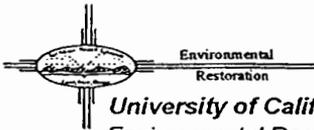


# Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION



University of California  
Environmental Restoration, MS M992  
Los Alamos, New Mexico 87545  
505-667-0808/FAX 505-665-4747



U. S. Department of Energy  
Los Alamos Area Office, MS A316  
Los Alamos, New Mexico 87544  
505-665-7203  
FAX 505-665-4504



Date: April 19, 1996  
Refer to: EM/ER:96-220

Mr. Benito Garcia  
NMED-HRMB  
P.O. Box 26110  
Santa Fe, NM 87502

SUBJECT: FINAL ACCELERATED CLEANUP REPORTS 21-024(e)

Dear Mr. Garcia:

Enclosed are the final reports and Certifications of Completion for the voluntary corrective actions completed in Fiscal Year 1995. The reports with potential release sites (PRSS) listed in the Hazardous and Solid Waste Amendments (HSWA) Module of the Los Alamos National Laboratory's Resource Conservation and Recovery Act operating permit contain our request for no further action (NFA). Upon your approval of these reports, we will submit a permit modification request for NFA of these PRSS.

For PRSS not listed in the HSWA Module, reports are included as informational copies for your records.

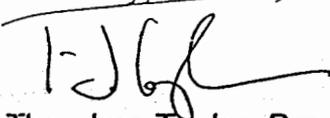
If you have any questions, please call David Bradbury at 505-665-6208.

Thank you for your timely attention to this matter.

Sincerely,

  
Jorg Jansen, Program Manager  
Environmental Restoration

Sincerely,

  
Theodore Taylor, Program Manager  
Los Alamos Area Office

JJ/TT/rfr



10223

- Enclosures: (1) Final Reports for HSWA: C-9-001, 6-007(f), 8-005, 16-016(b), 18-001(a), 19-002, 21-013(c), 21-013(d), 21-013(e), 21-024(d), 21-024(e), 21-024(h), 31-001, 33-016, 39-007(a), and 69-001  
(2) Final Reports for non-HSWA: C-0-036(a-d), C-0-041, C-10-001, C-21-027, C-36-001, 0-032, 1-001(f), 3-003(p), 3-022, 3-047(d), 3-051(c), 9-010(a-b), 16-011, 16-016(f), 20-003(c), 21-022(j), 39-002(c), 53-010, and 57-006  
(3) Certifications of Completion

Cy (w/enclosures):

B. Driscoll, EPA, R.6, 6PD-N, (2 copies of HSWA)  
D. Griswold, ERD, AL, MS A906  
/ J. Harry, EM/ER, MS M992  
B. Hoditschek, NMED-HRMB  
/ R. Kern, NMED-HRMB  
N. Naraine, EM-453, DOE-HQ  
M. Shaner, P&PI, MS J591 (5 copies)  
N. Weber, Bureau Chief, NMED-AIP, MS J993  
J. White, ESH-19, MS K490  
S. Yanicak, NMED-AIP, MS J993  
RPF, MS M707

Cy (w/o enclosures):

T. Baca, EM, MS J591  
D. Bradbury, EM/ER, MS M992  
T. Glatzmaier, DDEES/ER, MS M992  
D. McInroy, EM/ER, MS M992  
G. Rael, ERD, AL, MS A906  
W. Spurgeon, EM-453, DOE-HQ  
T. Taylor, LAAO, MS A316  
J. Vozella, LAAO, MS A316  
EM/ER File, MS M992

# **Voluntary Corrective Action Completion Report for**

**Potential Release Site  
21-024(e)  
TA-21 Septic Tank**

**Field Unit 1**

## **Environmental Restoration Program**

February 1996  
Revision 1

A Department of Energy  
Environmental Cleanup Program

# **Los Alamos**

NATIONAL LABORATORY

LA-UR-96-257

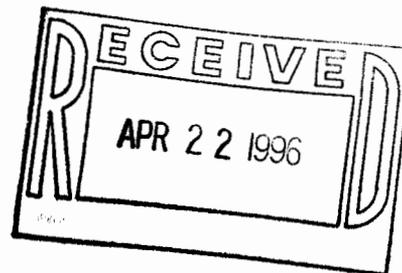
**Voluntary Corrective Action Completion Report  
Potential Release Site 21-024(e)  
TA-21 Septic Tank**

**Environmental Restoration Project  
Field Unit One  
Los Alamos National Laboratory**

**Revision 1**

**January 23, 1996**

**A Department of Energy  
Environmental Cleanup Project**



CERTIFICATION OF COMPLETION

I certify that all the work pertaining to the voluntary corrective action (VCA) at PRS 21-024(e) has been completed in accordance with the Department of Energy approved VCA plan entitled *Voluntary Corrective Action Plan for TA-21 Septic Tank 21-024(e)*. Based on my personal involvement or inquiry of the person or persons who managed this clean up, a review of all data gathered, and a visit to the site, to the best of my knowledge and belief all criteria of the plan have been met or exceeded. I believe that the completion of this VCA is protective to both human health and the environment. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.



\_\_\_\_\_  
Garry Allen  
Field Unit One Project Leader  
Environmental Restoration Project  
Los Alamos National Laboratory



\_\_\_\_\_  
Date signed

# Voluntary Corrective Action Completion Report

## Potential Release Site 21-024(e)

### TA-21 Septic Tank

#### DESCRIPTION

Potential release site (PRS) 21-024(e) is the location of a septic system that routed sewage from Building TA-21-20 (removed in 1965) through a concrete septic tank to the ground surface on the south rim of DP Mesa above Los Alamos Canyon. The outfall of the septic tank is broad and open with a clearly defined drainage channel. Results of investigations at this site<sup>1</sup> suggested that the only contaminant present at levels greater than Los Alamos National Laboratory (LANL) screening action levels<sup>2</sup> was plutonium-239.

PRS 21-024(e) is listed in the Hazardous and Solid Waste Amendments (HSWA) module of LANL's Resource Conservation and Recovery Act (RCRA) permit. When results of the RCRA facility investigation (RFI) at this site were reported,<sup>1</sup> LANL proposed to the Environmental Protection Agency (EPA) that no further action be taken for RCRA constituents and a risk assessment be performed for radioactivity. EPA accepted this proposal and recommended a request for a Class 3 modification to the HSWA module in a notice of deficiency.<sup>3</sup>

#### CORRECTIVE ACTION

PRS 21-024(e) at Field Unit 1, TA-21, was selected for voluntary corrective action (VCA). A VCA plan was prepared, and the plan was approved by the Department of Energy (DOE).<sup>4,5</sup> The VCA was conducted according to the plan with one minor deviation (noted below). This report provides the results of the VCA.

Action on this PRS began on July 26 when the septic tank at PRS 21-024(e) was sampled to characterize its contents for waste disposal (Fig. 1). A hand auger was used to obtain one representative sample from the entire 0-to-8-ft depth of the tank; the sample was analyzed for metals (using toxicity characteristic leaching procedures [TCLP]), semivolatile organic compounds, and isotopic plutonium. Three additional samples were collected from the top, middle, and bottom of the tank contents and analyzed for volatile organic compounds. To ensure worker health and safety and to meet the requirements of the fixed analytical laboratory, samples were screened for radiation and volatile compounds using hand-held instruments and mobile laboratory techniques.

On August 22 and 23, the drainage area below the septic tank outfall was surveyed for low-energy gamma radiation.<sup>6</sup> At 12 locations where an increase in low-energy gamma radiation was identified (Fig. 1), additional field instruments were used to quantify alpha activity (also indicating possible plutonium-239 contamination). To verify field results, six samples from these locations were sent to an off-site laboratory for plutonium-239 analysis.

<sup>1</sup> Phase Report Addendum 1B and 1C: Operable Unit 1106 RCRA Facility Investigation, LA-UR-94-4360, January 1995.

<sup>2</sup> Action level developed for Environmental Restoration Project screening assessments; documented in *Installation Work Plan for Environmental Restoration*, Appendix J, September 1994.

<sup>3</sup> List of Deficiencies: Operable Unit 1106, RFI Reports 1B, 1C, and Addendum 1B and 1C, March 1995.

<sup>4</sup> Voluntary Corrective Action Plan for TA-21 Septic Tank 21-024(e), September 12, 1995.

<sup>5</sup> Memo from B. Koch to T. Taylor, Re: VCA Plan for 21-024(e), September 12, 1995.

<sup>6</sup> Low-energy gamma radiation is emitted by americium-241, which is a daughter of plutonium-241. Plutonium-241 is a contaminant of the plutonium-239 separation process and is commonly used to indicate the presence of plutonium-239.

On September 7 and 8, the contents of the septic tank were removed with a backhoe and placed in five waste containers, resulting in approximately 18 yd<sup>3</sup> of waste. The containers were moved to MDA V at TA-21 where they will be stored until they can be disposed of properly as low-level radioactive waste. Backhoe operations were monitored for radiation and volatile compounds using hand-held instruments. When the tank was empty, a LANL radiation control technician swiped the walls of the tank and detected no removable radioactivity. In accordance with New Mexico regulations for abandoning septic tanks, the inlet and outlet lines were grouted with concrete, the tank was filled with pea gravel, and the area was regraded. On September 15, the surrounding area was reseeded and restored to original condition.

The VCA was completed with the following deviation from the approved VCA plan: samples from the drainage area were sent to a fixed analytical laboratory to verify results obtained with field instruments, which was not required in the plan.

## RESULTS

The results of septic tank contents analyses are presented in Table 1; the results of drainage area analyses are presented in Table 2. Copies of all data reports are available and will be provided upon request.

**Septic Tank Contents.** One semivolatile organic compound, chrysene, was detected. This compound, a polyaromatic hydrocarbon, is a constituent of asphalt, road oil, and diesel fuel and would collect in this tank when precipitation runs off parking areas to the north. Chrysene in the septic tank does not make the contents a hazardous waste. One volatile organic compound, 1,4-dichlorobenzene, was also detected. This compound would be considered hazardous if it had been discarded as a commercial chemical product, off-specification species, container residue, or spill residue thereof; at PRS 21-024(e), however, these criteria do not apply. All metals detected in the toxicity characteristic leachate were present at levels less than the toxicity characteristic regulatory level.<sup>7</sup> These results confirm the absence of RCRA hazardous constituents in the VCA waste.

Plutonium-238 was detected at a level greater than the upper tolerance limit<sup>8</sup> but less than the process area baseline;<sup>9</sup> plutonium-239 was detected at a level greater than both the upper tolerance limit and process area baseline. These results confirmed the presence of radioactivity in the VCA waste. Because the cleanup level<sup>10</sup> for plutonium-239 was not exceeded, however, cleanup actions at the septic tank were limited to abandonment in accordance with New Mexico regulations.

**Drainage Area Samples.** Results of field analyses indicated that plutonium-239 levels were less than the cleanup level throughout the drainage area, except possibly at sample locations 21-4066 and 21-4069 (Fig. 1). Results of laboratory analyses on samples from these and other locations confirmed that all samples had plutonium-239 levels less than the screening action level<sup>2</sup> and the cleanup level.<sup>10</sup>

Correspondence between laboratory and field results was poor, however, and most plutonium-239 laboratory results were much less than the estimated concentrations, which are calculated

<sup>7</sup> Level at which a solid waste containing this compound is regulated as a characteristically toxic hazardous waste; documented in 40CFR261.24.

<sup>8</sup> Limit at the 99th percentile with a 95% confidence level of a range of regional background concentrations; documented in *Statistical Comparisons to Background, Part I*, LA-UR-95-1217, March 28, 1995. Limit at the 95th percentile has not been calculated for plutonium isotopes.

<sup>9</sup> Comparison value developed from the 95.5% confidence level of ambient analyte concentrations in soil from TA-21 process areas; documented in *Phase Report 1C: TA-21 Operable Unit RCRA Facility Investigation*, LA-UR-94-228, February 28, 1994.

<sup>10</sup> Decontamination and Decommissioning Program cleanup level determined using RESRAD, Version 5.191, Code for Calculating Residual Radioactivity in Soil for a 100 mrem/yr dose to a resident farmer.

assuming that all alpha activity greater than background was from plutonium-239. If we do not make this assumption, the poor correspondence may be explained by the presence of uranium, which was detected at levels greater than the upper tolerance limit and process area baseline but less than the screening action level in samples analyzed and reported as part of the Phase I RFI. If uranium is responsible for the additional alpha emissions, the levels of uranium-234 and uranium-238 would total 129.7 pCi/g, or 64.85 pCi/g of each of these isotopes, at location 21-4069 where alpha radioactivity was greatest. Such values exceed the upper tolerance limit and the process area baseline for both isotopes and the screening action level for uranium-238, although not for uranium-234.

Given these values, it is appropriate to analyze the cumulative impact of radionuclides on human health to determine if the designated cleanup levels have been exceeded. The results of this analysis are presented in Table 3. The sum of the ratios of maximum analyzed values to cleanup levels is less than one, suggesting that these radionuclides taken together do not exceed cleanup levels.

Although the laboratory and field results for plutonium-239 do not correspond, the additional alpha emitters (if assumed to be uranium isotopes) do not exceed cleanup levels. Because the cleanup level was not exceeded, no cleanup actions were taken in the drainage area.

## **CONCLUSIONS**

This PRS can be removed from the HSWA module, as recommended by EPA.<sup>3</sup> The VCA addressed the radioactive contamination in the septic tank and drainage area and resulted in tank abandonment according to New Mexico regulations. This report serves as the formal request for DOE concurrence that PRS 21-024(e) need no longer be considered a discrete PRS for radiological issues, PRS 21-024(e) may be dropped from the list of Environmental Restoration Project PRSs, and no risk assessment for radioactivity is necessary at PRS 21-024(e).

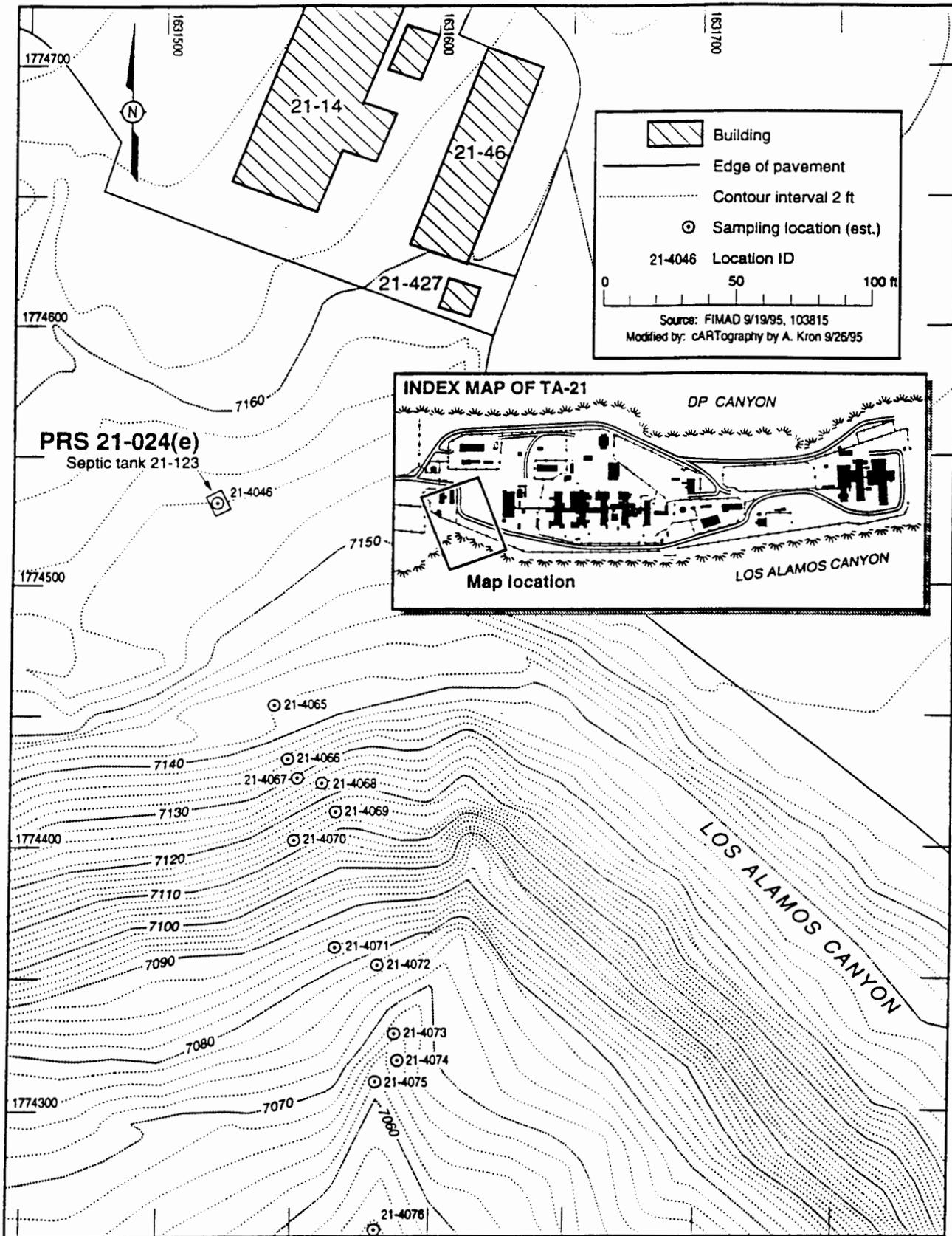


Fig. 1. Location of Samples Collected at PRS 21-024(e)

Table 1. Results of Septic Tank Contents Analyses for Waste Characterization at PRS 21-024(e)

Comparison Value	Radionuclides		Metals <sup>a</sup>			Semivolatile Organic Compounds	Volatile Organic Compounds
	<sup>238</sup> Pu (pCi/g)	<sup>239</sup> Pu (pCi/g)	As (µg/L)	Ba (µg/L)	Cd (µg/L)	Chrysene (µg/kg)	1,4-Dichlorobenzene (µg/kg)
Upper tolerance limit <sup>b</sup>	0.014	0.052	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>
Process area baseline <sup>d</sup>	6.21	9.41	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>
Toxicity characteristic threshold value <sup>e</sup>	NC <sup>c</sup>	NC <sup>c</sup>	5,000	100,000	1,000	NC <sup>c</sup>	NC <sup>c</sup>

Location ID	Sample ID	Depth (ft)	Radionuclides		Metals			Semivolatile Organic Compounds	Volatile Organic Compounds
			<sup>238</sup> Pu (pCi/g)	<sup>239</sup> Pu (pCi/g)	As (µg/L)	Ba (µg/L)	Cd (µg/L)	Chrysene (µg/kg)	1,4-Dichlorobenzene (µg/kg)
21-4046	121-95-0341	0-2.5	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	ND <sup>g</sup>	
21-4046	121-95-0342	2.5-5.0	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	ND <sup>g</sup>	
21-4046	121-95-0343	5.0-8.0	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	170	
21-4046	121-95-0344	0-8.0	0.02	19.5	78.7	1340	54.2	600	NA <sup>f</sup>

a Analyzed using toxicity characteristic leaching procedures (TCLP)

b Limit at the 99th percentile with a 95% confidence level of a range of regional background concentrations; limit at the 95th percentile has not been calculated for plutonium isotopes

c Not calculated in comparable units

d Comparison value developed from the 95.5% confidence level of ambient analyte concentrations in soil from TA-21 process areas

e Level at which a solid waste containing this compound is regulated as a characteristically toxic hazardous waste

f Not analyzed

g Not detected

Table 2. Results of Drainage Area Analyses at PRS 21-024(e)

Comparison Value	<sup>239</sup> Pu (pCi/g)
Upper tolerance limit <sup>a</sup>	0.052
Process area baseline <sup>b</sup>	9.41
Screening action level <sup>c</sup>	18
Cleanup level <sup>d</sup>	75

Location ID	Sample ID	Depth (in.)	Field Analysis	Lab Analysis
			Estimated <sup>239</sup> Pu (pCi/g)	<sup>239</sup> Pu (pCi/g)
21-4065	121-95-0381	0-6	64	14.6
21-4065	121-95-0382	6-12	11	NA <sup>e</sup>
21-4066	121-95-0383	0-6	101	17.1
21-4067	121-95-0384	0-6	34	NA <sup>e</sup>
21-4068	121-95-0385	0-6	36	5.1
21-4069	121-95-0386	0-6	142	12.3
21-4070	121-95-0387	0-6	13	NA <sup>e</sup>
21-4071	121-95-0388	0-6	47	NA <sup>e</sup>
21-4072	121-95-0389	0-6	9	NA <sup>e</sup>
21-4072	121-95-0390	6-12	44	3.7
21-4073	121-95-0391	0-6	1	NA <sup>e</sup>
21-4073	121-95-0392	6-12	9	NA <sup>e</sup>
21-4074	121-95-0393	0-6	< 1	NA <sup>e</sup>
21-4075	121-95-0394	0-6	< 1	2.3
21-4076	121-95-0395	0-6	36	NA <sup>e</sup>
21-4076	121-95-0396	6-12	4	NA <sup>e</sup>
21-4076	121-95-0397	12-18	30	NA <sup>e</sup>

a Limit at the 99th percentile with a 95% confidence level of a range of regional background concentrations; limit at the 95th percentile has not been calculated for plutonium isotopes

b Comparison value developed from the 95.5% confidence level of ambient analyte concentrations in soil from TA-21 process areas

c Action level developed for Environmental Restoration Project screening assessments

d Decontamination and Decommissioning Program cleanup level determined using RESRAD, Version 5.191, Code for Calculating Residual Radioactivity in Soil for a 100 mrem/y dose to a resident farmer

e Not analyzed

Table 3. Analysis for Cumulative Impact of Radionuclides Found Above Upper Tolerance Limits at PRS 21-024(e)

Radionuclide	Maximum Analyzed Value (pCi/g)	Cleanup Level (pCi/g) <sup>a</sup>	Ratio
Plutonium-238	0.14	85	0.002
Plutonium-239	17.1	75	0.228
Uranium-234 <sup>b</sup>	64.85	400	0.162
Uranium-238 <sup>b</sup>	64.85	350	0.185
Sum			0.58

a As determined using RESRAD, Version 5.191, Code for Calculating Residual Radioactivity in Soil for a 100 mrem/yr dose to a resident farmer

b Activity of each uranium isotope is estimated to be half the difference between the estimated <sup>239</sup>Pu concentration (from field analyses) and the analyzed <sup>239</sup>Pu concentration (from laboratory analyses)

ITEM #	PAGE, SECTION #, OR DRAWING #.	COMMENTS	RESPONSE
7	Page 2 & 5	<p><b>FRS 21-024(e), SEPTIC SYSTEM AND OUTFALL.</b></p> <p>As per EPA, shouldn't the UTL's be calculated based on the 95th percentile with a 95% confidence level of a range of regional background concentrations?</p>	<p>This limit has not been calculated for plutonium isotopes. Footnote 8 on page 2; footnote b, Table 1, on page 5; and footnote c, Table 2, on page 5 have been revised to provide this information.</p> <p>Footnote 10 on page 2 and footnote d, Table 2, on page 5 have been revised.</p> <p>Footnote 11 on page 2 has been deleted and the text has been revised.</p>
8	Page 2 & 5	For footnotes referencing RESRAD calculations by D&D, add the RESRAD version 5.191.	
9	Page 2	Footnotes 10 and 11 are the same, delete 11 and change reference in text.	
10	Page 2 & 6	<p><b>FRS 21-024(h), SEPTIC SYSTEM AND OUTFALL.</b></p> <p>As per EPA, shouldn't the UTL's be calculated based on the 95th percentile with a 95% confidence level of a range of regional background concentrations?</p>	
11	Page 2 & 6	For footnotes referencing RESRAD calculations by D&D, add the RESRAD version 5.191.	

REVIEWED BY: Joseph Mass. DOE/LAAO. (505)667-5000

DATE: 11/21/95

REVIEWED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

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ENV. & PROJECTS

1-2-98 4:48PM

SENT BY: DEPT. OF ENERGY

01/03/96 17:32 25030004034  
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 : 1- 2-98 : 4:48PM : ENV. : PROJECTS :  
 5056654632: #

**LOS ALAMOS  
 AREA OFFICE  
 (LAAO)**

**DOCUMENT REVIEW/RESPONSE**

DOC TITLE: Final Reports and Cert. Of Completion for VCA's (TA-21 review)

ITEM #	PAGE, SECTION #, OR DRAWING #.	COMMENTS	RESPONSE
1	Page 2 & 4	<p><b>PRS C-21-027, COOLING TOWER</b></p> <p>As per EPA, shouldn't the UTL's be calculated based on the 95th percentile with a 95% confidence level of a range of regional background concentrations?</p>	
2	Page 1 & 4	<p><b>PRS 21-022(j), SUMP</b></p> <p>Was the sump located in building 21-3 as stated in the text on page 1, or in building 21-4 as shown in the figure on page 4?</p>	
3	Page 2 & 5	<p>As per EPA, shouldn't the UTL's be calculated based on the 95th percentile with a 95% confidence level of a range of regional background concentrations?</p>	
4	Page 5	<p>For footnote "f" add the version of RESRAD used (5.191).</p>	
5	Page 2 & 5	<p><b>PRS 21-024(d), SEPTIC SYSTEM AND OUTFALL</b></p> <p>As per EPA, shouldn't the UTL's be calculated based on the 95th percentile with a 95% confidence level of a range of regional background concentrations?</p>	
6	Page 2 & 6	<p>For footnotes referencing RESRAD calculations by D&amp;D, add the RESRAD version 5.191.</p>	

REVIEWED BY: Joseph Mose, DOE/LAAO, (505)467-5808

DATE: 11/21/95

REVIEWED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

# **Voluntary Corrective Action Completion Report for**

**Potential Release Site  
21-024(e)  
TA-21 Septic Tank**

**Field Unit 1**

## **Environmental Restoration Program**

**February 1996  
Revision 1**

**A Department of Energy  
Environmental Cleanup Program**

# **Los Alamos**

**NATIONAL LABORATORY**

**LA-UR-96-257**

**Voluntary Corrective Action Completion Report  
Potential Release Site 21-024(e)  
TA-21 Septic Tank**

**Environmental Restoration Project  
Field Unit One  
Los Alamos National Laboratory**

**Revision 1**

**January 23, 1996**

**A Department of Energy  
Environmental Cleanup Project**

CERTIFICATION OF COMPLETION

I certify that all the work pertaining to the voluntary corrective action (VCA) at PRS 21-024(e) has been completed in accordance with the Department of Energy approved VCA plan entitled *Voluntary Corrective Action Plan for TA-21 Septic Tank 21-024(e)*. Based on my personal involvement or inquiry of the person or persons who managed this clean up, a review of all data gathered, and a visit to the site, to the best of my knowledge and belief all criteria of the plan have been met or exceeded. I believe that the completion of this VCA is protective to both human health and the environment. I am aware that there are significant penalties for submitting false information, including the possibility of fines and imprisonment for knowing violations.



\_\_\_\_\_  
Garry Allen  
Field Unit One Project Leader  
Environmental Restoration Project  
Los Alamos National Laboratory



\_\_\_\_\_  
Date signed

# Voluntary Corrective Action Completion Report

## Potential Release Site 21-024(e)

### TA-21 Septic Tank

#### DESCRIPTION

Potential release site (PRS) 21-024(e) is the location of a septic system that routed sewage from Building TA-21-20 (removed in 1965) through a concrete septic tank to the ground surface on the south rim of DP Mesa above Los Alamos Canyon. The outfall of the septic tank is broad and open with a clearly defined drainage channel. Results of investigations at this site<sup>1</sup> suggested that the only contaminant present at levels greater than Los Alamos National Laboratory (LANL) screening action levels<sup>2</sup> was plutonium-239.

PRS 21-024(e) is listed in the Hazardous and Solid Waste Amendments (HSWA) module of LANL's Resource Conservation and Recovery Act (RCRA) permit. When results of the RCRA facility investigation (RFI) at this site were reported,<sup>1</sup> LANL proposed to the Environmental Protection Agency (EPA) that no further action be taken for RCRA constituents and a risk assessment be performed for radioactivity. EPA accepted this proposal and recommended a request for a Class 3 modification to the HSWA module in a notice of deficiency.<sup>3</sup>

#### CORRECTIVE ACTION

PRS 21-024(e) at Field Unit 1, TA-21, was selected for voluntary corrective action (VCA). A VCA plan was prepared, and the plan was approved by the Department of Energy (DOE).<sup>4,5</sup> The VCA was conducted according to the plan with one minor deviation (noted below). This report provides the results of the VCA.

Action on this PRS began on July 26 when the septic tank at PRS 21-024(e) was sampled to characterize its contents for waste disposal (Fig. 1). A hand auger was used to obtain one representative sample from the entire 0-to-8-ft depth of the tank; the sample was analyzed for metals (using toxicity characteristic leaching procedures [TCLP]), semivolatile organic compounds, and isotopic plutonium. Three additional samples were collected from the top, middle, and bottom of the tank contents and analyzed for volatile organic compounds. To ensure worker health and safety and to meet the requirements of the fixed analytical laboratory, samples were screened for radiation and volatile compounds using hand-held instruments and mobile laboratory techniques.

On August 22 and 23, the drainage area below the septic tank outfall was surveyed for low-energy gamma radiation.<sup>6</sup> At 12 locations where an increase in low-energy gamma radiation was identified (Fig. 1), additional field instruments were used to quantify alpha activity (also indicating possible plutonium-239 contamination). To verify field results, six samples from these locations were sent to an off-site laboratory for plutonium-239 analysis.

<sup>1</sup> Phase Report Addendum 1B and 1C: Operable Unit 1106 RCRA Facility Investigation, LA-UR-94-4360, January 1995.

<sup>2</sup> Action level developed for Environmental Restoration Project screening assessments; documented in *Installation Work Plan for Environmental Restoration*, Appendix J, September 1994.

<sup>3</sup> List of Deficiencies: Operable Unit 1106, RFI Reports 1B, 1C, and Addendum 1B and 1C, March 1995.

<sup>4</sup> Voluntary Corrective Action Plan for TA-21 Septic Tank 21-024(e), September 12, 1995.

<sup>5</sup> Memo from B. Koch to T. Taylor, Re: VCA Plan for 21-024(e), September 12, 1995.

<sup>6</sup> Low-energy gamma radiation is emitted by americium-241, which is a daughter of plutonium-241. Plutonium-241 is a contaminant of the plutonium-239 separation process and is commonly used to indicate the presence of plutonium-239.

On September 7 and 8, the contents of the septic tank were removed with a backhoe and placed in five waste containers, resulting in approximately 18 yd<sup>3</sup> of waste. The containers were moved to MDA V at TA-21 where they will be stored until they can be disposed of properly as low-level radioactive waste. Backhoe operations were monitored for radiation and volatile compounds using hand-held instruments. When the tank was empty, a LANL radiation control technician swiped the walls of the tank and detected no removable radioactivity. In accordance with New Mexico regulations for abandoning septic tanks, the inlet and outlet lines were grouted with concrete, the tank was filled with pea gravel, and the area was regraded. On September 15, the surrounding area was reseeded and restored to original condition.

The VCA was completed with the following deviation from the approved VCA plan: samples from the drainage area were sent to a fixed analytical laboratory to verify results obtained with field instruments, which was not required in the plan.

## RESULTS

The results of septic tank contents analyses are presented in Table 1; the results of drainage area analyses are presented in Table 2. Copies of all data reports are available and will be provided upon request.

**Septic Tank Contents.** One semivolatile organic compound, chrysene, was detected. This compound, a polyaromatic hydrocarbon, is a constituent of asphalt, road oil, and diesel fuel and would collect in this tank when precipitation runs off parking areas to the north. Chrysene in the septic tank does not make the contents a hazardous waste. One volatile organic compound, 1,4-dichlorobenzene, was also detected. This compound would be considered hazardous if it had been discarded as a commercial chemical product, off-specification species, container residue, or spill residue thereof; at PRS 21-024(e), however, these criteria do not apply. All metals detected in the toxicity characteristic leachate were present at levels less than the toxicity characteristic regulatory level.<sup>7</sup> These results confirm the absence of RCRA hazardous constituents in the VCA waste.

Plutonium-238 was detected at a level greater than the upper tolerance limit<sup>8</sup> but less than the process area baseline;<sup>9</sup> plutonium-239 was detected at a level greater than both the upper tolerance limit and process area baseline. These results confirmed the presence of radioactivity in the VCA waste. Because the cleanup level<sup>10</sup> for plutonium-239 was not exceeded, however, cleanup actions at the septic tank were limited to abandonment in accordance with New Mexico regulations.

**Drainage Area Samples.** Results of field analyses indicated that plutonium-239 levels were less than the cleanup level throughout the drainage area, except possibly at sample locations 21-4066 and 21-4069 (Fig. 1). Results of laboratory analyses on samples from these and other locations confirmed that all samples had plutonium-239 levels less than the screening action level<sup>2</sup> and the cleanup level.<sup>10</sup>

Correspondence between laboratory and field results was poor, however, and most plutonium-239 laboratory results were much less than the estimated concentrations, which are calculated

<sup>7</sup> Level at which a solid waste containing this compound is regulated as a characteristically toxic hazardous waste; documented in 40CFR261.24.

<sup>8</sup> Limit at the 99th percentile with a 95% confidence level of a range of regional background concentrations; documented in *Statistical Comparisons to Background, Part I*, LA-UR-95-1217, March 28, 1995. Limit at the 95th percentile has not been calculated for plutonium isotopes.

<sup>9</sup> Comparison value developed from the 95.5% confidence level of ambient analyte concentrations in soil from TA-21 process areas; documented in *Phase Report 1C: TA-21 Operable Unit RCRA Facility Investigation*, LA-UR-94-228, February 28, 1994.

<sup>10</sup> Decontamination and Decommissioning Program cleanup level determined using RESRAD, Version 5.191, Code for Calculating Residual Radioactivity in Soil for a 100 mrem/yr dose to a resident farmer.

assuming that all alpha activity greater than background was from plutonium-239. If we do not make this assumption, the poor correspondence may be explained by the presence of uranium, which was detected at levels greater than the upper tolerance limit and process area baseline but less than the screening action level in samples analyzed and reported as part of the Phase I RFI. If uranium is responsible for the additional alpha emissions, the levels of uranium-234 and uranium-238 would total 129.7 pCi/g, or 64.85 pCi/g of each of these isotopes, at location 21-4069 where alpha radioactivity was greatest. Such values exceed the upper tolerance limit and the process area baseline for both isotopes and the screening action level for uranium-238, although not for uranium-234.

Given these values, it is appropriate to analyze the cumulative impact of radionuclides on human health to determine if the designated cleanup levels have been exceeded. The results of this analysis are presented in Table 3. The sum of the ratios of maximum analyzed values to cleanup levels is less than one, suggesting that these radionuclides taken together do not exceed cleanup levels.

Although the laboratory and field results for plutonium-239 do not correspond, the additional alpha emitters (if assumed to be uranium isotopes) do not exceed cleanup levels. Because the cleanup level was not exceeded, no cleanup actions were taken in the drainage area.

## **CONCLUSIONS**

This PRS can be removed from the HSWA module, as recommended by EPA.<sup>3</sup> The VCA addressed the radioactive contamination in the septic tank and drainage area and resulted in tank abandonment according to New Mexico regulations. This report serves as the formal request for DOE concurrence that PRS 21-024(e) need no longer be considered a discrete PRS for radiological issues, PRS 21-024(e) may be dropped from the list of Environmental Restoration Project PRSs, and no risk assessment for radioactivity is necessary at PRS 21-024(e).

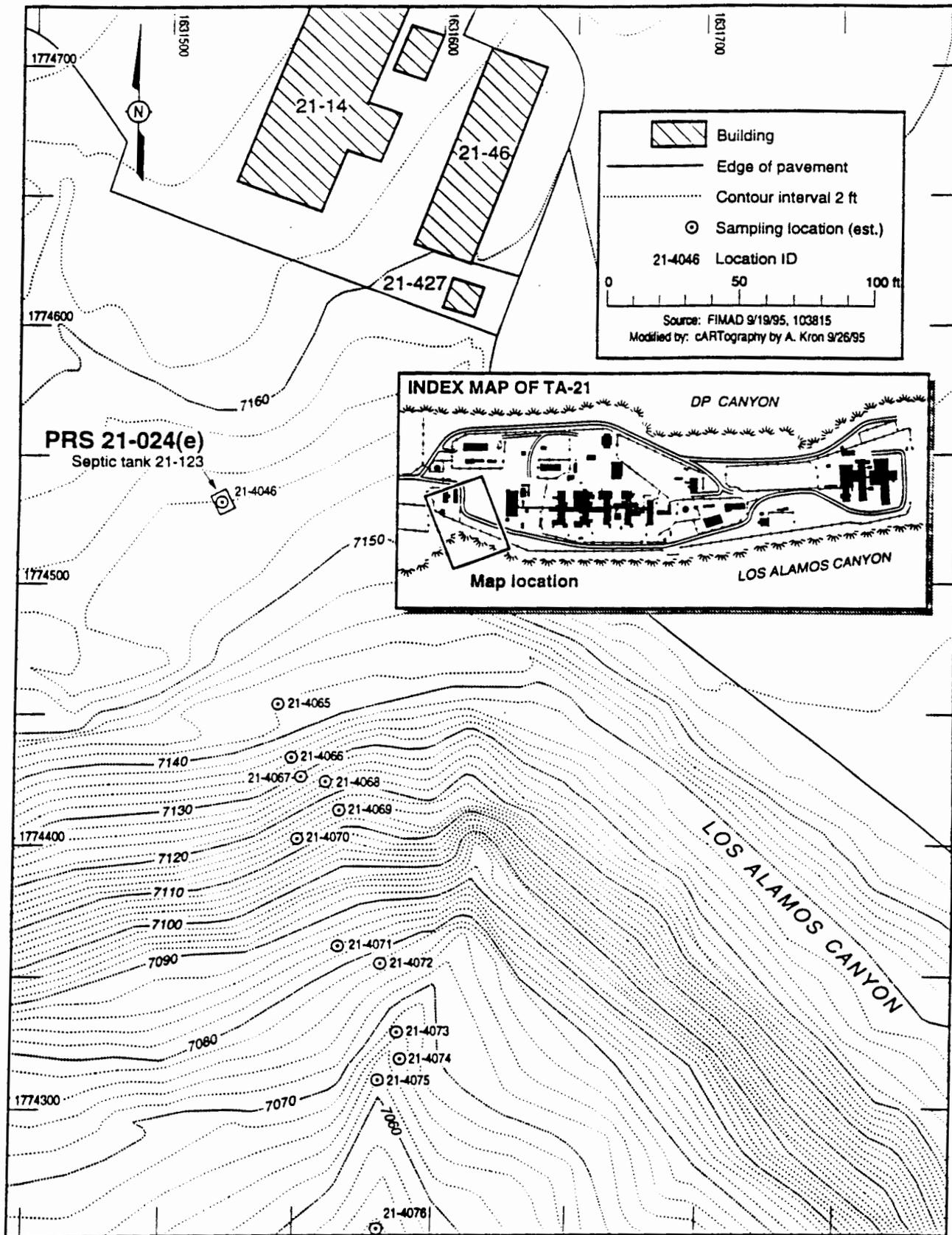


Fig. 1. Location of Samples Collected at PRS 21-024(e)

Table 1. Results of Septic Tank Contents Analyses for Waste Characterization at PRS 21-024(e)

Comparison Value	Radionuclides		Metals <sup>a</sup>			Semivolatile Organic Compounds	Volatile Organic Compounds
	<sup>238</sup> Pu (pCi/g)	<sup>239</sup> Pu (pCi/g)	As (μg/L)	Ba (μg/L)	Cd (μg/L)	Chrysene (μg/kg)	1,4-Dichlorobenzene (μg/kg)
Upper tolerance limit <sup>b</sup>	0.014	0.052	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>
Process area baseline <sup>d</sup>	6.21	9.41	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>	NC <sup>c</sup>
Toxicity characteristic threshold value <sup>e</sup>	NC <sup>c</sup>	NC <sup>c</sup>	5,000	100,000	1,000	NC <sup>c</sup>	NC <sup>c</sup>

Location ID	Sample ID	Depth (ft)	Radionuclides		Metals			Semivolatile Organic Compounds	Volatile Organic Compounds
			<sup>238</sup> Pu (pCi/g)	<sup>239</sup> Pu (pCi/g)	As (μg/L)	Ba (μg/L)	Cd (μg/L)	Chrysene (μg/kg)	1,4-Dichlorobenzene (μg/kg)
21-4046	121-95-0341	0-2.5	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	ND <sup>g</sup>	
21-4046	121-95-0342	2.5-5.0	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	ND <sup>g</sup>	
21-4046	121-95-0343	5.0-8.0	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	NA <sup>f</sup>	170	
21-4046	121-95-0344	0-8.0	0.02	19.5	78.7	1340	54.2	600	

- a Analyzed using toxicity characteristic leaching procedures (TCLP)
- b Limit at the 99th percentile with a 95% confidence level of a range of regional background concentrations; limit at the 95th percentile has not been calculated for plutonium isotopes
- c Not calculated in comparable units
- d Comparison value developed from the 95.5% confidence level of ambient analyte concentrations in soil from TA-21 process areas
- e Level at which a solid waste containing this compound is regulated as a characteristically toxic hazardous waste
- f Not analyzed
- g Not detected

Table 2. Results of Drainage Area Analyses at PRS 21-024(e)

Comparison Value	<sup>239</sup> Pu (pCi/g)
Upper tolerance limit <sup>a</sup>	0.052
Process area baseline <sup>b</sup>	9.41
Screening action level <sup>c</sup>	18
Cleanup level <sup>d</sup>	75

Location ID	Sample ID	Depth (in.)	Field Analysis	Lab Analysis
			Estimated <sup>239</sup> Pu (pCi/g)	<sup>239</sup> Pu (pCi/g)
21-4065	121-95-0381	0-6	64	14.6
21-4065	121-95-0382	6-12	11	NA <sup>e</sup>
21-4066	121-95-0383	0-6	101	17.1
21-4067	121-95-0384	0-6	34	NA <sup>e</sup>
21-4068	121-95-0385	0-6	36	5.1
21-4069	121-95-0386	0-6	142	12.3
21-4070	121-95-0387	0-6	13	NA <sup>e</sup>
21-4071	121-95-0388	0-6	47	NA <sup>e</sup>
21-4072	121-95-0389	0-6	9	NA <sup>e</sup>
21-4072	121-95-0390	6-12	44	3.7
21-4073	121-95-0391	0-6	1	NA <sup>e</sup>
21-4073	121-95-0392	6-12	9	NA <sup>e</sup>
21-4074	121-95-0393	0-6	< 1	NA <sup>e</sup>
21-4075	121-95-0394	0-6	< 1	2.3
21-4076	121-95-0395	0-6	36	NA <sup>e</sup>
21-4076	121-95-0396	6-12	4	NA <sup>e</sup>
21-4076	121-95-0397	12-18	30	NA <sup>e</sup>

- a Limit at the 99th percentile with a 95% confidence level of a range of regional background concentrations; limit at the 95th percentile has not been calculated for plutonium isotopes
- b Comparison value developed from the 95.5% confidence level of ambient analyte concentrations in soil from TA-21 process areas
- c Action level developed for Environmental Restoration Project screening assessments
- d Decontamination and Decommissioning Program cleanup level determined using RESRAD, Version 5.191, Code for Calculating Residual Radioactivity in Soil for a 100 mrem/yr dose to a resident farmer
- e Not analyzed

Table 3. Analysis for Cumulative Impact of Radionuclides Found Above Upper Tolerance Limits at PRS 21-024(e)

Radionuclide	Maximum Analyzed Value (pCi/g)	Cleanup Level (pCi/g) <sup>a</sup>	Ratio
Plutonium-238	0.14	85	0.002
Plutonium-239	17.1	75	0.228
Uranium-234 <sup>b</sup>	64.85	400	0.162
Uranium-238 <sup>b</sup>	64.85	350	0.185
Sum			0.58

a As determined using RESRAD, Version 5.191, Code for Calculating Residual Radioactivity in Soil for a 100 mrem/yr dose to a resident farmer

b Activity of each uranium isotope is estimated to be half the difference between the estimated <sup>239</sup>Pu concentration (from field analyses) and the analyzed <sup>239</sup>Pu concentration (from laboratory analyses)

DOC TITLE: Final Reports and Cert. Of Completion for VCA's (TA-21 review)

ITEM #	PAGE, SECTION #, OR DRAWING #.	COMMENTS	RESPONSE
7	Page 2 & 5	<b>FRS 21-024(e), SEPTIC SYSTEM AND OUTFALL.</b> As per EPA, shouldn't the UTL's be calculated based on the 95th percentile with a 95% confidence level of a range of regional background concentrations?	This limit has not been calculated for plutonium isotopes. Footnote 8 on page 2; footnote b, Table 2, on page 5; and footnote c, Table 2, on page 5 have been revised to provide this information. Footnote 10 on page 2 and footnote d, Table 2, on page 5 have been revised. Footnote 11 on page 2 has been deleted and the text has been revised.
8	Page 2 & 5	For footnotes referencing RESRAD calculations by D&D, add the RESRAD version 5.191.	
9	Page 2	Footnotes 10 and 11 are the same, delete 11 and change reference in text.	
10	Page 2 & 6	<b>FRS 21-024(b), SEPTIC SYSTEM AND OUTFALL.</b> As per EPA, shouldn't the UTL's be calculated based on the 95th percentile with a 95% confidence level of a range of regional background concentrations?	
11	Page 2 & 6	For footnotes referencing RESRAD calculations by D&D, add the RESRAD version 5.191.	

REVIEWED BY: Joseph Mass. DOE/LAAO. (505)667-5808

DATE: 11/21/95

REVIEWED BY: \_\_\_\_\_

DATE: \_\_\_\_\_

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ENV. & PROJECTS

1-2-96 4:48PM

SENT BY: DEPT. OF ENERGY

ITEM #	PAGE, SECTION #, OR DRAWING #.	COMMENTS	RESPONSE
1	Page 2 & 4	<p><b>FRS C-21-027, COOLING TOWER</b></p> <p>As per EPA, shouldn't the UTL's be calculated based on the 95th percentile with a 95% confidence level of a range of regional background concentrations?</p>	
2	Page 1 & 4	<p><b>FRS 21-022(j), SUMP</b></p> <p>Was the sump located in building 21-3 as stated in the text on page 1, or in building 21-4 as shown in the figure on page 4?</p>	
3	Page 2 & 5	<p>As per EPA, shouldn't the UTL's be calculated based on the 95th percentile with a 95% confidence level of a range of regional background concentrations?</p>	
4	Page 5	<p>For footnote "f" add the version of RESRAD used (5.191).</p>	
5	Page 2 & 5	<p><b>FRS 21-024(d), SEPTIC SYSTEM AND OUTFALL</b></p> <p>As per EPA, shouldn't the UTL's be calculated based on the 95th percentile with a 95% confidence level of a range of regional background concentrations?</p>	
6	Page 2 & 6	<p>For footnotes referencing RESRAD calculations by D&amp;D, add the RESRAD version 5.191.</p>	

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