# Los Alamos National Laboratory

ENVIRONMENTAL RESTORATION

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**

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

10219

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
21-022(j)
TA-21 Sump



Field Unit 1

## Environmental Restoration Program

February 1996
Revision 1

A Department of Energy
Environmental Cleanup Program

Los Alamos
NATIONAL LABORATORY

LA-UR-96-248

# Voluntary Corrective Action Completion Report
# Potential Release Site 21-022(j)
# TA-21 Sump

Environmental Restoration Project
Field Unit One
Los Alamos National Laboratory

Revision 1

January 22, 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 21-022(j) has been completed in accordance with the Department of Energy approved VCA plan entitled *Voluntary Corrective Action Plan for TA-21 Sump and Cooling Tower Sites.* 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 both protective to 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.

GR Allen

Gary Allen
Field Unit One Project Leader
Environmental Restoration Project
Los Alamos National Laboratory

7 Feb 96

Date signed

# Voluntary Corrective Action Completion Report
# Potential Release Site 21-022(j)
# TA-21 Sump

## DESCRIPTION

Potential release site (PRS) 21-022(j) is the location of a former sump in an equipment room in the southeast corner of Building TA-21-3. PRS 21-022(j) is listed in the Hazardous and Solid Waste Amendments (HSWA) module of Los Alamos National Laboratory's (LANL's) Resource Conservation and Recovery Act (RCRA) permit.[1] Chapter 18.9 of the Technical Area 21 (TA-21) RFI work plan[2] states that activities at this PRS were to be coordinated with the TA-21 Decontamination and Decommissioning Program.

The sump, which occupied an area 18 in. by 18 in. by 8 ft, received drainage from the equipment room. The equipment room was below grade, and the bottom of the sump was approximately 14 ft below ground level. During decontamination and decommissioning activities, the above-ground section of the equipment room was removed (along with the south portion of Building TA-21-3) in 1994, and the below-ground section was removed in April 1995. The footprint of the sump was left exposed. No information was available from previous investigations to determine whether hazardous or radioactive contamination remained at this site. It was expected that any contamination was removed during decontamination and decommissioning activities.

## CORRECTIVE ACTION

PRS 21-022(j) at Field Unit 1, TA-21 at LANL was selected for voluntary corrective action (VCA). A VCA plan was prepared, and the plan was approved by the Department of Energy (DOE).[3,4] The VCA was conducted according to the plan with minor deviations (noted below). This report provides the results of the VCA.

The VCA at this site deviated from the initial characterization plan presented in Chapter 18.9 of the TA-21 RFI work plan. This plan called for a 50-ft borehole to be placed outside the building (before the building was removed) and 20 ft south of the sump with the objective of identifying contaminants spreading from beneath the sump. When the building was removed during decontamination and decommissioning and the floor of the sump was exposed, we took the opportunity to sample immediately beneath the sump where there is the greatest potential for contamination. We judged this biased sampling approach to be an improvement on and a sufficient replacement for the original plan.

Action on this PRS was begun in 1994 when decontamination and decommissioning operations removed the contaminated structures that stood above ground on this site and continued in April 1995 when the below-ground sections were removed. Documentation that the remedy was completed is provided by confirmatory sampling discussed in this report.

In compliance with the approved VCA plan, three confirmatory samples from one location in the center of the footprint of the former sump (Fig. 1) were collected. Starting at the bottom of the

---

[1] We have reported the results of actions taken at PRS 21-022(j) in this report in lieu of preparing a separate RCRA facility investigation (RFI) report. Decontamination and decommissioning activities obviated the need for a Phase I investigation and results show that no RCRA concerns remain following the decontamination and decommissioning activities. This VCA report presents the information that would otherwise be provided in an RFI report.
[2] *TA-21 Operable Unit RFI Work Plan for Environmental Restoration*, May 1991.
[3] *Voluntary Corrective Action Plan for TA-21 Sump and Cooling Tower Sites*, August 9, 1995.
[4] Memo LAAO:EP:TJT:VCA:1.4.2.5.3.3.17, from Theodore J. Taylor to J. Jansen, August 1995.

sump footprint, which was exposed at approximately 14 ft below ground level, samples were collected at 0-to-6 in., 6-to-12 in., and 12-to-18 in. intervals using a backhoe. A duplicate of the 0-to-6-in. sample and a rinsate blank were also collected.

To ensure worker health and safety and to meet the requirements of the fixed analytical laboratory, samples were screened for radiation using hand-held field instruments and mobile laboratory techniques. To confirm the absence of contaminants following corrective action, samples were sent to a fixed laboratory and analyzed for gamma-emitting radionuclides, tritium, isotopic uranium, isotopic plutonium, isotopic thorium, strontium-90, americium-241, semivolatile and volatile organic compounds, and metals (inorganic compounds analyzed by Environmental Protection Agency (EPA) Method SW6010), as stated in the approved VCA plan.

All wastes were disposed of through the TA-21 decontamination and decommissioning process.

The VCA was completed with the following deviations from the approved VCA plan.

- Sample locations were surveyed to provide exact coordinates, which was not required explicitly in the plan.
- Samples were not screened for volatile organic compounds in the field as planned because experience from decontamination and decommissioning operations indicated that such contaminants were not present at this site.
- Samples were analyzed for isotopic uranium rather than total uranium (as planned) to provide a more complete characterization.
- A duplicate sample and a rinsate blank were collected.

## RESULTS

The results of confirmatory sampling are presented in Tables 1 and 2. Copies of all data reports are available and will be provided upon request.

**Data Quality.** All analyses requested were reported and analytical quality was acceptable for the intended purpose, which was to verify residual contaminant levels.

**Background Comparison.** No volatile or semivolatile organic compounds were present at levels greater than the minimum amount that the analytical method could detect. All detected metals were present at levels less than process area baselines[5] and screening action levels.[6] Calcium, lead, and zinc were detected at levels slightly greater than upper tolerance limits.[7]

All samples exceeded the upper tolerance limit for one or more of the following radionuclides: cesium-137, plutonium-238, plutonium-239, strontium-90, uranium-234, and uranium-235 (the uranium isotopic ratios indicate that enriched uranium contamination is present). None, except for plutonium-239, exceeded the Environmental Restoration Project screening action levels, and none exceeded the Decontamination and Decommissioning Program cleanup levels.

**Human Health Screening Assessment.** The metals that exceeded upper tolerance limits were only marginally elevated; thus, no human health impact is expected. For the radionuclides

[5] 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.
[6] Action level developed for Environmental Restoration Project screening assessments; documented in *Installation Work Plan for Environmental Restoration*, Appendix J, September 1994.
[7] Limit at the 95th percentile with a 95% confidence level of a range of regional background concentrations; documented in *Natural Background Geochemistry and Statistical Analysis of Selected Soil Profiles, Sediments, and Bandelier Tuff, Los Alamos, New Mexico*, LA-UR-95-3468. For americium-241, cesium-137, tritium, plutonium-238 and -239, strontium-90, and thorium-230, the limit at the 95th percentile has not been calculated so the limit at the 99th percentile with a 95% confidence level of a range of regional background concentrations was used; documented in *Statistical Comparisons to Background, Part I*, LA-UR-95-1217, March 28, 1995.

that exceeded the upper tolerance limit, an analysis of the cumulative impact of these radionuclides on human health, using the cleanup levels, is appropriate. (Such an analysis is usually done during a human health screening assessment as a multiple constituent evaluation using screening action levels; however, in this situation it is the designated cleanup levels that are relevant.) 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. In addition, pathways for exposure to these radionuclides are severely limited because the sump has been backfilled.

**Ecotoxicological Screening Assessment.** The radionuclides that exceeded the upper tolerance limit do not raise ecological concerns. TA-21 provides limited habitat for biota, does not contain sensitive habitats, and does not harbor threatened or endangered species. Therefore, no ecotoxicological screening assessment is necessary for this PRS.

**Nature and Extent of Contamination.** Results of analyses suggest that the contamination at 21-022(j) is nonhazardous, low-level plutonium-239 contamination. Results show that plutonium-239 levels are least in the deepest sample collected (12-to-18 in.), which suggests that the contamination is confined to the area directly beneath the floor of the sump.

## CONCLUSIONS

On the basis of analyses for volatile organic compounds, semivolatile organic compounds, and metals, we conclude that no release of RCRA hazardous materials occurred from sump PRS 21-022(j). This report serves as the formal request for regulator concurrence to remove PRS 21-022(j) from the HSWA module.

On the basis of analysis for cumulative impact of radionuclides found above background levels, we conclude that PRS 21-022(j) need no longer be considered a discrete PRS for radiological issues. This report serves as the formal request for DOE concurrence to remove PRS 21-022(j) from the list of Environmental Restoration Project PRSs.

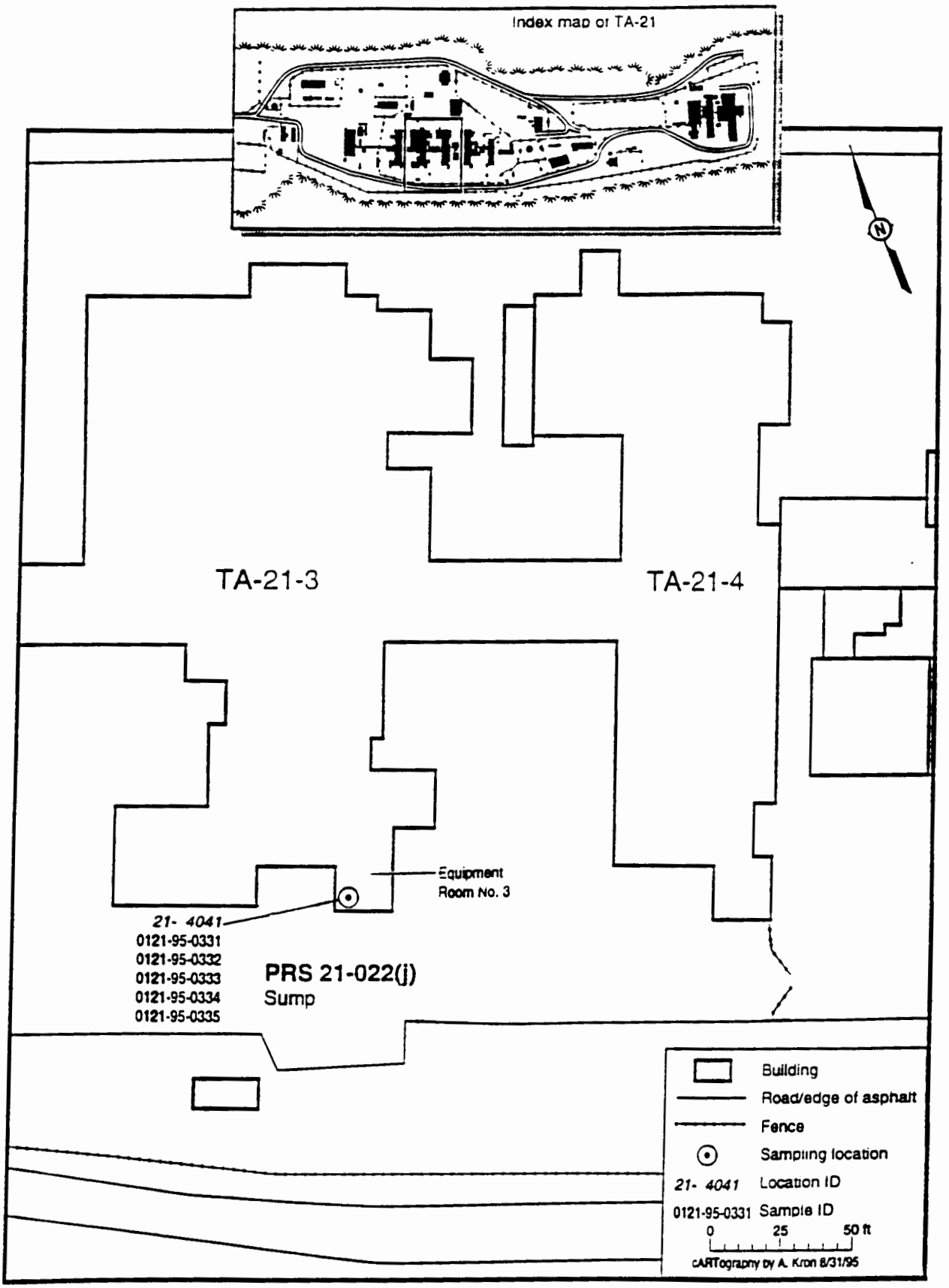


Fig. 1. Location of Confirmatory Samples Collected at PRS 21-022(j)

## Table 1. Results of Analyses for Metals at PRS 21-022(j)

| Comparison Value | Al (mg/kg) | As (mg/kg) | Ba (mg/kg) | Be (mg/kg) | Ca (mg/kg) | Co (mg/kg) | Cr (mg/kg) | Cu (mg/kg) | Fe (mg/kg) | Hg (mg/kg) | K (mg/kg) | Mg (mg/kg) | Mn (mg/kg) | Na (mg/kg) | Ni (mg/kg) | Pb (mg/kg) | V (mg/kg) | Zn (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper tolerance limit[a] | 38,700 | 7.82 | 315 | 1.95 | 6120 | 19.2 | 19.3 | 30.7 | 21,300 | 0.1 | 3410 | 4610 | 714 | 915 | 15.2 | 23.3 | 41.9 | 50.8 |
| Process area baseline[b] | 74,900 | 3.67 | 513 | 4.23 | 13,880 | 8.50 | 21 | 50.8 | 23,200 | NA[c] | NA[c] | 4,760 | 592 | 29,600 | 13.6 | 56.5 | 43.4 | 210 |
| Screening action level[d] | NA[c] | NA[c] | 5,600 | NA[c] | NA[c] | NA[c] | 400[e] | 3,000 | NA[c] | 24 | NA[c] | NA[c] | 11,000 | NA[c] | 1,600 | 400 | 560 | 24,000 |

| Location ID | Sample ID | Depth (in.) | Al (mg/kg) | As (mg/kg) | Ba (mg/kg) | Be (mg/kg) | Ca (mg/kg) | Co (mg/kg) | Cr (mg/kg) | Cu (mg/kg) | Fe (mg/kg) | Hg (mg/kg) | K (mg/kg) | Mg (mg/kg) | Mn (mg/kg) | Na (mg/kg) | Ni (mg/kg) | Pb (mg/kg) | V (mg/kg) | Zn (mg/kg) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21-4041 | 121-95-0331 | 0-6 | 6,010 | 3.0 | 88.0 | 0.36 | 6,130 | 3.6 | 5.6 | 6.0 | 8,950 | 0.09 | 921 | 1,450 | 232 | 278 | 3.7 | 13.6 | 13.3 | 49.3 |
| 21-4041 | 121-95-0334 | 0-6 | 6,370 | 2.2 | 98.5 | 0.47 | 5,950 | 2.8 | 6.2 | 5.8 | 9,170 | ND[f] | 1,110 | 1,390 | 264 | 271 | 5.9 | 11.9 | 14.8 | 50.2 |
| 21-4041 | 121-95-0332 | 6-12 | 7,240 | 1.7 | 100 | 0.65 | 5,830 | 0.8 | 6.7 | 6.4 | 9,320 | 0.06 | 1,250 | 1,630 | 254 | 283 | 7.2 | 25.8 | 15.6 | 65.5 |
| 21-4041 | 121-95-0333 | 12-18 | 2,030 | 1.1 | 38.5 | 0.28 | 3,740 | 2.2 | 2.1 | 2.9 | 9,170 | ND[f] | 538 | 844 | 254 | 218 | 5.5 | 4.8 | 5.1 | 40.5 |

a Limit at the 95th percentile with a 95% confidence level of a range of regional background concentrations
b Comparison value developed from the 95.5% confidence level of ambient analyte concentrations in soil from TA-21 process areas
c Not available
d Action level developed for Environmental Restoration Project screening assessments
e Level is for chromium(VI)
f Not detected

## Table 2. Results of Analyses for Moisture and Radionuclides at PRS 21-022(j)

| Comparison Value | $^{241}$Am (pCi/g) | $^{137}$Cs (pCi/g) | $^{3}$H (pCi/L) | $^{40}$K (pCi/g) | $^{238}$Pu (pCi/g) | $^{239}$Pu (pCi/g) | $^{90}$Sr (pCi/g) | $^{228}$Th (pCi/g) | $^{230}$Th (pCi/g) | $^{232}$Th (pCi/g) | $^{234}$U (pCi/g) | $^{235}$U (pCi/g) | $^{238}$U (pCi/g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Upper tolerance limit[a] | NA[b] | 1.4 | NA[b] | 28.6 | 0.014 | 0.052 | 1 | 2.47 | 1.90 | 2.47 | 1.94 | 0.084 | 1.82 |
| Process area baseline[c] | 0.53 | NA[b] | 7,850 | NA[b] | 6.21 | 9.41 | 0.73 | 2.05 | 1.82 | 1.98 | 2.03 | 0.15 | 2.19 |
| Screening action level[d] | 17 | 4 | 2,300,000[e] | NA[b] | 20 | 18 | 5.9 | NA[b] | 5 | 5 | 86 | 18 | 59 |
| Cleanup level[f] | 75 | 30 | NA[b] | NA[b] | 85 | 75 | 11 | NA[b] | NA[b] | NA[b] | 400 | 135 | 350 |

| Location ID | Sample ID | Depth (in.) | Moisture (%) | $^{241}$Am (pCi/g) | $^{137}$Cs (pCi/g) | $^{3}$H (pCi/L) | $^{40}$K (pCi/g) | $^{238}$Pu (pCi/g) | $^{239}$Pu (pCi/g) | $^{90}$Sr (pCi/g) | $^{228}$Th (pCi/g) | $^{230}$Th (pCi/g) | $^{232}$Th (pCi/g) | $^{234}$U (pCi/g) | $^{235}$U (pCi/g) | $^{238}$U (pCi/g) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 21-4041 | 121-95-0331 | 0-6 | 13.6 | 1.3 | 3.49 | 8,970 | 23.1 | 0.2 | 22.5 | 2.46 | 0.7 | 1.2 | 0.7 | 18.8 | 0.93 | 0.92 |
| 21-4041 | 12-95-0334 | 0-6 | 13.4 | 1.3 | 3.18 | 9,800 | 26.6 | 0.2 | 17.9 | 2.18 | 0.6 | 0.9 | 0.5 | 19.9 | 1.22 | 1.06 |
| 21-4041 | 121-95-0332 | 6-12 | 13.6 | 1.8 | 3.72 | 9,310 | 25.9 | 0.2 | 26.2 | 3.07 | 0.7 | 1.1 | 0.8 | 24.3 | 1.92 | 1.16 |
| 21-4041 | 121-95-0333 | 12-18 | 13.1 | 0.4 | 0.335 | 4,700 | 29.8 | 0.1 | 8.1 | < 2 | 0.7 | 1.5 | 0.5 | 8.66 | 0.49 | 0.7 |

a Limit at the 99th percentile with a 95% confidence level of a range of regional background concentrations for $^{241}$Am, $^{137}$Cs, $^{3}$H, $^{238}$Pu, $^{239}$Pu, $^{90}$Sr, $^{230}$Th; limit at the 95th percentile with a 95% confidence level of a range of regional background concentrations for $^{40}$K, $^{228}$Th, $^{232}$Th, $^{234}$U, $^{235}$U, and $^{238}$U.
b Not available
c Comparison value developed from the 95.5% confidence level of ambient analyte concentrations in soil from TA-21 process areas
d Action level developed for Environmental Restoration Project screening assessments
e Calculated assuming a screening action level of 810 pCi/g of dry soil and 26% soil moisture
f 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

Table 3. Analysis for Cumulative Impact of Radionuclides Found Above Upper Tolerance Limits at PRS 21-022(j)

| Radionuclide | Maximum Analyzed Value (pCi/g) | Cleanup Level (pCi/g)[a] | Ratio |
|---|---|---|---|
| Cesium-137 | 3.72 | 30 | 0.124 |
| Plutonium-238 | 0.2 | 85 | 0.002 |
| Plutonium-239 | 26.2 | 75 | 0.35 |
| Strontium-90 | 3.07 | 11 | 0.28 |
| Uranium-234 | 24.3 | 400 | 0.06 |
| Uranium-235 | 1.92 | 135 | 0.014 |
| Total | | | 0.83 |

a 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

| LOS ALAMOS AREA OFFICE (LAAO) | DOCUMENT REVIEW/RESPONSE<br>DOC TITLE: Final Reports and Cert. Of Completion for VCA's (TA-21 review) | Page 1 of 2 |
|---|---|---|

| ITEM # | PAGE, SECTION #, OR DRAWING #. | COMMENTS | RESPONSE |
|---|---|---|---|
| | | **PRS C-21-027, COOLING TOWER** | |
| 1 | Page 2 & 4 | 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? | |
| | | **PRS 21-022(j), SUMP** | |
| 2 | Page 1 & 4 | 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? | Text on p. 1 is correct. Figure 1 has been revised to show the correct location of the sump. JAL |
| 3 | Page 2 & 5 | 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? | Text on p. 2 has been revised to compare sample results to the 95/95 UTLs Table 2 on p. 5. has been revised to include the 95/95 UTLs, where they are available. JAL |
| 4 | Page 5 | For footnote "f" add the version of RESRAD used (5.191). | Table 2, footnote f, p 5, has been revised to include the RESRAD version. JAL |
| | | **PRS 21-024(d), SEPTIC SYSTEM AND OUTFALL** | |
| 5 | Page 2 & 5 | 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? | |
| 6 | Page 2 & 6 | For footnotes referencing RESRAD calculations by D&D, add the RESRAD version 5.191. | |

REVIEWED BY: Joseph Moss, DOE/LAAO, (505)667-5808 DATE: 11/21/95

REVIEWED BY: _____ DATE: _____

| LOS ALAMOS AREA OFFICE (LAAO) | DOCUMENT REVIEW/RESPONSE<br>DOC TITLE: Final Reports and Cert. Of Completion for VCA's (TA-21 review) | |
|---|---|---|

| ITEM # | PAGE, SECTION #, OR DRAWING #. | COMMENTS | RESPONSE |
|---|---|---|---|
| | | **PRS 21-024(e), SEPTIC SYSTEM AND OUTFALL** | |
| 7 | Page 2 & 5 | 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? | |
| 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. | |
| | | **PRS 21-024(h), SEPTIC SYSTEM AND OUTFALL** | |
| 10 | Page 2 & 6 | 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 Mase, DOE/LAAO, (505)667-5808 DATE: 11/21/95

REVIEWED BY: _____ DATE: _____