51	0.00	0.07
10/25/98	004399	PRS-304 CENTER @ 5-6'	Investigation	0.02	0.08	0.01	0.07	1.45	0.67	1.87	0.95	0.00	0.28	7.05	7.61	0.81	0.25	0.00	23.56	0.07	0.08
10/25/98	004399	PRS-304 CENTER @5-6'	Investigation	0.01	0.03	0.03	0.02	0.83	0.37	1.15	0.21	0.10	0.11	0.86	3.48	0.99	0.07	30.20	37.60	0.00	0.04
10/25/98	004400	PRS-304 CENTER @ 6-7'	Investigation	0.00	0.12	0.00	0.10	0.82	0.80	2.43	0.82	0.00	0.30	0.00	8.99	1.03	0.23	0.33	2.92	0.03	0.09
10/25/98	004401	PRS-304 CENTER @ 7-8'	Investigation	0.00	0.09	0.03	0.06	0.89	0.60	0.61	0.79	0.00	0.24	0.00	6.70	0.71	0.25	12.67	12.73	0.00	0.07
10/25/98	004402	PRS-304 CENTER @ 9-10'	Investigation	0.00	0.08	0.11	0.06	1.44	0.72	2.26	0.84	0.10	0.26	0.56	7.93	0.92	0.18	0.00	18.20	0.00	0.09
10/25/98	004403	PRS-304 NORTH #1 @ 0-1'	Investigation	0.00	0.10	0.04	0.06	0.24	0.77	1.14	0.86	0.23	0.24	0.00	7.47	0.86	0.23	1.60	17.90	0.00	0.08
10/25/98	004404	PRS-304 NORTH #2 @ 1-2'	Investigation	0.03	0.05	0.05	0.05	0.27	0.72	1.81	0.75	0.04	0.23	0.00	6.99	0.82	0.20	1.10	17.40	0.05	0.07
10/26/98	004405	PRS-304 NORTH #3 @ 2-3'	Investigation	0.00	0.09	0.07	0.05	0.74	0.64	1.67	0.68	0.05	0.22	2.65	6.30	0.90	0.22	6.44	15.50	0.00	0.08
10/26/98	004406	PRS-304 NORTH #4 @ 3-4'	Investigation	0.00	0.10	0.00	0.06	0.57	0.55	1.51	0.69	0.00	0.23	3.11	6.40	0.40	0.26	1.49	14.40	0.03	0.06
10/26/98	004407	PRS-304 NORTH #5 @ 4-5'	Investigation	0.02	0.07	0.01	0.06	0.52	0.61	1.67	0.66	0.00	0.28	3.02	6.00	0.61	0.22	0.00	15.96	0.03	0.06
10/27/98	004408	PRS-304 NORTH #6 @ 6-7'	Investigation	0.00	0.07	0.04	0.05	0.72	0.51	1.11	0.68	0.16	0.18	0.00	6.25	0.32	0.22	5.18	12.54	0.02	0.06
10/27/98	004409	PRS-304 NORTH #7 @ 7-8'	Investigation	0.05	0.06	0.18	0.06	1.62	0.68	1.92	0.78	0.00	0.29	2.75	6.87	0.68	0.20	0.10	17.20	0.00	0.08
10/27/98	004410	PRS-304 EAST DIRTPILE	Investigation	0.10	0.10	0.10	0.12	0.42	1.48	3.39	1.74	0.29	0.55	1.53	17.80	11.90	0.37	0.00	33.60	0.10	0.18
10/27/98	004411	PRS-304 WEST DIRTPILE	Investigation	0.00	0.12	0.07	0.10	0.62	1.18	1.18	1.46	0.07	0.45	0.00	14.00	6.40	0.32	0.00	31.60	0.20	0.13
10/27/98	004412	PRS-304 West Verification	Investigation	0.01	0.03	0.11	0.02	0.62	0.52	0.82	0.27	0.26	0.13	2.04	4.81	0.99	0.09	38.08	50.70	0.00	0.06
10/27/98	004413	PRS-304 West Verification	Investigation	0.02	0.04	0.05	0.02	0.61	0.44	0.94	0.30	0.31	0.26	1.65	4.54	1.18	0.10	1.53	40.21	0.01	0.05
	004413	PRS-304 West Verification - External Lab	Verification													1.09	0.02	0.97	0.01		
10/27/98	004414	PRS304-west verification	Investigation	0.00	0.09	0.03	0.05	0.56	0.64	1.54	0.72	0.00	0.25	0.96	6.36	0.67	0.21	2.53	16.65	0.01	0.07
10/27/98	004415	PRS304-west verification	Investigation	0.03	0.08	0.16	0.06	0.13	0.81	0.91	1.04	0.00	0.32	6.91	8.08	1.60	0.17	2.74	20.95	0.02	0.09
10/27/98	004416	PRS-304 West Verification	Investigation	0.03	0.03	0.05	0.04	0.61	0.79	1.11	0.52	0.47	0.26	0.00	9.57	2.66	0.10	0.00	89.86	0.09	0.09
	004416	PRS-304 West Verification - External Lab	Verification*													4.04	0.03	2.34	0.08		
12/3/98	004428	PRS-304 West Verification former 004416	Confirmation	0.05	0.02	0.04	0.02	0.00	0.35	1.61	0.34	0.00	0.17	2.69	3.45	0.55	0.06	0.00	10.11	0.00	0.04
12/3/98	004429	PRS-304 West Verificationformat 004416	Confirmation	0.02	0.02	0.04	0.01	0.28	0.19	1.13	0.22	0.05	0.06	0.36	1.60	0.52	0.05	2.46	4.26	0.00	0.02
		Clean-up Objective per Action Memo														3	Not to exceed	55	Not to exceed		
		Risk Based Guideline Value Table 4B (10-6 Risk)		0.1		0.46		N/A		0.14		1		44						4.95	
		Risk Based Guideline Value Table 4B (10-5 Risk)		1		4.6				1.4		10		440						49.5	
		Background Values				0.42				2		1.9				1.4		0.13			

*Since this sample (004416) exceeded the cleanup objective, additional excavation was performed at this location. This sample is not part of the final verification set.

Table B-1 Compilation of measurement results.

Analytical Data Package Prepared For

WESTON

Radiochemical Analysis By

Quanterra Environmental Services
Richland Laboratory

Report Nbr: 6457

SDG Nbr	ORDER Nbr	CLIENT ID NUMBER	QUANTERRA ID NUMBER
11141		004373	81050101
		004374	81050102
		004375	81050103
		004376	81050104
		004377	81050105

Analytical Data Package for verification samples 004373 through 004377.

0001

Comments:

FORM I

Date: 11/17/98

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG:	11141	COLLECTION DATE:	10/21/98 9:20:00 AM
LAB SAMPLE ID:	81050101	REPORT NBR:	6457	RECEIVED DATE:	10/26/98 10:30:00 AM
CLIENT ID:	004373	ORDER NBR:		MATRIX:	SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-228	1.18E+00	1.7E-01	2.3E-01	5.82E-02	pCi/g	90.90%	(20.3)	(7.1)	11/12/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-230	1.62E+00	1.9E-01	2.8E-01	2.59E-02	pCi/g	90.90%	(62.4)	(8.4)	11/12/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-232	1.08E+00	1.6E-01	2.1E-01	2.28E-02	pCi/g	90.90%	(47.2)	(6.9)	11/12/98	2.0	G	ALPHA-SPEC	RICHRC5011
U-234	9.08E-01	1.3E-01	1.9E-01	2.73E-02	pCi/g	86.40%	(33.2)	(6.8)	11/11/98	2.01	G	ALPHA-SPEC	RICHRC5030
U-235	2.38E-02	2.2E-02	2.2E-02	1.95E-02	pCi/g	86.40%	(1.2)	(1.1)	11/11/98	2.01	G	ALPHA-SPEC	RICHRC5030
U-238	1.01E+00	1.4E-01	2.1E-01	2.41E-02	pCi/g	86.40%	(41.7)	(7.2)	11/11/98	2.01	G	ALPHA-SPEC	RICHRC5030
PU-238	1.04E+00	1.1E-01	1.5E-01	1.43E-02	pCi/g	77.20%	(72.9)	(9.3)	11/9/98	1.09	G	ALPHA-SPEC	RICHRC5010
PU239/40	1.89E-02U	1.4E-02	1.4E-02	1.89E-02	pCi/g	77.20%	0.7	0.97	11/9/98	1.09	G	ALPHA-SPEC	RICHRC5010
AM-241	1.53E-01U	1.0E-01	1.0E-01	1.53E-01	pCi/g	N/A	-0.37	-0.56	11/12/98	290.2	G	GAMMA	RICHRC5017
BI-207	7.13E-02U	4.2E-02	4.2E-02	7.13E-02	pCi/g	N/A	-0.38	-0.65	11/12/98	290.2	G	GAMMA	RICHRC5017
BI-210M	1.33E-01U	7.3E-02	7.3E-02	1.33E-01	pCi/g	N/A	0.21	0.38	11/12/98	290.2	G	GAMMA	RICHRC5017
CO-60	1.22E-01U	6.3E-02	6.3E-02	1.22E-01	pCi/g	N/A	0.07	0.14	11/12/98	290.2	G	GAMMA	RICHRC5017
CS-137	1.22E-01U	6.2E-02	6.2E-02	1.22E-01	pCi/g	N/A	0.49	0.96	11/12/98	290.2	G	GAMMA	RICHRC5017
K-40	1.86E+01	3.0E+00	3.0E+00	7.66E-01	pCi/g	N/A	(24.3)	(6.3)	11/12/98	290.2	G	GAMMA	RICHRC5017
RA-226	7.89E-01	2.3E-01	2.3E-01	3.83E-01	pCi/g	N/A	(2.1)	(3.4)	11/12/98	290.2	G	GAMMA	RICHRC5017
TRITIUM	4.38E-02	1.7E-02	2.4E-02	3.30E-02	pCi/g	88.10%	(1.3)	(2.6)	11/6/98	100.27	G	LSC	RICHRC5037

Number of Results: 16

0007

Comments:

Analytical Data Package for verification samples 004373 through 004377.

FORM I

Date: 11/17/98

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG:	11141	COLLECTION DATE:	10/21/98 9:20:00 AM
LAB SAMPLE ID:	81050102	REPORT NBR:	6457	RECEIVED DATE:	10/26/98 10:30:00 AM
CLIENT ID:	004374	ORDER NBR:		MATRIX:	SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-228	1.00E+00	1.7E-01	2.2E-01	7.42E-02	pCi/g	88.20%	(13.5)	(6.)	11/12/98	1.98	G	ALPHA-SPEC	RICHRC5011
TH-230	1.04E+00	1.7E-01	2.2E-01	1.82E-02	pCi/g	88.20%	(57.3)	(6.2)	11/12/98	1.98	G	ALPHA-SPEC	RICHRC5011
TH-232	9.25E-01	1.6E-01	2.0E-01	3.07E-02	pCi/g	88.20%	(30.2)	(5.9)	11/12/98	1.98	G	ALPHA-SPEC	RICHRC5011
U-234	6.87E-01	1.1E-01	1.5E-01	2.65E-02	pCi/g	96.90%	(25.9)	(6.3)	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
U-235	6.36E-02	3.3E-02	3.5E-02	1.96E-02	pCi/g	96.90%	(3.2)	(1.9)	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
U-238	7.75E-01	1.2E-01	1.6E-01	1.96E-02	pCi/g	96.90%	(39.6)	(6.7)	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
PU-238	8.19E-01	1.0E-01	1.3E-01	8.62E-03	pCi/g	72.50%	(95.)	(8.)	11/9/98	1.03	G	ALPHA-SPEC	RICHRC5010
PU239/40	1.52E-02U	1.1E-02	1.1E-02	1.52E-02	pCi/g	72.50%	0.58	0.8	11/9/98	1.03	G	ALPHA-SPEC	RICHRC5010
AM-241	3.01E-01U	1.7E-01	1.7E-01	3.01E-01	pCi/g	N/A	0.55	0.99	11/12/98	258.4	G	GAMMA	RICHRC5017
BI-207	6.82E-02U	3.9E-02	3.9E-02	6.82E-02	pCi/g	N/A	-0.17	-0.3	11/12/98	258.4	G	GAMMA	RICHRC5017
BI-210M	1.13E-01U	6.3E-02	6.3E-02	1.13E-01	pCi/g	N/A	0.01	0.01	11/12/98	258.4	G	GAMMA	RICHRC5017
CO-60	9.42E-02U	5.0E-02	5.0E-02	9.42E-02	pCi/g	N/A	-0.09	-0.16	11/12/98	258.4	G	GAMMA	RICHRC5017
CS-137	1.16E-01U	6.1E-02	6.1E-02	1.16E-01	pCi/g	N/A	0.29	0.55	11/12/98	258.4	G	GAMMA	RICHRC5017
K-40	1.82E+01	3.1E+00	3.1E+00	1.08E+00	pCi/g	N/A	(16.9)	(5.9)	11/12/98	258.4	G	GAMMA	RICHRC5017
RA-226	7.12E-01	2.2E-01	2.2E-01	3.72E-01	pCi/g	N/A	(1.9)	(3.3)	11/12/98	258.4	G	GAMMA	RICHRC5017
TRITIUM	3.30E-02U	1.6E-02	2.3E-02	3.30E-02	pCi/g	88.10%	0.82	(1.7)	11/6/98	100.11	G	LSC	RICHRC5037

Number of Results: 16

0008

Comments:

Analytical Data Package for verification samples 004373 through 004377.

FORM I

Date: 11/17/98

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG:	11141	COLLECTION DATE:	10/21/98 10:00:00 AM
LAB SAMPLE ID:	81050103	REPORT NBR:	6457	RECEIVED DATE:	10/26/98 10:30:00 AM
CLIENT ID:	004375	ORDER NBR:		MATRIX:	SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-228	9.58E-01	1.6E-01	2.1E-01	6.83E-02	pCi/g	81.80%	(14.)	(5.9)	11/12/98	1.99	G	ALPHA-SPEC	RICHRC5011
TH-230	8.95E-01	1.5E-01	2.0E-01	1.78E-02	pCi/g	81.80%	(50.3)	(5.8)	11/12/98	1.99	G	ALPHA-SPEC	RICHRC5011
TH-232	7.44E-01	1.4E-01	1.7E-01	1.78E-02	pCi/g	81.80%	(41.8)	(5.3)	11/12/98	1.99	G	ALPHA-SPEC	RICHRC5011
U-234	7.90E-01	1.2E-01	1.7E-01	2.44E-02	pCi/g	88.00%	(32.4)	(6.4)	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
U-235	2.90E-02U	2.2E-02	2.2E-02	2.90E-02	pCi/g	88.00%	0.76	(1.)	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
U-238	8.72E-01	1.3E-01	1.9E-01	2.90E-02	pCi/g	88.00%	(30.1)	(6.7)	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
PU-238	4.49E-01	7.1E-02	8.2E-02	1.60E-02	pCi/g	79.20%	(28.1)	(6.3)	11/9/98	1.09	G	ALPHA-SPEC	RICHRC5010
PU239/40	1.60E-02U	1.6E-03	1.6E-03	1.60E-02	pCi/g	79.20%	-0.07	-0.71	11/9/98	1.09	G	ALPHA-SPEC	RICHRC5010
AM-241	1.48E-01U	9.3E-02	9.3E-02	1:48E-01	pCi/g	N/A	0.76	(1.2)	11/12/98	311.1	G	GAMMA	RICHRC5017
BI-207	7.80E-02U	3.9E-02	3.9E-02	7.80E-02	pCi/g	N/A	0.37	0.73	11/12/98	311.1	G	GAMMA	RICHRC5017
BI-210M	9.68E-02U	6.1E-02	6.1E-02	9.68E-02	pCi/g	N/A	-0.77	-(1.2)	11/12/98	311.1	G	GAMMA	RICHRC5017
CO-60	9.18E-02U	4.9E-02	4.9E-02	9.18E-02	pCi/g	N/A	-0.09	-0.17	11/12/98	311.1	G	GAMMA	RICHRC5017
CS-137	1.07E-01U	5.4E-02	5.4E-02	1.07E-01	pCi/g	N/A	0.48	0.95	11/12/98	311.1	G	GAMMA	RICHRC5017
K-40	2.10E+01	3.0E+00	3.0E+00	6.88E-01	pCi/g	N/A	(30.6)	(6.9)	11/12/98	311.1	G	GAMMA	RICHRC5017
RA-226	8.00E-01	1.8E-01	1.8E-01	1.47E-01	pCi/g	N/A	(5.5)	(4.4)	11/12/98	311.1	G	GAMMA	RICHRC5017
TRITIUM	3.30E-02U	1.6E-02	2.4E-02	3.30E-02	pCi/g	88.10%	0.79	(1.7)	11/6/98	100.8	G	LSC	RICHRC5037

mber of Results: 16

0009

ments:

Analytical Data Package for verification samples 004373 through 004377.
(Continued)

FORM I

Date: 11/17/98

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG:	11141	COLLECTION DATE:	10/21/98 10:00:00 AM
LAB SAMPLE ID:	8-1050104	REPORT NBR:	6457	RECEIVED DATE:	10/26/98 10:30:00 AM
CLIENT ID:	004376	ORDER NBR:		MATRIX:	SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-228	9.08E-01	1.5E-01	1.9E-01	5.70E-02	pCi/g	91.20%	(15.9)	(6.)	11/12/98	1.99	G	ALPHA-SPEC	RICHRC5011
TH-230	1.09E+00	1.6E-01	2.2E-01	2.41E-02	pCi/g	91.20%	(45.2)	(6.7)	11/12/98	1.99	G	ALPHA-SPEC	RICHRC5011
TH-232	8.95E-01	1.5E-01	1.9E-01	1.62E-02	pCi/g	91.20%	(55.1)	(6.1)	11/12/98	1.99	G	ALPHA-SPEC	RICHRC5011
U-234	8.10E-01	1.2E-01	1.8E-01	2.91E-02	pCi/g	89.10%	(27.9)	(6.6)	11/11/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-235	2.71E-02	2.3E-02	2.3E-02	2.34E-02	pCi/g	89.10%	(1.2)	(1.2)	11/11/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-238	7.54E-01	1.2E-01	1.7E-01	4.71E-02	pCi/g	89.10%	(16.)	(6.3)	11/11/98	2.0	G	ALPHA-SPEC	RICHRC5030
PU-238	3.60E-01	6.9E-02	7.6E-02	8.86E-03	pCi/g	80.30%	(40.7)	(5.2)	11/9/98	1.0	G	ALPHA-SPEC	RICHRC5010
PU239/40	1.96E-02	1.6E-02	1.6E-02	8.86E-03	pCi/g	80.30%	(2.2)	(1.2)	11/9/98	1.0	G	ALPHA-SPEC	RICHRC5010
AM-241	2.87E-01U	1.7E-01	1.7E-01	2.87E-01	pCi/g	N/A	0.03	0.05	11/12/98	259.1	G	GAMMA	RICHRC5017
BI-207	6.82E-02U	4.2E-02	4.2E-02	6.82E-02	pCi/g	N/A	-0.47	-0.77	11/12/98	259.1	G	GAMMA	RICHRC5017
BI-210M	1.22E-01U	6.8E-02	6.8E-02	1.22E-01	pCi/g	N/A	0.02	0.04	11/12/98	259.1	G	GAMMA	RICHRC5017
CO-60	1.01E-01U	4.7E-02	4.7E-02	1.01E-01	pCi/g	N/A	0.19	0.39	11/12/98	259.1	G	GAMMA	RICHRC5017
CS-137	1.05E-01U	5.6E-02	5.6E-02	1.05E-01	pCi/g	N/A	0.18	0.34	11/12/98	259.1	G	GAMMA	RICHRC5017
K-40	1.61E+01	2.8E+00	2.8E+00	8.06E-01	pCi/g	N/A	(20.)	(5.7)	11/12/98	259.1	G	GAMMA	RICHRC5017
RA-226	5.99E-01	1.9E-01	1.9E-01	3.54E-01	pCi/g	N/A	(1.7)	(3.1)	11/12/98	259.1	G	GAMMA	RICHRC5017
TRITIUM	3.30E-02U	1.6E-02	2.3E-02	3.30E-02	pCi/g	88.10%	0.85	(1.8)	11/6/98	100.5	G	LSC	RICHRC5037

Number of Results: 16

Comments:

Analytical Data Package for verification samples 004373 through 004377.

FORM I

Date: 11/17/98

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG:	11141	COLLECTION DATE:	10/21/98 10:00:00 AM
LAB SAMPLE ID:	81050105	REPORT NBR:	6457	RECEIVED DATE:	10/26/98 10:30:00 AM
CLIENT ID:	004377	ORDER NBR:		MATRIX:	SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-228	1.05E+00	1.6E-01	2.1E-01	5.73E-02	pCi/g	92.30%	(18.4)	(6.5)	11/12/98	1.99	G	ALPHA-SPEC	RICHRC5011
TH-230	1.05E+00	1.6E-01	2.1E-01	1.61E-02	pCi/g	92.30%	(65.)	(6.6)	11/12/98	1.99	G	ALPHA-SPEC	RICHRC5011
TH-232	1.05E+00	1.6E-01	2.1E-01	1.61E-02	pCi/g	92.30%	(65.4)	(6.7)	11/12/98	1.99	G	ALPHA-SPEC	RICHRC5011
U-234	7.44E-01	1.5E-01	2.0E-01	3.37E-02	pCi/g	56.90%	(22.1)	(5.)	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
U-235	4.42E-02	3.6E-02	3.7E-02	2.00E-02	pCi/g	56.90%	(2.2)	(1.2)	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
U-238	7.37E-01	1.5E-01	2.0E-01	2.00E-02	pCi/g	56.90%	(37.)	(5.)	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
PU-238	9.07E-01	1.1E-01	1.3E-01	1.48E-02	pCi/g	82.50%	(61.4)	(8.6)	11/9/98	1.05	G	ALPHA-SPEC	RICHRC5010
PU239/40	1.23E-02	1.2E-02	1.2E-02	8.35E-03	pCi/g	82.50%	(1.5)	1.	11/9/98	1.05	G	ALPHA-SPEC	RICHRC5010
AM-241	1.90E-01U	1.1E-01	1.1E-01	1.90E-01	pCi/g	N/A	0.03	0.06	11/12/98	234.3	G	GAMMA	RICHRC5017
BI-207	9.01E-02U	5.1E-02	5.1E-02	9.01E-02	pCi/g	N/A	-0.22	-0.39	11/12/98	234.3	G	GAMMA	RICHRC5017
BI-210M	1.34E-01U	7.9E-02	7.9E-02	1.34E-01	pCi/g	N/A	-0.35	-0.6	11/12/98	234.3	G	GAMMA	RICHRC5017
CO-60	1.22E-01U	7.5E-02	7.5E-02	1.22E-01	pCi/g	N/A	-0.45	-0.73	11/12/98	234.3	G	GAMMA	RICHRC5017
CS-137	1.29E-01U	6.5E-02	6.5E-02	1.29E-01	pCi/g	N/A	0.39	0.77	11/12/98	234.3	G	GAMMA	RICHRC5017
K-40	2.12E+01	3.4E+00	3.4E+00	5.20E+00	pCi/g	N/A	(4.1)	(6.3)	11/12/98	234.3	G	GAMMA	RICHRC5017
RA-226	1.01E+00	2.3E-01	2.3E-01	4.44E-01	pCi/g	N/A	(2.3)	(4.4)	11/12/98	234.3	G	GAMMA	RICHRC5017
TRITIUM	3.87E-02	1.8E-02	2.6E-02	3.30E-02	pCi/g	88.10%	(1.2)	(2.2)	11/6/98	100.25	G	LSC	RICHRC5037

mber of Results: 16

00111

mments:

Analytical Data Package for verification samples 004373 through 004377.

FORM II

DUPLICATE RESULTS

Date: 11/17/98

LAB NAME: QUANTERRA, Richland
SDG: 11141
COLLECTION DATE: 10/21/98 9:20:00 AM
LAB SA ID/ORIG ID: D1050101 / 81050101
REPORT NBR: 6457
RECEIVED DATE: 10/26/98 10:30:00 AM
CLIENT ID: 004373
ORDER NBR:
MATRIX: SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	ORIG RESULT	RPD	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-228	9.84E-01	1.6E-01	2.0E-01	5.95E-02	pCi/g	92.70%	1.18E+00	18.13%	11/12/98	1.98	G	ALPHA-SPEC	RICHRC5011
TH-230	1.81E+00	2.1E-01	3.2E-01	1.65E-02	pCi/g	92.70%	1.62E+00	11.41%	11/12/98	1.98	G	ALPHA-SPEC	RICHRC5011
TH-232	1.26E+00	1.8E-01	2.4E-01	2.45E-02	pCi/g	92.70%	1.08E+00	15.30%	11/12/98	1.98	G	ALPHA-SPEC	RICHRC5011
U-234	7.77E-01	1.1E-01	1.6E-01	2.17E-02	pCi/g	101.80%	9.08E-01	15.60%	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
U-235	3.23E-02	2.3E-02	2.4E-02	1.64E-02	pCi/g	101.80%	2.38E-02	30.12%	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
U-238	8.47E-01	1.2E-01	1.7E-01	3.04E-02	pCi/g	101.80%	1.01E+00	17.12%	11/11/98	1.99	G	ALPHA-SPEC	RICHRC5030
PU-238	1.58E+00	1.4E-01	2.0E-01	1.69E-02	pCi/g	83.70%	1.04E+00	40.91%	11/9/98	1.01	G	ALPHA-SPEC	RICHRC5010
PU239/40	1.43E-02U	1.2E-02	1.2E-02	1.43E-02	pCi/g	83.70%	1.31E-02	14.34%	11/9/98	1.01	G	ALPHA-SPEC	RICHRC5010
AM-241	2.36E-01U	1.4E-01	1.4E-01	2.36E-01	pCi/g	N/A	-5.71E-02	51.27%	11/12/98	290.2	G	GAMMA	RICHRC5017
BI-207	6.24E-02U	3.1E-02	3.1E-02	6.24E-02	pCi/g	N/A	-2.71E-02	859.12%	11/12/98	290.2	G	GAMMA	RICHRC5017
BI-210M	1.11E-01U	6.5E-02	6.5E-02	1.11E-01	pCi/g	N/A	2.80E-02	13189.51%	11/12/98	290.2	G	GAMMA	RICHRC5017
CO-60	9.37E-02U	4.5E-02	4.5E-02	9.37E-02	pCi/g	N/A	9.03E-03	58.35%	11/12/98	290.2	G	GAMMA	RICHRC5017
CS-137	8.35E-02	5.0E-02	5.0E-02	7.45E-02	pCi/g	N/A	5.90E-02	34.42%	11/12/98	290.2	G	GAMMA	RICHRC5017
K-40	1.73E+01	2.7E+00	2.7E+00	7.19E-01	pCi/g	N/A	1.86E+01	7.43%	11/12/98	290.2	G	GAMMA	RICHRC5017
RA-226	6.31E-01	2.2E-01	2.2E-01	3.49E-01	pCi/g	N/A	7.89E-01	22.28%	11/12/98	290.2	G	GAMMA	RICHRC5017

mber of Results: 15

Comments:

Analytical Data Package for verification samples 004373 through 004377

FORM II

DUPLICATE RESULTS

Date: 11/17/98

LAB NAME:	QUANTERRA, Richland	SDG:	11141	COLLECTION DATE:	10/21/98 10:00:00 AM
LAB SA ID/ORIG ID:	D1050105 / 81050105	REPORT NBR:	6457	RECEIVED DATE:	10/26/98 10:30:00 AM
CLIENT ID:	004377	ORDER NBR:		MATRIX:	SOIL

SOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	ORIG RESULT	RPD	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TRITIUM	3.30E-02U	1.8E-02	2.6E-02	3.30E-02	pCi/g	88.10%	3.87E-02	20.49%	11/6/98	100.27	G	LSC	RICHRC5037

umber of Results: 1

Analytical Data Package for verification samples 004373 through 004377.

0013

mments:

FORM II

Date: 11/17/98

BLANK RESULTS

LAB NAME: QUANTERRA, Richland SDG: 11141 ORDER NBR:

LAB SAMPLE ID: J105011B REPORT NBR: 6457 MATRIX: SOIL

SOTOPE	RESULT	COUNTING ERROR (s)	TOTAL ERROR (s)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-228	4.18E-02U	1.4E-02	1.4E-02	4.18E-02	pCi/g	78.10%	0.07	0.22	11/12/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-230	2.69E-02U	1.3E-02	1.3E-02	2.69E-02	pCi/g	78.10%	0.23	0.46	11/12/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-232	2.69E-02U	1.1E-03	1.1E-03	2.69E-02	pCi/g	78.10%	-0.02	-0.5	11/12/98	2.0	G	ALPHA-SPEC	RICHRC5011
U-234	3.42E-02U	1.6E-02	1.7E-02	3.42E-02	pCi/g	79.80%	0.26	0.53	11/11/98	2.0	G	ALPHA- SPEC	RICHRC5030
U-235	3.71E-02U	2.6E-03	2.7E-03	3.71E-02	pCi/g	79.80%	-0.1	-(1.4)	11/11/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-238	3.08E-02U	1.8E-03	1.9E-03	3.08E-02	pCi/g	79.80%	-0.06	-(1.)	11/11/98	2.0	G	ALPHA-SPEC	RICHRC5030
PU-238	2.36E-02U	2.4E-03	2.4E-03	2.36E-02	pCi/g	78.90%	-0.07	-0.71	11/9/98	1.0	G	ALPHA-SPEC	RICHRC5010
PU239/40	2.36E-02U	2.4E-03	2.4E-03	2.36E-02	pCi/g	78.90%	-0.07	-0.71	11/9/98	1.0	G	ALPHA-SPEC	RICHRC5010
TRITIUM	3.30E-02U	1.3E-01	2.1E-01	3.30E-02	pCi/g	88.10%	-(2.1)	-0.53	11/6/98	10.0	G	LS-C	RICHRC5037

nber of Results: 9

ents:

0014

Analytical Data Package for verification samples 004373 through 004377.

FORM II

Date: 11/17/98

BLANK RESULTS

LAB NAME: QUANTERRA, Richland SDG: 11141 ORDER NBR:

LAB SAMPLE ID: J105011X REPORT NBR: 6457 MATRIX: SOIL

ISOTOPE	RESULT	COUNTING ERROR (s)	TOTAL ERROR (s)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
AM-241	6.60E-02U	4.3E-02	4.3E-02	6.60E-02	pCi/g	N/A	-0.14	-0.21	11/12/98	348.0	G	GAMMA	RICHRC5017
BI-207	5.28E-02U	2.3E-02	2.3E-02	5.28E-02	pCi/g	N/A	0.55	(1.3)	11/12/98	348.0	G	GAMMA	RICHRC5017
BI-210M	7.09E-02U	3.8E-02	3.8E-02	7.09E-02	pCi/g	N/A	0.09	0.17	11/12/98	348.0	G	GAMMA	RICHRC5017
CO-60	7.06E-02U	3.3E-02	3.3E-02	7.06E-02	pCi/g	N/A	0.11	0.24	11/12/98	348.0	G	GAMMA	RICHRC5017
CS-137	5.07E-02U	2.9E-02	2.9E-02	5.07E-02	pCi/g	N/A	-0.3	-0.52	11/12/98	348.0	G	GAMMA	RICHRC5017
K-40	1.50E+00U	6.2E-01	6.2E-01	1.50E+00	pCi/g	N/A	0.15	0.36	11/12/98	348.0	G	GAMMA	RICHRC5017
RA-226	1.55E-01U	7.5E-02	7.5E-02	1.55E-01	pCi/g	N/A	0.32	0.66	11/12/98	348.0	G	GAMMA	RICHRC5017

Number of Results: 7

Comments:

Analytical Data Package for verification samples 004373 through 004377.

FORM II

Date: 11/17/98

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: 11141 ORDER NBR:

LAB SAMPLE ID: J105011M REPORT NBR: 6457 MATRIX: SOIL

SOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	Expected	Expected Uncert	Recovery	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
CS-137	2.60E-01	1.0E-01	1.0E-01	1.17E-01	pCi/g	N/A	3.16E-01	0.0E+00	82.18%	11/12/98	200.01	G	GAMMA	RICHRC5017
K-40	1.62E+01	3.1E+00	3.1E+00	6.91E-01	pCi/g	N/A	1.95E+01	0.0E+00	82.85%	11/12/98	200.01	G	GAMMA	RICHRC5017
RA-226	1.05E+00	2.6E-01	2.6E-01	4.80E-01	pCi/g	N/A	1.15E+00	0.0E+00	91.14%	11/12/98	200.01	G	GAMMA	RICHRC5017
RA-228	2.18E+00	5.6E-01	5.6E-01	4.03E-01	pCi/g	N/A	1.87E+00	0.0E+00	116.30%	11/12/98	200.01	G	GAMMA	RICHRC5017
U-238	3.72E+00U	2.2E+00	2.2E+00	3.72E+00	pCi/g	N/A	1.05E+00	0.0E+00	50.35%	11/12/98	200.01	G	GAMMA	RICHRC5017

mber of Results: 5

Analytical Data Package for verification samples 004373 through 004377.

Comments:

FORM II

Date: 11/17/98

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: 11141 ORDER NBR:

LAB SAMPLE ID: J105011S REPORT NBR: 6457 MATRIX: SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	Expected	Expected Uncert	Recovery	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-230	6.99E-01	1.5E-01	1.8E-01	2.10E-02	pCi/g	71.10%	9.07E-01	0.0E+00	77.06%	11/12/98	2.0	G	ALPHA-SPEC	RICHRC5011
U-234	7.92E-01	1.2E-01	1.6E-01	2.50E-02	pCi/g	98.60%	8.69E-01	0.0E+00	91.10%	11/11/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-235	3.63E-02	2.5E-02	2.6E-02	2.38E-02	pCi/g	98.60%	3.96E-02	0.0E+00	91.58%	11/11/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-238	7.93E-01	1.2E-01	1.6E-01	1.93E-02	pCi/g	98.60%	9.10E-01	0.0E+00	87.14%	11/11/98	2.0	G	ALPHA-SPEC	RICHRC5030
PU239/40	8.96E-01	1.2E-01	1.6E-01	1.09E-02	pCi/g	85.70%	9.12E-01	0.0E+00	98.24%	11/9/98	1.0	G	ALPHA-SPEC	RICHRC5010
TRITIUM	1.27E+00	2.1E-01	3.0E-01	3.30E-02	pCi/g	88.10%	1.37E+00	0.0E+00	93.01%	11/6/98	10.0	G	LSC	RICHRC5037

Number of Results: 6

Comments:

Analytical Data Package for verification samples 004373 through 004377.

Analytical Data Package for verification samples 004413 and 004416 soil screening.

Analytical Data Package Prepared For

WESTON

Radiochemical Analysis By

Quanterra Environmental Services
Richland Laboratory

Report Nbr: 6517

SDG Nbr	ORDER Nbr	CLIENT ID NUMBER		QUANTERRA ID NUMBER
11159		004413	.....	81056401
		004416	.....	81056402

Quanterra

CERTIFICATE OF ANALYSIS

Roy F. Weston, Inc.
2566 Kohnle Dr.
Miamisburg, OH 45342

November, 19, 1998

Attention: Craig Stoll

SDG Number	:	11159
Date Samples Received	:	10/29/98
Number of Samples	:	Two (2)
Sample Type	:	Soil
Project No.	:	01011-032-009-0001-00
Sub Contract	:	LL-2325-C1

I. Introduction

On October 29, 1998 two soil samples were received for 15 day processing radiochemical analysis at the Quanterra Richland Laboratory (QRL). Upon receipt the samples were assigned the following laboratory ID numbers to correspond with the Roy F. Weston Company (WES) IDs:

QRL ID#	WVN ID#	TESTS REQUESTED
81056401	004413	Puiso, Thiso,Uiso,H3,Gamma
81056402	004416	Puiso, Thiso,Uiso,H3,Gamma

II. Analytical Results/Methodology

The analytical results for this report are presented by laboratory sample ID. Each set of data includes sample identification information, analytical results and the appropriate associated statistical errors.

The requested analyses were:

Alpha Spectroscopy
Plutonium Isotopic by method RICH-RC-5010/5039
Uranium Isotopic by method RICH-RC-5030
Thorium Isotopic by method RICH-RC-5011
Scintillation Counting
Tritium by method RICH-RC-5007
Gamma Spectroscopy
Gamma Scan by method RICH-RC-5017

- Analytical Data Package for verification samples 004413 and 004416 soil screening. (Continued)

Quanterra

III. Quality Control

The analytical results for each analysis performed under SDG 11159 include a minimum of one Laboratory Control Sample (LCS), sample duplicate and one method blank. Any exceptions have been noted in the "Comments" section.

IV. Comments

Alpha Spectroscopy

Plutonium by method RICH-RC-5010/5039

The LCS, batch blank, and sample results are within contractual requirements. PU-238 activity was > than the required MDA. Pu-239 the MDA > than the RDL.

Uranium Isotopic by method RICH-RC-5030

The LCS, batch blank, sample duplicate and sample results are within contractual requirements.

Thorium Isotopic by method RICH-RC-5011

The LCS, batch blank, sample duplicate and sample results are within contractual requirements.

Liquid Scintillation

Tritium by method RICH-RC-5031

The LCS, batch blank, sample, and sample duplicate results are within contractual requirements.

Gamma Spectroscopy

Gamma Scan by method RICH-RC-5017

The LCS, batch blank, sample, and sample duplicate results are within contractual requirements.

I certify that this Certificate of Analysis is in compliance with the SOW, both technically and for completeness, for other than the conditions detailed above. Release of the data contained in this hard copy data package has been authorized by the Laboratory Manager or a designee, as verified by the following signature.

Reviewed and approved:

Doug Swenson
Project Manager

Analytical Data Package for verification samples 004413 and 004416 soil screening (Continued)

FORM I

Date: 11/20/98

SAMPLE RESULTS

LAB NAME:	QUANTERRA, Richland	SDG:	11159	COLLECTION DATE:	10/27/98 7:50:00 AM
LAB SAMPLE ID:	81056401	REPORT NBR:	6517	RECEIVED DATE:	10/29/98 10:30:00 AM
CLIENT ID:	004413	ORDER NBR:		MATRIX:	SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALIQ UNIT	DETECTOR ID	METHOD NUMBER
TH-228	1.28E+00	1.7E-01	2.4E-01	5.15E-02	pCi/g	91.80%	(24.8)	(7.3)	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-230	1.09E+00	1.6E-01	2.1E-01	2.32E-02	pCi/g	91.80%	(47.)	(6.9)	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-232	1.09E+00	1.6E-01	2.1E-01	1.56E-02	pCi/g	91.80%	(69.8)	(6.9)	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
U-234	7.88E-01	9.4E-02	1.4E-01	1.60E-02	pCi/g	29.70%	(49.1)	(8.3)	11/18/98	1.99	G	ALPHA-SPEC	RICHRC5030
U-235	3.39E-02	2.0E-02	2.0E-02	7.65E-03	pCi/g	29.70%	(4.4)	(1.7)	11/18/98	1.99	G	ALPHA-SPEC	RICHRC5030
U-238	8.05E-01	1.0E-01	1.6E-01	7.65E-03	pCi/g	29.70%	(118.3)	(6.9)	11/18/98	1.99	G	ALPHA-SPEC	RICHRC5030
PU-238	9.57E-01	1.1E-01	1.4E-01	1.44E-02	pCi/g	83.70%	(67.2)	(9.)	11/12/98	1.0	G	ALPHA-SPEC	RICHRC5010
PU239/40	1.90E-02U	8.8E-03	8.8E-03	1.90E-02	pCi/g	83.70%	0.22	0.48	11/12/98	1.0	G	ALPHA-SPEC	RICHRC5010
AM-241	8.78E-02U	6.0E-02	6.0E-02	8.78E-02	pCi/g	N/A	0.69	(1.3)	11/13/98	37.8	G	GAMMA	RICHRC5017
BI-207	6.79E-02U	4.0E-02	4.0E-02	6.79E-02	pCi/g	N/A	0.08	0.14	11/13/98	37.8	G	GAMMA	RICHRC5017
BI-210M	9.58E-02U	5.9E-02	5.9E-02	9.58E-02	pCi/g	N/A	-0.57	-0.92	11/13/98	37.8	G	GAMMA	RICHRC5017
CO-60	9.36E-02U	5.5E-02	5.5E-02	9.36E-02	pCi/g	N/A	-0.23	-0.4	11/13/98	37.8	G	GAMMA	RICHRC5017
CS-137	9.52E-02U	5.3E-02	5.3E-02	9.52E-02	pCi/g	N/A	0.96	(1.7)	11/13/98	37.8	G	GAMMA	RICHRC5017
K-40	2.69E+01	3.2E+00	3.2E+00	8.05E-01	pCi/g	N/A	(33.5)	(8.4)	11/13/98	37.8	G	GAMMA	RICHRC5017
RA-226	9.23E-01	1.8E-01	1.8E-01	2.42E-01	pCi/g	N/A	(3.8)	(5.1)	11/13/98	37.8	G	GAMMA	RICHRC5017
TRITIUM	3.61E-02	1.6E-02	2.4E-02	3.30E-02	pCi/g	88.10%	(1.1)	(2.2)	11/6/98	100.17	G	LSC	RICHRC5037

Number of Results: 18

Comments:

FORM I

SAMPLE RESULTS

Date: 11/20/98

LAB NAME:	QUANTERRA, Richland	SDG:	11159	COLLECTION DATE:	10/27/98 7:35:00 AM
LAB SAMPLE ID:	81056402	REPORT NBR:	6517	RECEIVED DATE:	10/29/98 10:30:00 AM
CLIENT ID:	004416	ORDER NBR:		MATRIX:	SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-229	3.57E+00	3.0E-01	5.6E-01	6.16E-02	pCi/g	87.30%	(57.9)	(11.8)	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-230	1.61E+00	2.0E-01	2.9E-01	2.85E-02	pCi/g	87.30%	(56.5)	(8.)	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-232	4.04E+00	3.2E-01	6.3E-01	2.51E-02	pCi/g	87.30%	(160.8)	(12.7)	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
U-234	1.14E+00	1.3E-01	2.2E-01	3.64E-02	pCi/g	23.50%	(31.3)	(5.5)	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-235	5.33E-02	3.2E-02	3.3E-02	3.88E-02	pCi/g	23.50%	(1.4)	(1.7)	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-238	1.07E+00	1.3E-01	2.1E-01	3.08E-02	pCi/g	23.50%	(35.)	(5.2)	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
PU-238	2.34E+00	1.7E-01	2.7E-01	8.05E-03	pCi/g	79.20%	(290.5)	(14.)	11/12/98	1.01	G	ALPHA-SPEC	RICHRC5010
PU239/40	1.43E-02	1.3E-02	1.3E-02	1.42E-02	pCi/g	79.20%	(1.)	(1.1)	11/12/98	1.01	G	ALPHA-SPEC	RICHRC5010
AM-241	9.39E-02U	5.9E-02	5.9E-02	9.39E-02	pCi/g	N/A	-(1.1)	-(1.6)	11/14/98	39.2	G	GAMMA	RICHRC5017
BI-207	7.18E-02U	4.1E-02	4.1E-02	7.18E-02	pCi/g	N/A	0.49	0.88	11/14/98	39.2	G	GAMMA	RICHRC5017
BI-210M	1.00E-01U	7.1E-02	7.1E-02	1.00E-01	pCi/g	N/A	0.28	0.4	11/14/98	39.2	G	GAMMA	RICHRC5017
CO-60	8.68E-02U	4.8E-02	4.8E-02	8.68E-02	pCi/g	N/A	0.28	0.51	11/14/98	39.2	G	GAMMA	RICHRC5017
CS-137	9.81E-02U	5.5E-02	5.5E-02	9.81E-02	pCi/g	N/A	0.48	0.83	11/14/98	39.2	G	GAMMA	RICHRC5017
K-40	1.76E+01	2.4E+00	2.4E+00	7.79E-01	pCi/g	N/A	(22.6)	(7.4)	11/14/98	39.2	G	GAMMA	RICHRC5017
RA-226	6.03E-01	1.5E-01	1.5E-01	2.29E-01	pCi/g	N/A	(2.6)	(4.)	11/14/98	39.2	G	GAMMA	RICHRC5017
TRITIUM	3.30E-02U	1.8E-02	2.3E-02	3.30E-02	pCi/g	88.10%	0.71	(1.5)	11/6/98	100.12	G	LSC	RICHRC5037

Number of Results: 16

Comments:

Analytical Data Package for verification samples 004413 and 004416 soil screening (Continued)

FORM II

DUPLICATE RESULTS

Date: 11/20/98

LAB NAME:	QUANTERRA, Richland	SDG:	11159	COLLECTION DATE:	10/27/98 7:50:00 AM
LAB SA ID/ORIG ID:	D1056401 / 81056401	REPORT NBR:	6517	RECEIVED DATE:	10/29/98 10:30:00 AM
CLIENT ID:	004413	ORDER NBR:		MATRIX:	SOIL

OTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	ORIG RESULT	RPD	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
PU-238	9.88E-01	1.1E-01	1.4E-01	1.77E-02	pCi/g	79.50%	9.87E-01	2.06%	11/12/98	1.02	G	ALPHA-SPEC	RICHRC5010
PU239/40	1.50E-02U	6.4E-03	6.4E-03	1.50E-02	pCi/g	79.50%	4.21E-03	50.80%	11/12/98	1.02	G	ALPHA-SPEC	RICHRC5010
AM-241	8.44E-02U	5.1E-02	5.1E-02	8.44E-02	pCi/g	N/A	7.80E-02	537.34%	11/14/98	37.9	G	GAMMA	RICHRC5017
BI-207	6.23E-02U	3.7E-02	3.7E-02	6.23E-02	pCi/g	N/A	5.53E-03	459.29%	11/14/98	37.9	G	GAMMA	RICHRC5017
BI-210M	9.46E-02U	5.8E-02	5.8E-02	9.46E-02	pCi/g	N/A	-5.46E-02	63.72%	11/14/98	37.9	G	GAMMA	RICHRC5017
CO-60	9.46E-02U	5.5E-02	5.5E-02	9.46E-02	pCi/g	N/A	-2.19E-02	86.53%	11/14/98	37.9	G	GAMMA	RICHRC5017
CS-137	8.46E-02U	5.0E-02	5.0E-02	8.46E-02	pCi/g	N/A	8.14E-02	257.77%	11/14/98	37.9	G	GAMMA	RICHRC5017
K-40	2.20E+01	2.7E+00	2.7E+00	7.52E-01	pCi/g	N/A	2.69E+01	20.27%	11/14/98	37.9	G	GAMMA	RICHRC5017
RA-226	8.33E-01	2.0E-01	2.0E-01	2.30E-01	pCi/g	N/A	9.25E-01	10.48%	11/14/98	37.9	G	GAMMA	RICHRC5017

ber of Results: 9

ments:

Analytical Data Package for verification samples 004413 and 004416 soil screening (Continued)

FORM II

DUPLICATE RESULTS

Date: 11/20/98

LAB NAME:	QUANTERRA, Richland	SDG:	11159	COLLECTION DATE:	10/27/98 7:35:00 AM
LAB SA ID/ORIG ID:	D1056402 / 81056402	REPORT NBR:	6517	RECEIVED DATE:	10/29/98 10:30:00 AM
CLIENT ID:	004416	ORDER NBR:		MATRIX:	SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	ORIG RESULT	RPD	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-228	4.23E+00	3.2E-01	8.4E-01	6.09E-02	pCi/g	92.00%	3.57E+00	16.95%	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-230	1.97E+00	2.2E-01	3.4E-01	1.61E-02	pCi/g	92.00%	1.61E+00	20.34%	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-232	4.60E+00	3.3E-01	6.8E-01	1.61E-02	pCi/g	92.00%	4.64E+00	10.84%	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
U-234	1.11E+00	8.5E-02	1.8E-01	1.92E-02	pCi/g	47.90%	1.14E+00	2.53%	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-235	3.30E-02	1.6E-02	1.7E-02	1.51E-02	pCi/g	47.90%	5.33E-02	46.98%	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-238	1.06E+00	8.6E-02	1.5E-01	1.36E-02	pCi/g	47.90%	1.07E+00	1.86%	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030

Number of Results: 6

Comments:

Analytical Data Package for verification samples 004413 and 004416 soil screening (Continued)

FORM II

BLANK RESULTS

Date: 11/20/98

LAB NAME: QUANTERRA, Richland SDG: 11159 ORDER N BR:

LAB SAMPLE ID: J105641B REPORT NBR: 6517 MATRIX: SOIL

OTOPE	RESULT	COUNTING ERROR (±)	TOTAL ERROR (±)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-229	4.51E-02U	1.5E-02	1.5E-02	4.51E-02	pCi/g	72.60%	0.07	0.22	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-230	2.89E-02U	1.4E-02	1.4E-02	2.89E-02	pCi/g	72.60%	0.23	0.48	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
TH-232	2.89E-02U	1.2E-03	1.2E-03	2.89E-02	pCi/g	72.60%	-0.02	-0.5	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
U-234	1.88E-02U	9.4E-03	9.5E-03	1.88E-02	pCi/g	38.50%	0.28	0.58	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-235	1.24E-02U	4.7E-03	4.7E-03	1.24E-02	pCi/g	38.50%	0.11	0.28	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-238	1.71E-02U	8.2E-03	8.2E-03	1.71E-02	pCi/g	38.50%	0.23	0.48	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
PU-238	2.80E-03U	2.4E-03	2.5E-03	2.80E-03	pCi/g	49.40%	0.99	(1.1)	11/12/98	10.0	G	ALPHA-SPEC	RICHRC5010
PU239/40	2.80E-03U	2.8E-04	2.8E-04	2.80E-03	pCi/g	49.40%	-0.07	-0.71	11/12/98	10.0	G	ALPHA-SPEC	RICHRC5010

ber of Results: 8

mments:

Analytical Data Package for verification samples 004413 and 004416 soil

FORM III

Date: 11/20/98

BLANK RESULTS

LAB NAME: QUANTERRA, Richland SDG: 111:59 ORDER NBR:

LAB SAMPLE ID: J105641X REPORT NBR: 6517 MATRIX: SOIL

OTOPE	RESULT	COUNTING ERROR (s)	TOTAL ERROR (s)	MDA	REPORT UNIT	YIELD	RST/MDA	RST/CNTERR	ANALYSIS DATE	ALIQUOT SIZE	ALIQ UNIT	DETECTOR ID	METHOD NUMBER
AM-241	4.21E-02U	2.5E-02	2.5E-02	4.21E-02	pCi/g	N/A	-0.14	-0.24	11/16/98	52.0	G	GAMMA	RICHRC5017
BI-207	3.84E-02U	2.2E-02	2.2E-02	3.84E-02	pCi/g	N/A	0.13	0.22	11/16/98	52.0	G	GAMMA	RICHRC5017
BI-210M	5.65E-02U	3.3E-02	3.3E-02	5.65E-02	pCi/g	N/A	-0.09	-0.16	11/16/98	52.0	G	GAMMA	RICHRC5017
CO-60	4.67E-02U	2.7E-02	2.7E-02	4.67E-02	pCi/g	N/A	0.09	0.16	11/16/98	52.0	G	GAMMA	RICHRC5017
CS-137	4.76E-02U	2.8E-02	2.8E-02	4.76E-02	pCi/g	N/A	0.05	0.09	11/16/98	52.0	G	GAMMA	RICHRC5017
K-40	6.14E-01	6.3E-01	6.3E-01	4.13E-01	pCi/g	N/A	(1.5)	0.97	11/16/98	52.0	G	GAMMA	RICHRC5017
RA-226	1.72E-01	6.4E-02	6.4E-02	1.17E-01	pCi/g	N/A	(1.5)	(2.7)	11/16/98	52.0	G	GAMMA	RICHRC5017

ber of Results: 7

mments:

Analytical Data Package for verification samples 004413 and 004416 soil screening. (Continued)

FORM II

Date: 11/20/98

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: 11159 ORDER NBR:

LAB SAMPLE ID: J105641M REPORT NBR: 6517 MATRIX: SOIL

ISOTOPE	RESULT	COUNTING ERROR (2 s)	TOTAL ERROR (2 s)	MDA	REPORT UNIT	YIELD	Expected	Expected Uncert	Recovery	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
CS-137	8.17E-01	1.5E-01	1.5E-01	1.84E-01	pCi/g	N/A	1.01E+00	0.0E+00	80.74%	11/16/98	28.72	G	GAMMA	RICHRC5017
RA-226	1.64E+00	2.9E-01	2.8E-01	2.00E-01	pCi/g	N/A	2.15E+00	0.0E+00	76.54%	11/16/98	28.72	G	GAMMA	RICHRC5017

Number of Results: 2

Comments:

FORM II

Date: 11/20/98

LABORATORY CONTROL SAMPLE

LAB NAME: QUANTERRA, Richland SDG: 11159 ORDER NBR:

LAB SAMPLE ID: J105641S REPORT NBR: 6517 MATRIX: SOIL

ISOTOPE	RESULT	COUNTING ERROR (± s)	TOTAL ERROR (± s)	MDA	REPORT UNIT	YIELD	Expected	Expected Uncert	Recovery	ANALYSIS DATE	ALIQUOT SIZE	ALQ UNIT	DETECTOR ID	METHOD NUMBER
TH-230	7.16E-01	1.5E-01	1.8E-01	3.17E-02	pCi/g	70.20%	9.04E-01	0.0E+00	78.19%	11/17/98	2.0	G	ALPHA-SPEC	RICHRC5011
U-234	8.57E-01	5.6E-02	1.0E-01	5.18E-03	pCi/g	70.40%	8.76E-01	0.0E+00	97.90%	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-235	3.76E-02	1.2E-02	1.2E-02	2.48E-03	pCi/g	70.40%	3.99E-02	0.0E+00	94.13%	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
U-238	9.10E-01	5.8E-02	1.1E-01	2.48E-03	pCi/g	70.40%	9.17E-01	0.0E+00	99.22%	11/18/98	2.0	G	ALPHA-SPEC	RICHRC5030
PU239/40	9.15E-02	1.2E-02	1.6E-02	1.03E-03	pCi/g	87.30%	9.11E-02	0.0E+00	100.46%	11/12/98	10.0	G	ALPHA-SPEC	RICHRC5010

Number of Results: 5

Comments:

Analytical Data Package for verification samples 004413 and 004416 soil

98-LD-016
p 3 of 4
RIM

SOIL ANALYSIS REPORT

FIELD SAMPLE ID: 004428
LAB SAMPLE ID: ML800211
FILE ID: MG200005.SO
PRIORITY: Y

Description\Location:
Follow up #4416 #1
Long Count

Collector: [redacted]n. 5520

Date Received: 12/3/98 **Date** [redacted] COPY

Radionuclide		Activity (pCi/g)	MDA (pCi/g)	MD-10438 Limit (pCi/g)
Co-60		0.05	0.02	45,000
Cs-137		0.04	0.02	45,000
Pb-210	•	0.00	0.35	45,000
Ra-226		1.61	0.34	800
Ac-227 (D)	*	0.00	0.17	40
Th-230	•	2.69	3.45	800
Th-232 (D)		0.55	0.06	130
Pu-238	•	0.00	10.11	500
Am-241	•	0.00	0.04	500

Other Nuclides:

Radionuclide	Activity (pCi/g)	MDA	MD-10438 Limit (pCi/g)

Σ DOT 0.02 nCi/g

Σ Respirator 0.04

Σ Respirator <1 indicates soil levels below limit.
Values > or = 1 indicate soil levels exceed limit. Limits based on MD-10438 table 4.

Σ DOT 2 nCi/g limit, total activity.

(D) Denotes identification by daughter emissions.
Sample is assumed to be in secular equilibrium.

* Indicates activity < MDA. MDA used in limits calculation.

Instrument type: High Purity Germanium

Comments:

Date: 12/3/98 Counted By: 5801 Analyzed By: 5755 INITIALS [redacted]

• Confirmatory Measurement Results for samples 004428 and 004429

98-LS-076
P4 of 4
RIM

SOIL ANALYSIS REPORT

FIELD SAMPLE ID: 004429
LAB SAMPLE ID: ML800212
FILE ID: MG100193.SO
PRIORITY: Y

COPY

Description\Location:
Follow up #4416 #2
Long Count

Collector: [redacted] 5520

Date Received: 12/3/98 **Date Collected:**

Radionuclide		Activity (pCi/g)	MDA (pCi/g)	MD-10438 Limit (pCi/g)
Co-60	•	0.02	0.02	45,000
Cs-137		0.04	0.01	45,000
Pb-210		0.28	0.19	45,000
Ra-226		1.13	0.22	800
Ac-227 (D)	*	0.05	0.06	40
Th-230	•	0.36	1.80	800
Th-232 (D)		0.52	0.05	130
Pu-238	*	2.46	4.26	500
Am-241	•	0.00	0.02	500

Other Nuclides:

Radionuclide	Activity (pCi/g)	MDA	MD-10438 Limit (pCi/g)

Σ DOT 0.01 nCi/g

Σ Respirator 0.02

Σ Respirator <1 indicates soil levels below limit.
Values > or = 1 indicate soil levels exceed limit. Limits based on MD-10438 table 4.

Σ DOT 2 nCi/g limit, total activity.

(D) Denotes identification by daughter emissions.
Sample is assumed to be in secular equilibrium.

* Indicates activity < MDA. MDA used in limits calculation.

Instrument type: High Purity Germanium

Comments:

Date: 12/3/98 Counted By: 5801 Analyzed By: 5755 INITIALS [redacted]

- Confirmatory Measurement Results for samples 004428 and 004429. (Continued)

SOIL ANALYSIS REPORT

FIELD SAMPLE ID: 004373
LAB SAMPLE ID: ML800028
FILE ID: MG100028.S0
PRIORITY: Y

Description\Location:
PRS304 Sample 1

Collector: [redacted] 5520

Date Received: 10/21/98 **Date Collected:**

Radionuclide		Activity (pCi/g)	MDA (pCi/g)	MD-10438 Limit (pCi/g)
Co-60	•	0.05	0.05	45,000
Cs-137		0.11	0.05	45,000
Pb-210	*	0.10	0.70	45,000
Ra-226		1.32	0.70	800
Ac-227 (D)	*	0.14	0.20	40
Th-230	*	0.00	6.77	800
Th-232 (D)		0.66	0.18	130
Pu-238	*	8.55	14.50	500
Am-241	•	0.05	0.07	500

Other Nuclides:

Radionuclide	Activity (pCi/g)	MDA	MD-10438 Limit (pCi/g)

Σ DOT 002 nCi/g

Σ Respirator 0.05

Σ Respirator <1 indicates soil levels below limit.
Values > or = 1 indicate soil levels exceed limit. Limits based on MD-10438 table 4.

Σ DOT 2 nCi/g limit, total activity.

(D) Denotes identification by daughter emissions.
Sample is assumed to be in secular equilibrium.

* Indicates activity < MDA. MDA used in limits calculation.

Instrument type: High Purity Germanium

Comments:

Date: 10/21/98 Counted By: 5801 Analyzed By: 5390 INITIALS

- Soil screening measurement results for verification samples 004373 through 004377 and 004413 and 004416.

SOIL ANALYSIS REPORT

FIELD SAMPLE ID: 004374
LAB SAMPLE ID: ML800029
FILE ID: MG100029.S0
PRIORITY: Y

Description\Location:
PRS304 Sample 2

Collector: [redacted] 5520

Date Received: 10/21/98 **Date Collected:**

Radionuclide		Activity (pCi/g)	MDA (pCi/g)	MD-10438 Limit (pCi/g)
Co-60	*	0.02	0.06	45,000
Cs-137	*	0.03	0.06	45,000
Pb-210		0.90	0.59	45,000
Ra-226		1.58	0.76	800
Ac-227 (D)	*	0.00	0.25	40
Th-230	*	1.73	6.18	800
Th-232 (D)		0.63	0.24	130
Pu-238	*	0.00	17.07	500
Am-241	*	0.04	0.07	500

Other Nuclides:

Radionuclide	Activity (pCi/g)	MDA	MD-10438 Limit (pCi/g)

Σ DOT 0.03 nCi/g

Σ Respirator 0.06

Σ Respirator <1 indicates soil levels below limit.
Values > or = 1 indicate soil levels exceed limit. Limits based on MD-10438 table 4.

Σ DOT 2 nCi/g limit, total activity.

(D) Denotes identification by daughter emissions.
Sample is assumed to be in secular equilibrium.

* Indicates activity < MDA. MDA used in limits calculation.

Instrument type: High Purity Germanium

Comments:

Date: 10/21/98 Counted By: 5801 Analyzed By: 5390 INITIALS

- Soil screening measurement results for verification samples 004373 through 004377 and 004413 and 004416. (Continued)

SOIL ANALYSIS REPORT

FIELD SAMPLE ID: 004375
LAB SAMPLE ID: ML800030
FILE ID: MG100030.S0
PRIORITY: Y

Description\Location:
PRS304 Sample 3

Collector: [redacted] 5520

Date Received: 10/21/98 **Date Collected:**

Radionuclide		Activity (pCi/g)	MDA (pCi/g)	MD-10438 Limit (pCi/g)
Co-60	•	0.00	0.09	45,000
Cs-137	•	0.03	0.05	45,000
Pb-210	•	0.46	0.72	45,000
Ra-226		2.05	0.73	800
Ac-227 (D)	•	0.08	0.29	40
Th-230	•	2.24	6.70	800
Th-232 (D)		0.70	0.20	130
Pu-238	•	0.00	18.89	500
Am-241	*	0.04	0.07	500

Other Nuclides:

Radionuclide	Activity (pCi/g)	MDA	MD-10438 Limit (pCi/g)

Σ DOT 0.03 nCi/g

Σ Respirator 0.06

Σ Respirator <1 indicates soil levels below limit.
Values > or = 1 indicate soil levels exceed limit. Limits based on MD-10438 table 4.

Σ DOT 2 nCi/g limit, total activity.

(D) Denotes identification by daughter emissions.
Sample is assumed to be in secular equilibrium.

* Indicates activity < MDA. MDA used in limits calculation.

Instrument type: High Purity Germanium

Comments:

Date: 10/21/98 Counted By: 5801 Analyzed By: 5390 INITIALS _____

- Soil screening measurement results for verification samples 004373 through 004377 and 004413 and 004416. (Continued)

SOIL ANALYSIS REPORT

FIELD SAMPLE ID: 004376
LAB SAMPLE ID: ML800031
FILE ID: MG100031.S0
PRIORITY: Y

Description\Location:
PRS304 Sample 4

Collector: [redacted] 5520

Date Received: 10/21/98 **Date Collected:**

Radionuclide		Activity (pCi/g)	MDA (pCi/g)	MD-10438 Limit (pCi/g)
Co-60	*	0.03	0.06	45,000
Cs-137		0.08	0.05	45,000
Pb-210	*	0.55	0.81	45,000
Ra-226		1.78	0.84	800
Ac-227 (D)	*	0.24	0.32	40
Th-230	*	4.66	6.42	800
Th-232 (D)		0.75	0.23	130
Pu-238	*	6.88	17.19	500
Am-241	*	0.03	0.07	500

Other Nuclides:

Radionuclide	Activity (pCi/g)	MDA	MD-10438 Limit (pCi/g)

Σ DOT 0.03 nCi/g

Σ Respirator 0.06

Σ Respirator <1 indicates soil levels below limit.
Values > or = 1 indicate soil levels exceed limit. Limits based on MD-10438 table 4.

Σ DOT 2 nCi/g limit, total activity.

(D) Denotes identification by daughter emissions.
Sample is assumed to be in secular equilibrium.

* Indicates activity < MDA. MDA used in limits calculation.

Instrument type: High Purity Germanium

Comments:

Date: 10/21/98 Counted By: 5801 Analyzed By: 5390 INITIALS

- Soil screening measurement results for verification samples 004373 through 004377 and 004413 and 004416. (Continued)

SOIL ANALYSIS REPORT

FIELD SAMPLE ID: 004377
LAB SAMPLE ID: ML800032
FILE ID: MG100032.S0
PRIORITY: Y

Description\Location:
PRS304 Sample 5

Collector: [redacted] 5520

Date Received: 10/21/98 **Date Collected:**

Radionuclide		Activity (pCi/g)	MDA (pCi/g)	MD-10438 Limit (pCi/g)
Co-60	*	0.02	0.06	45,000
Cs-137		0.07	0.05	45,000
Pb-210		0.86	0.48	45,000
Ra-226		1.37	0.60	800
Ac-227 (D)	*	0.14	0.22	40
Th-230	*	0.00	5.91	800
Th-232 (D)		0.64	0.17	130
Pu-238	*	1.99	14.16	500
Am-241	*	0.04	0.05	500

Other Nuclides:

Radionuclide	Activity (pCi/g)	MDA	MD-10438 Limit (pCi/g)

Σ DOT 0.02 nCi/g

Σ Respirator 0.05

Σ Respirator <1 indicates soil levels below limit.
Values > or = 1 indicate soil levels exceed limit. Limits based on MD-10438 table 4.

Σ DOT 2 nCi/g limit, total activity.

(D) Denotes identification by daughter emissions.
Sample is assumed to be in secular equilibrium.

* Indicates activity < MDA. MDA used in limits calculation.

Instrument type: High Purity Germanium

Comments:

Date: 10/21/98 Counted By: 5801 Analyzed By: 5390 INITIALS _____

- Soil screening measurement results for verification samples 004373 through 004377 and 004413 and 004416. (Continued)

SOIL ANALYSIS REPORT

FIELD SAMPLE ID: 004413
LAB SAMPLE ID: HPG02798
FILE ID: HPG02798
PRIORITY: Y

Description\Location:
PRS304-west verification
Initial count 14.4k sec. count

Collector: [redacted] 5520

Date Received: 10/27/98 **Date Collected:**

Radionuclide		Activity (pCi/g)	MDA (pCi/g)	MD-10438 Limit (pCi/g)
Co-60	•	0.01	0.03	45,000
Cs-137		0.05	0.02	45,000
Pb-210		0.61	0.44	45,000
Ra-226		0.94	0.30	800
Ac-227 (D)	•	0.08	0.15	40
Th-230	•	1.65	4.54	800
Th-232 (D)		1.18	0.10	130
Pu-238	*	1.53	49.20	500
Am-241	•	0.01	0.05	500

Other Nuclides:

Radionuclide	Activity (pCi/g)	MDA	MD-10438 Limit (pCi/g)

Σ DOT 0.06 nCi/g

Σ Respirator 0.12

Σ Respirator <1 indicates soil levels below limit.
Values > or = 1 indicate soil levels exceed limit. Limits based on MD-10438 table 4.

Σ DOT 2 nCi/g limit, total activity.

(D) Denotes identification by daughter emissions.
Sample is assumed to be in secular equilibrium.

* Indicates activity < MDA. MDA used in limits calculation.

Instrument type: High Purity Germanium

Comments:

Date: 10/28/98 Counted By: 5801 Analyzed By: 6086 INITIALS _____

- Soil screening measurement results for verification samples 004373 through 004377 and 004413 and 004416. (Continued)

SOIL ANALYSIS REPORT

FIELD SAMPLE ID: 004416
LAB SAMPLE ID: HPG02799
FILE ID: HPG02799
PRIORITY: Y

Description\Location:
PRS304-west verification
Report B, 82k sec. count

Collector: [redacted]. 5520

Date Received: 10/27/98 **Date Collected:**

Radionuclide		Activity (pCi/g)	MDA (pCi/g)	MD-10438 Limit (pCi/g)
Co-60	*	0.01	0.01	45,000
Cs-137		0.08	0.01	45,000
Pb-210		0.91	0.27	45,000
Ra-226		1.13	0.17	800
Ac-227 (D)		0.46	0.09	40
Th-230	*	0.54	3.24	800
Th-232 (D)		2.66	0.04	130
Pu-238	*	0.00	29.57	500
Am-241	*	0.02	0.03	500

Other Nuclides:

Radionuclide	Activity (pCi/g)	MDA	MD-10438 Limit (pCi/g)

Σ DOT 0.04 nCi/g

Σ Respirator 0.10

Σ Respirator <1 indicates soil levels below limit.
Values > or = 1 indicate soil levels exceed limit. Limits based on MD-10438 table 4.

Σ DOT 2 nCi/g limit, total activity.

(D) Denotes identification by daughter emissions.
Sample is assumed to be in secular equilibrium.

* Indicates activity < MDA. MDA used in limits calculation.

Instrument type: High Purity Germanium

Comments:

Date: 10/28/98 Counted By: 5890 Analyzed By: 6086 INITIALS _____

- Soil screening measurement results for verification samples 004373 through 004377 and 004413 and 004416. (Continued)

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