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*Date:* July 14, 1999
*Refer to:* E/ER:99-179

Mr. James Bearzi
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P.O. Box 26110
Santa Fe, NM 87502

**SUBJECT: SUBMITTAL OF VOLUNTARY CORRECTIVE ACTION PLAN FOR PRSs 21-024(f) AND C-21-015**

Dear Mr. Bearzi:

Enclosed is a copy of the Voluntary Corrective Action (VCA) Plan for PRSs 21-024(f) and C-21-015 (Enclosure 1) for your review. Enclosure 2, an update for the Material Disposal Area Technical Area 21 Reference Set, includes references that correspond to this plan. Instructions for updates are included.

If you have any questions or concerns please feel free to call Dave McInroy at (505) 667-0819 or Deba Daymon at (505) 667-9021.

Sincerely,

Julie A. Canepa, Program Manager
LANL/ER

Sincerely,

Theodore J. Taylor, Program Manager
DOE/LAAO

JC/TT/dm

Enclosures: (1) VCA Plan for PRSs 21-024(f) and C-21-015
(2) Update to Reference Set for Material Disposal Areas TA-21



10539

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July 1999

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# Voluntary Corrective Action Plan for Potential Release Sites

## 21-024(f)
## C-21-015

Environmental Restoration Project
A Department of Energy Environmental Cleanup Program

**Los Alamos**
NATIONAL LABORATORY
Los Alamos, NM 87545

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## EXECUTIVE SUMMARY

This voluntary corrective action (VCA) plan describes activities that will be conducted at Potential Release Sites (PRSs) 21-024(f) and C-21-015 located in Technical Area (TA) 21. PRS 21-024(f) is an inactive septic system (inlet pipe, septic tank, outlet pipe, outfall pit, and outfall drainage area), and PRS C-21-015 is the location of the former Building TA-21-45 and includes an inactive concrete sump and associated piping.

Both the septic system and the sump served Building TA-21-45. This building was originally situated at 15th Street and Trinity Drive; in July 1947, the building was moved to the north side of DP Road across from the DP laundry building, TA-21-20, and set on piers. From 1947 to 1948, it was used as a safety training building. In 1949, alterations were made to the building for use by Los Alamos Scientific Laboratory's Industrial Waste Studies Group, a group that studied various waste streams in an attempt to recover more plutonium and uranium as well as other valuable and scarce materials. Waste streams from the building were discharged to the septic system and the sump. The septic system drained to a pit approximately 158 ft north and near the edge of DP Canyon; the pit drained to an outfall on the slope of the canyon. The sump was connected to the DP laundry building, and waste streams from there discharged to absorption beds, which are now designated as Material Disposal Area V. Building TA-21-45 was removed in 1954, and both PRSs 21-024(f) (the septic system) and C-21-015 (the concrete sump), were abandoned in place.

*PRS 21-024(f).* There have been three sampling events at PRS 21-024(f). In 1988, a reconnaissance sample was collected from the septic system outfall pit at a depth of 0–6 in. In 1992, three locations around the outfall pit were sampled at three depths (0–6 in., 6–12 in., and 12–18 in.). In 1993, two boreholes were drilled, and eight samples were collected. One borehole was drilled adjacent to the septic tank to a depth of 20 ft with samples collected every 5 ft. The other borehole was drilled in the outfall pit to a depth of 10 ft with samples collected every 2.5 ft.

The extent of contamination has not been defined; inorganics and the highest concentration of radionuclides were detected in the surface sample at the most distant point sampled in the outfall drainage slope. The contents of the abandoned septic tank have not been sampled, so the potential exists for additional contaminants to be identified, indicating that the full nature of contamination present at PRS 21-024(f) may not have been determined.

*PRS C-21-015.* No samples have been collected at PRS C-21-015. This PRS was proposed for no further action (NFA) in 1991 based on information available during the preparation of the Operable Unit 1106 (TA-21) RFI work plan. Until recently, it was not known that the Industrial Waste Studies Group had used Building TA-21-45. The site, therefore, has the potential for contaminants to be present. The presence of any contamination in the sump or any remaining pipes is unknown; therefore, the nature or extent of contamination is unknown. If any contaminants are present, they are expected to be similar to those found in PRS 21-024(f).

The purpose of this VCA is to characterize, excavate, remove, and dispose of all components of the abandoned septic system, sump, and drain lines. The planned sequence of events is as follows:

1. sample the contents of the septic tank and sump;
2. remove and dispose of the septic tank, sump, and their pipes;

3. perform confirmatory sampling of any excavated area;
4. sample the outfall slope; and
5. restore the site.

Samples will be collected from within the septic tank and the sump before they are removed. A full-suite analysis will be performed; the analysis will include polychlorinated biphenyls, inorganics, volatile and semivolatile organic chemicals, soil pH, and radionuclides (gamma-emitting radionuclides by gamma spectrometry, tritium, isotopic plutonium, isotopic uranium, isotopic thorium, and strontium-90). After the sump, septic tank, and pipes are excavated, confirmatory samples will be taken beneath the sump and from the bottom of the trench. To bound the extent of contamination for PRS 21-024(f), 16 locations will be identified and sampled in the outfall drainage. Analytical suites for these samples will be based on results of septic tank and sump analyses and data from previous investigations.

No soil remediation in the outfall drainage has been planned because no contamination that warrants soil removal has as yet been identified. The VCA sampling data will be compared to screening action levels and ecological screening levels after extent has been defined; the results will be used to determine whether soil removal will be necessary. If remediation of the soils is required, cleanup levels for human receptors, based on appropriate land use and/or ecological receptors, will be derived for the contaminants.

This VCA is not dependant on whether contaminants are present. The structures will be removed even if no significant contamination is found. Removal of the structures will facilitate the proposed transfer of the area to a new owner.

After VCA activities are complete, the site will be restored and stormwater controls will be installed as needed. The waste will be disposed of at the proper facility for each particular waste stream.

Sampling of the septic tank and sump will occur during July 1999, removal and disposal activities and confirmatory sampling will take place during August and September 1999, and the VCA report will be published during fiscal year 2000. A summary of the PRSs is located in Table ES-1.

**Table ES-1**
**VCA Summary Table**

| PRS Number | PRS Description | HSWA[a] | Radionuclide Component[b] | Proposed Action | Rationale for Recommendation |
|---|---|---|---|---|---|
| 21-024(f) | Inactive septic system | Yes | Yes | Septic tank and pipeline removal | NFA |
| C-21-015 | Inactive sump | No | Unknown | Sump and pipelines removal | NFA |

[a] Is this site listed in Module VIII of the Laboratory's Hazardous Waste Facility Permit?

[b] Are radionuclides associated with this PRS?

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## 1.0 INTRODUCTION

Los Alamos National Laboratory (the Laboratory) is a multidisciplinary research facility owned by the Department of Energy (DOE) and managed by the University of California. The Laboratory is located in north-central New Mexico approximately 60 miles northeast of Albuquerque and 20 miles northwest of Santa Fe (Figure 1.0-1). The Laboratory site covers 43 square miles of the Pajarito Plateau, which consists of a series of finger-like mesas separated by deep canyons containing ephemeral and intermittent streams that run from west to east. Mesa tops range in elevation from approximately 6200 ft to 7800 ft. The eastern portion of the plateau stands 300 to 900 ft above the Rio Grande.

The Laboratory's Environmental Restoration (ER) Project is involved in a national effort by the DOE to clean up its facilities, including those that were formerly involved in weapons production. The goal of the ER Project is to ensure that DOE's past operations do not threaten human or environmental health and safety in and around Los Alamos County, New Mexico. To achieve that goal, the ER Project is currently investigating sites potentially contaminated by past Laboratory operations. This voluntary corrective action (VCA) plan addresses potential release sites in Technical Area (TA); these are PRS 21-024(f), an inactive septic system and outfall, and PRS C-21-015, the location of former Building TA-21-45, which now consists only of an abandoned sump and possible waste line(s). PRSs 21-024(f) and C-21-015 are located within TA-21, on DP Mesa, on the northern boundary of the Laboratory immediately east-southeast of the Los Alamos townsite. TA-21 was used primarily for plutonium research, metals production, and related activities from 1945 to 1978.

This corrective action, including sampling, analysis, and material removal and disposal, is conducted under the requirements of the Resource Conservation and Recovery Act (RCRA). The current installation work plan (LANL 1996, 55574) describes the methodologies used in the investigation and analysis. For PRSs 21-024(f) and C-21-015, the VCA will be consistent with the Hazardous and Solid Wastes Amendments of 1984 and meets the requirements in Module VIII of the Laboratory's Hazardous Waste Facility Permit (EPA 1990, 01585). Module VIII was issued to the Laboratory by the US Environmental Protection Agency (EPA) on May 23, 1990, and modified on May 19, 1994. Radionuclides are regulated under DOE Order 5400.5, "Radiation Protection of the Public and the Environment" (proposed rule 10 CFR 843.5 in 58 FR 16268). In this plan, PRS 21-024(f) and possibly PRS C-21-015 have a radionuclide component.

The purpose and scope, regulatory history, and rationale for proposed corrective action are presented in Section 1. Section 2 discusses the site description and operational history, previous field investigations, and results of previous investigations for the PRSs. The basis for cleanup levels is presented in Section 3. Section 4 includes the conceptual model, the supplemental sampling, the cleanup activities, and the site restoration activities. Confirmatory sampling is discussed in Section 5. Section 6 presents the estimated types and volumes of waste and the method of management and disposal. Section 7 discusses the proposed schedule and uncertainties. References are listed in Section 8. Appendix A includes acronyms and abbreviations, Appendix B includes the VCA checklists, Appendix C includes the ER standard operating procedure (SOP) 2.01 surface water assessments, Appendix D includes the ecological checklists, and Appendix E includes the estimated costs.

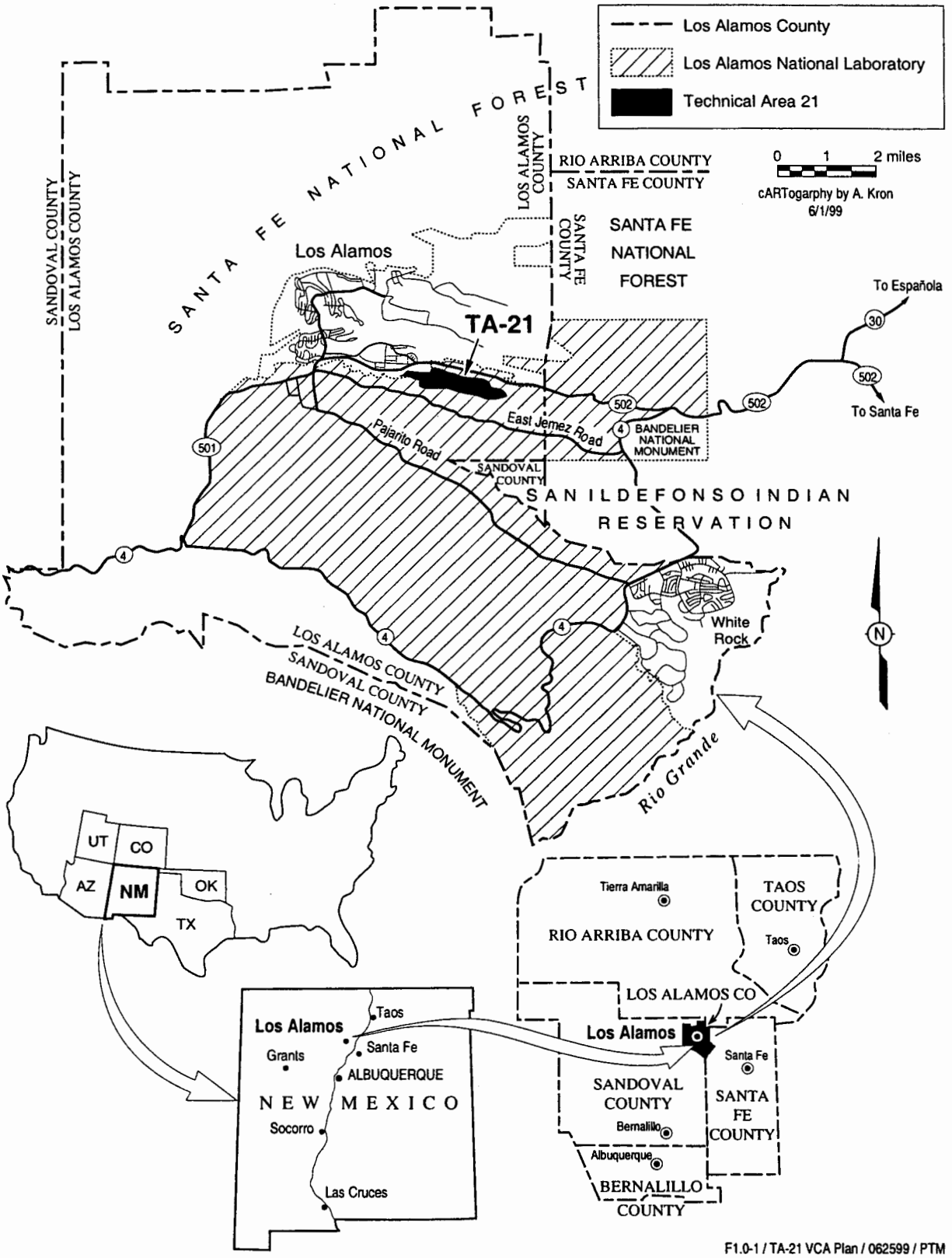



**Figure 1.0-1. Location of TA-21 within the Laboratory**

## 1.1 Purpose and Scope

The purpose of this VCA is to define nature and extent of any contamination at PRSs 21-024(f) (septic system) and C-21-015 (sump) and to remove all structures associated with these sites. The potential sources at each of these sites, the contents of the septic tank and the sump, have not been sampled; therefore, the nature of potential contamination is not fully known. Samples will be collected from these structures and analyzed by an off-site, fixed laboratory for inorganics, volatile and semivolatile organic chemicals, polychlorinated biphenyls (PCBs), radionuclides (gamma-emitting radionuclides by gamma spectrometry, tritium, isotopic plutonium, isotopic uranium, isotopic thorium, and strontium-90), and soil pH. When the nature of any contamination has been determined, the septic tank and sump will be excavated and removed. Confirmatory samples of the soil at the bottom of the excavation will be collected and analyzed.

The extent of contamination downgradient in the outfall drainage is also undefined; therefore, samples will be collected in the drainage. Drainage samples will be analyzed for the analytical suites identified by the septic tank sample results. These data will also be used to identify any areas that may require remediation and further sampling.

## 1.2 Regulatory History

PRS 21-024(f) was identified during the Comprehensive Environmental Assessment and Response Program investigation (LANL 1987, 39998). The 1991 TA-21 operable unit RCRA facility investigation (RFI) work plan discussed the results of a 1988 sample collected in the septic system outfall pit and proposed that radiological surveys be conducted and three additional samples be collected (LANL 1991, 7680). The 1994 RFI Phase Report 1C discussed sampling results from 1988, 1992, and 1993 and deferred making a recommendation until outstanding data were received and evaluated (LANL 1994, 59051). The 1995 addendum to Phase Reports 1B and 1C discussed sampling results from 1988, 1992, and 1993 and recommended no further action (NFA) (LANL 1995, 52350). The 1991 TA-21 RFI work plan described C-21-015 and concluded that this site did not qualify as a PRS (LANL 1991, 7680).

## 1.3 Rationale for Proposed Corrective Action

*PRS 21-024(f).* An analytical result of a surface soil sample collected in 1992 approximately 10 ft downgradient from the outlet pit indicated the presence of plutonium-239/240 (13.9 pCi/g). This result exceeds the Laboratory-wide background level of plutonium-239/240 (0.054 pCi/g) in surface soil and indicates that the downward trend has not been demonstrated. Therefore, a series of soil samples will be collected downgradient from the septic system outfall pit. In addition, all structures associated with this site will be removed, regardless of their contamination level, to alleviate concerns that may be raised in the future concerning their contents and the possibility of contamination. The removal of all structures will facilitate the proposed land transfer of this area.

*PRS C-21-015.* The driver for the VCA of PRS C-21-015 is the need to investigate the area based on new archival information indicating the previously unknown use of this facility as a waste treatment laboratory. The potential exists that the sump could be contaminated with inorganics and radionuclides used in the laboratory. All remaining structures associated with this site will be removed, regardless of their contamination level, to alleviate questions that may be raised in the future concerning their contents and the possibility of contamination. The removal of all structures will facilitate the proposed land transfer of this area.

# 2.0 PREVIOUS SITE CHARACTERIZATION

## 2.1 PRS 21-024(f)

### 2.1.1 Site Description and Operational History

PRS 21-024(f) (Figures 2.1-1 and 2.1-2) is a septic system (inlet pipe, septic tank, outlet pipe, outfall pit, and outfall drainage area) that received effluent from Building TA-21-45 from 1947 to 1954. This building was originally situated at 15th Street and Trinity Drive; in July 1947, it was moved to the north side of DP Road across from the DP laundry building, TA-21-20, and set on piers (Francis 1996, 63125). Effluent from the building was conveyed north approximately 84 ft through a 4-in.-diameter vitrified clay pipe (VCP) to a 1000-gal. steel septic tank (TA-21-124). In 1949, alterations were made to the building for Los Alamos Scientific Laboratory's Industrial Waste Studies Group, a group that studied various waste streams in an attempt to recover more plutonium and uranium as well as other valuable and scarce materials. The restroom in the northwest corner of the building was converted into a waste treatment laboratory, which included a stainless steel sink with a drain line that led to the building's septic tank. The clarified effluent from the septic tank was discharged through a 4-in.-diameter VCP to a shallow rock-lined pit approximately 158 ft further north and down gradient at the edge of DP Mesa (LANL 1995, 52350). The volume of liquid discharged to the pit is unknown. The pit is approximately 5 ft in diameter by 2 ft deep. From the pit, there is a broad, moderate slope to the north edge of the mesa, then a steep slope to the bottom of DP Canyon. At this point in DP canyon, the stream is intermittent. Building TA-21-45 was removed in 1954, and the septic system was abandoned in place (LANL 1991, 7680). There is no surface expression of the septic tank. It is expected that the inlet pipe from Building TA-21-45 remains abandoned in place. The 4-in. outlet pipe currently daylights into the pit, indicating that the pipe from the septic tank to the pit was also abandoned in place.

### 2.1.2 Previous Field Investigations

There have been three separate sampling events at PRS 21-024(f). In 1988, a single soil sample was collected in the pit below the outfall pipe discharge point at a depth of 0 to 6 in. In 1992, a radiation survey was conducted throughout a 50-ft radius around the pit. Soil samples were collected from areas south, west, and north of the pit (three locations). One surface (0 to 6 in.) and two near-surface (6 to 12 in. and 12 to 18 in.) samples were collected from each location. In 1993, two boreholes were drilled. One was placed adjacent to the septic tank location; four samples were collected at 5-ft intervals to a depth of 20 ft. The second borehole was placed at the center of the outfall pit; four samples were collected at 2.5-ft intervals to a depth of 10 ft. Figure 2.1-3 shows PRS 21-024(f) and the sample locations.

### 2.1.3 Results from Previous Investigations

#### 1988 Reconnaissance Sampling

Analytical results from the single October 1988 reconnaissance sample collected from a depth of 0 to 6 in. in the center of the septic system outfall pit (Figure 2.1-3) are presented in Table 2.1-1. The sample was analyzed for inorganics, volatile and semivolatile organic chemicals, pesticides, PCBs, and radionuclides. Cesium-137, tritium, plutonium-239, and mercury were all identified above regional background levels that were in use at the time. A comparison of the 1988 results with the 1999 background values (BVs) is shown in Table 2.1-1. This comparison identifies lead, mercury, plutonium-239/240, and tritium as greater than BVs.

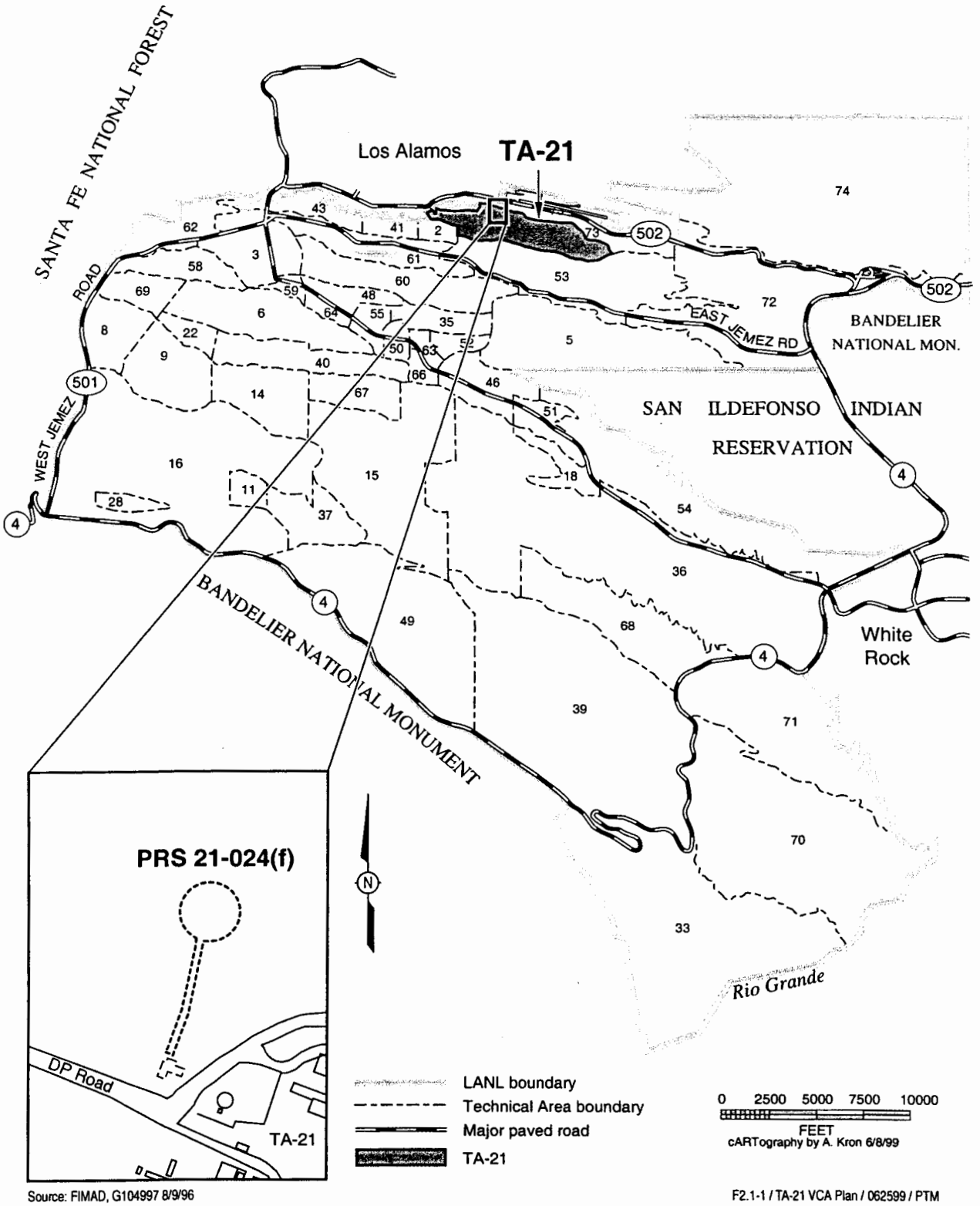
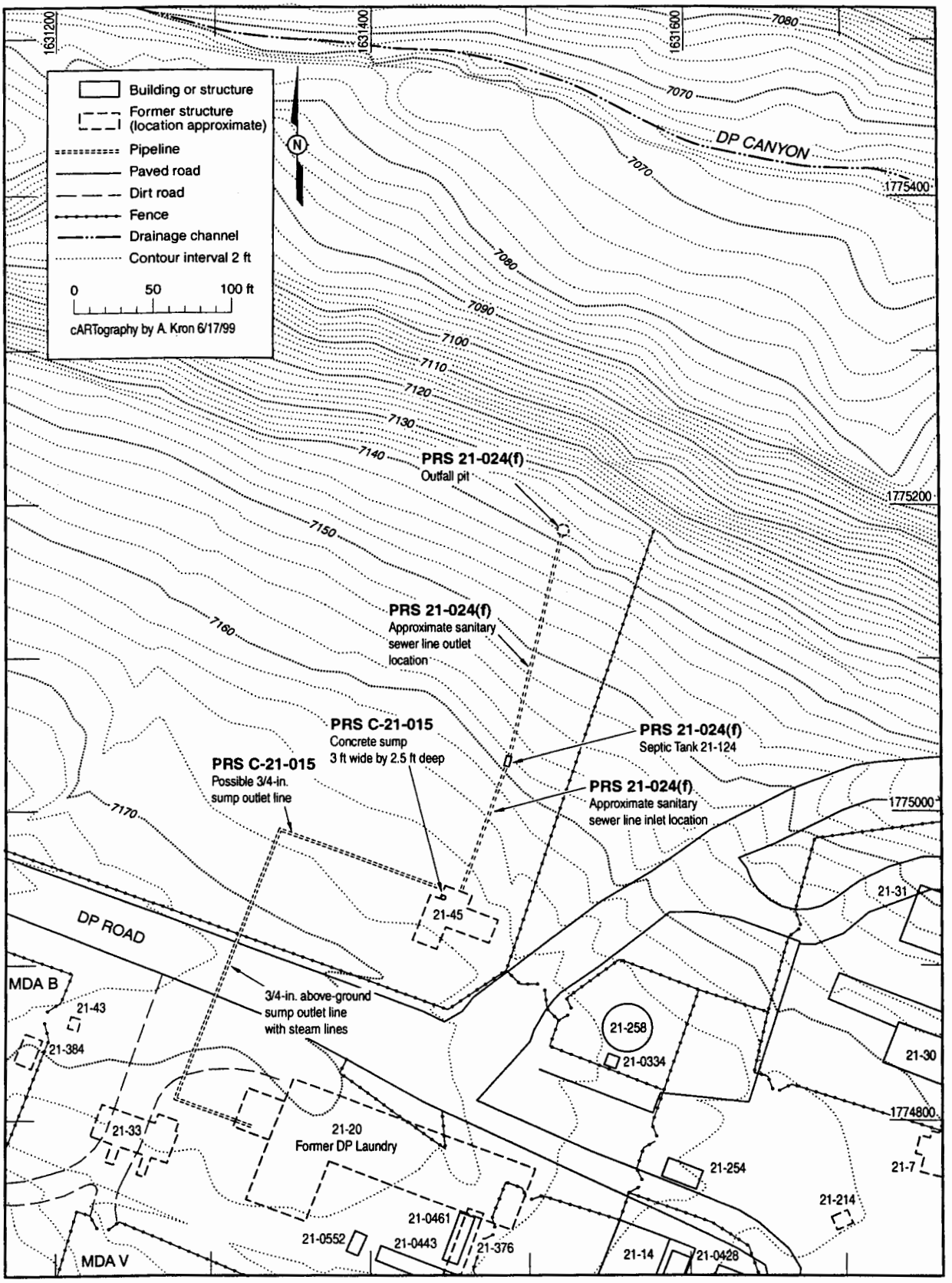


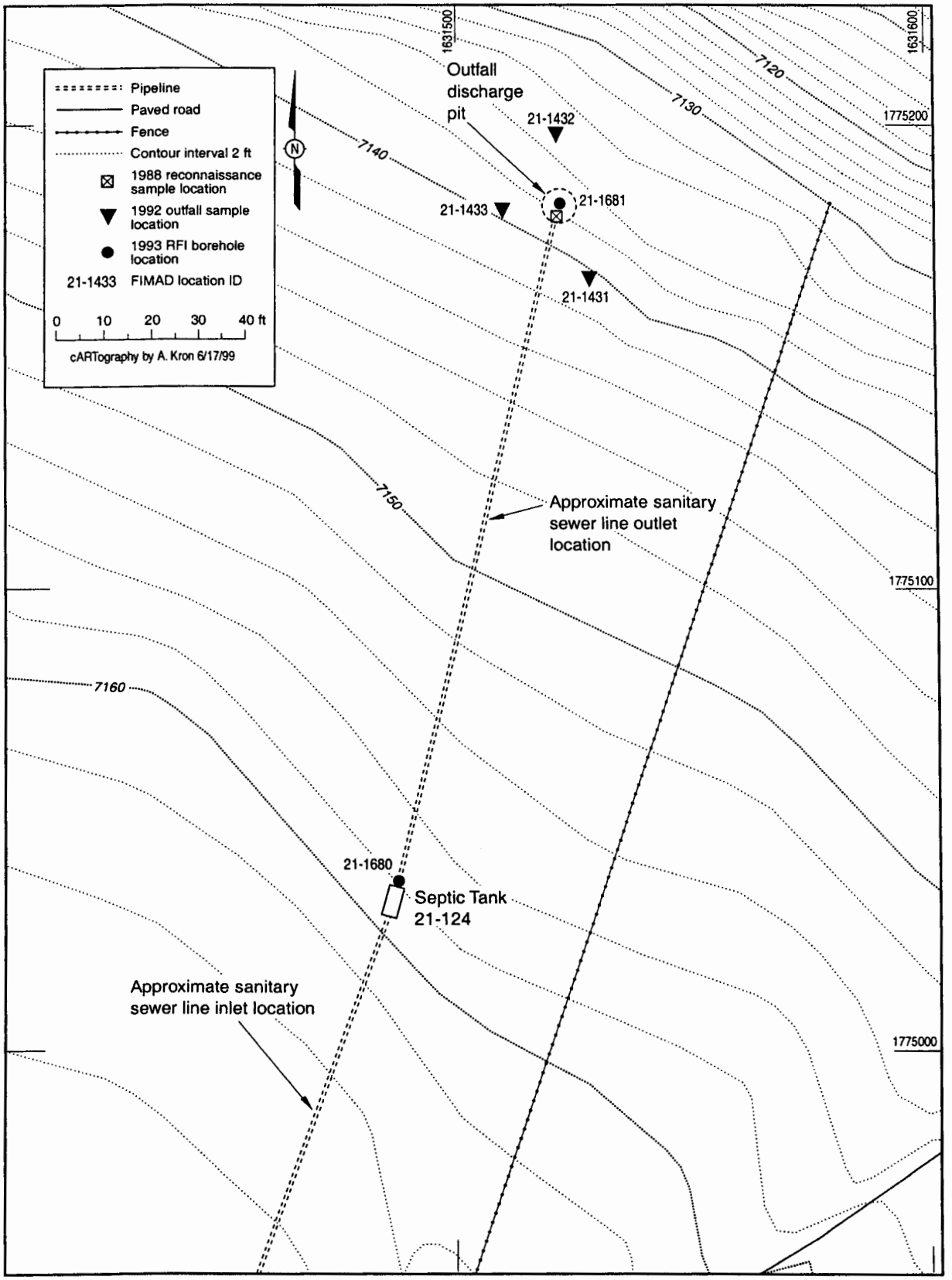

**Figure 2.1-1. Locations of TA-21 and PRS 21-024(f) with respect to Laboratory TAs and surrounding land holdings**




Sources: FIMAD G107662 5/14/99; LASL 1949, ENG4C-660 Sh. 1 of 2

F2.1-2 / TA-21 VCA Plan / 071399 / PTM

**Figure 2.1-2. PRS 21-024(f) septic system and PRS C-21-015 sump**




Sources: FIMAD G107662 5/14/99; LASL 1949, ENG4C-660 Sh. 1 of 2

F2.1-3 / TA-21 VCA Plan / 062599 / PTM

**Figure 2.1-3. Previous sampling locations at PRS 21-024(f)**

**Table 2.1-1**
**PRS 21-024(f) 1988 Outfall Reconnaissance Sampling**

| Analyte | Concentration (mg/kg) | Detection Limit (mg/kg) | 1999 BVs (mg/kg) |
|---|---|---|---|
| ***Inorganics*** | | | |
| Aluminum | 9750 | 37 | 29200 |
| Arsenic | 2.2 | 2.0 | 8.17 |
| Barium | 131 | 37 | 295 |
| Calcium | 2130 | 914 | 6120 |
| Chromium | 8.9 | 2.0 | 19.3 |
| Copper | 9.0 | 6.0 | 14.7 |
| Iron | 9920 | 18 | 21500 |
| Lead | **34.5*** | 10 | 22.3 |
| Magnesium | 2150 | 914 | 4610 |
| Mercury | **0.22** | 0 | 0.1 |
| Nickel | 12.4 | 8.0 | 15.4 |
| Potassium | 1330 | 914 | 3460 |
| Vanadium | 23.5 | 10 | 39.6 |
| Zinc | 44.2 | 4.0 | 48.8 |
| ***Organic Chemicals*** | | | |
| Oil and grease | 257 | 56 | Not applicable |
| ***Radionuclides*** | | | |
| Cesium-137 | 1.0 | 0.1 | 1.65 |
| Plutonium-239/240 | **1.6** | 0.2 | 0.023 |
| Radium-226 | 1.8 | 0.2 | 2.59 |
| Thorium-232 | 1.0 | 0.4 | 2.33 |
| Tritium | **15** (pCi/ml) | 2.0 (pCi/ml) | 0.76 (pCi/ml) |
| Uranium-234 | 1.7 | 0.4 | 2.59 |
| Uranium-238 | 1.3 | 0.3 | 2.29 |

*Bolded, enlarged concentrations are above BVs.

### 1992 RFI Sampling

In 1992, three locations (Figure 2.1-3) were sampled around the pit at depths of 0–6 in., 6–12 in., and 12–18 in. (9 samples total). The analytical results above BVs and analytical results for chemicals that have no BVs are presented in Table 2.1-2. These samples were analyzed for gross alpha, beta, and gamma radiation; inorganics; volatile and semivolatile organic chemicals; and radionuclides (gamma-emitting radionuclides by gamma spectrometry, tritium, isotopic plutonium, total uranium, isotopic thorium, and americium-241). No analysis was conducted for mercury because the laboratory analytical suite at this time did not include mercury.

**Table 2.1-2**
**Analytical Results Above BVs and Those With No BVs (1992 RFI Sampling)**

| Sample ID and Depth[a] | Analyte | Result | RFI Class | BV | SAL[b] | Units |
|---|---|---|---|---|---|---|
| ***Location 21-1431*** | | | | | | |
| AAA1095 (0–6 in.) | Acetone | 0.028 | Organic | n/a[c] | 1400 | mg/kg |
| | Cadmium | 1.6 | Inorganic | 0.4 | 37 | mg/kg |
| | Lithium | 10.2 | Inorganic | n/a | 1500 | mg/kg |
| | Plutonium-239 | 1.06 | Radionuclide | 0.054 | 24 | pCi/g |
| | Strontium | 25.5 | Inorganic | N.A.[d] | 45000 | mg/kg |
| | Tritium | 220 | Radionuclide | 0.08 | 260 | pCi/g |
| AAA1096 (6–12 in.) | Lithium | 3.1 | Inorganic | N.A. | 1500 | mg/kg |
| | Strontium | 4.2 | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 66 | Radionuclide | 0.03 | 260 | pCi/g |
| AAA1097 (12–18 in.) | Lithium | 1.9 | Inorganic | N.A. | 1500 | mg/kg |
| | Strontium | 1.7 | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 110 | Radionuclide | 0.03 | 260 | pCi/g |
| ***Location 21-1432*** | | | | | | |
| AAA1098 (0–6 in.) | Americium-241 | 0.677 | Radionuclide | 0.013 | 22 | pCi/g |
| | Cadmium | 0.74 | Inorganic | 0.4 | 37 | mg/kg |
| | Lead | 32.3 | Inorganic | 22.3 | 400 | mg/kg |
| | Lithium | 3.3 | Inorganic | N.A. | 1500 | mg/kg |
| | Molybdenum | 10.6 | Inorganic | N.A. | 370 | mg/kg |
| | Plutonium-239 | 13.9 | Radionuclide | 0.054 | 24 | pCi/g |
| | Strontium | 8.6 | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 253 | Radionuclide | 0.08 | 260 | pCi/g |
| AAA1099 (0–6 in.) | Americium-241 | 0.699 | Radionuclide | 0.013 | 22 | pCi/g |
| | Americium-241 | 0.598 | Radionuclide | 0.013 | 22 | pCi/g |
| | Cadmium | 0.78 | Inorganic | 0.4 | 37 | mg/kg |
| | Lead | 22.7 | Inorganic | 22.3 | 400 | mg/kg |
| | Lithium | 3.9 | Inorganic | N.A. | 1500 | mg/kg |
| | Molybdenum | 9.4 | Inorganic | N.A. | 370 | mg/kg |
| | Plutonium-239 | 11.8 | Radionuclide | 0.054 | 24 | pCi/g |
| | Strontium | 8.8 | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 209 | Radionuclide | 0.08 | 260 | pCi/g |

**Table 2.1-2 (continued)**

| Sample ID and Depth[a] | Analyte | Result | RFI Class | BV | SAL[b] | Units |
|---|---|---|---|---|---|---|
| ***Location 21-1432 (continued)*** | | | | | | |
| AAA1100 (6–12 in.) | Acetone | 0.055 | Organic | n/a | 1400 | mg/kg |
| | Chromium | 15 | Inorganic | 7.14 | 210 | mg/kg |
| | Lithium | 4.9 | Inorganic | N.A. | 1500 | mg/kg |
| | Plutonium-239 | 0.571 | Radionuclide | n/a | 24 | pCi/g |
| | Strontium | 3.8 | Inorganic | N.A. | 45000 | mg/kg |
| | Toluene | 0.008 | Organic | n/a | 520 | mg/kg |
| | Tritium | 77 | Radionuclide | 0.03 | 260 | pCi/g |
| AAA1101 (12–18 in.) | Acetone | 0.02 | Organic | n/a | 1400 | mg/kg |
| | Lithium | 2.5 | Inorganic | N.A. | 1500 | mg/kg |
| | Strontium | 1.7 | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 66 | Radionuclide | 0.03 | 260 | pCi/g |
| ***Location 21-1433*** | | | | | | |
| AAA1102 (0–6 in.) | Cadmium | 0.88 | Inorganic | 0.4 | 37 | mg/kg |
| | Lithium | 5.6 | Inorganic | N.A. | 1500 | mg/kg |
| | Plutonium-239 | 1.04 | Radionuclide | 0.054 | 24 | pCi/g |
| | Strontium | 12.6 | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 242 | Radionuclide | 0.08 | 260 | pCi/g |
| AAA1103 (6–12 in.) | Acetone | 0.036 | Organic | n/a | 1400 | mg/kg |
| | Lithium | 2.8 | Inorganic | N.A. | 1500 | mg/kg |
| | Strontium | 5.4 | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 110 | Radionuclide | 0.03 | 260 | pCi/g |
| AAA1104 (12–18 in.) | Acetone | 0.042 | Organic | n/a | 1400 | mg/kg |
| | Lithium | 3 | Inorganic | N.A. | 1500 | mg/kg |
| | Methylene Chloride | 0.007 | Organic | n/a | 8.5 | mg/kg |
| | Strontium | 4 | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 77 | Radionuclide | 0.03 | 260 | pCi/g |

[a] The 0- to 6-in. depth is in soil. The 6- to 12-in. and 12- to 18-in. depths are in tuff.

[b] SAL = screening action level.

[c] n/a = not applicable.

[d] N.A. = not available.

*Inorganic Results.* Inorganic chemical results were compared to 1999 BVs. Three chemicals, cadmium, chromium, and lead, were detected above their respective BVs for soil. In the tuff, two inorganic chemicals, arsenic and chromium, were detected above their respective BVs (Qbt 2, 3, and 4). The inorganic chemicals, lithium, strontium, and molybdenum were also detected; however, there are no established BVs for these chemicals. A comparison of the inorganics detected above their BVs to the range of concentrations in the background data sets found that arsenic (3.3 mg/kg) was within the range

of tuff background concentrations (0.25 mg/kg to 5 mg/kg), and chromium concentrations (20.4 mg/kg and 21 mg/kg) were within the range of soil background concentrations (1.9 mg/kg to 36.5 mg/kg). Therefore, arsenic in tuff and chromium in soil are not considered to be different from background.

Comparison of the analytical results for cadmium, chromium, and lead, and the inorganic chemicals without BVs, lithium, molybdenum, and strontium, to SALs is relevant to a depth of 12 ft because no receptors are present below that depth. This comparison found that none of the inorganic chemicals exceeded 0.1 of their SALs.

*Radionuclide Results.* The radionuclide results were compared to 1999 BVs (Table 2.1-2). Three radionuclides, americium-241, plutonium-239, and tritium, were detected above their respective background/fallout values for soil. Comparison of the analytical results to SALs found that none of the radionuclides exceeded SALs.

*Volatile Organic Results.* In one or more samples, three volatile organic compounds, acetone, methylene chloride, and toluene, were detected in the soil and tuff (Table 2.1-2). These chemicals were detected at concentrations of 0.055 mg/kg (acetone), 0.007 mg/kg (methylene chloride), and 0.008 mg/kg (toluene). These concentrations are less than 0.1 SALs.

*Semivolatile Organic Results.* No semivolatile organic compounds were detected in any of the samples collected at this PRS.

**1993 RFI Sampling**

In 1993, a borehole was drilled at the septic tank location (21-1681), and four samples were collected at 5-ft intervals to a depth of 20 ft. Another borehole was drilled in the center of the outfall pit (21-1680), and four samples were collected at 2.5-ft intervals to a depth of 10 ft. These samples were analyzed for inorganics, volatile and semivolatile organic chemicals, radionuclides (gamma-emitting radionuclides by gamma spectrometry, tritium, isotopic plutonium, isotopic uranium, isotopic thorium, strontium-90, and americium-241). There was no analysis conducted for mercury in these two boreholes because the laboratory analytical suite at that time did not include mercury. Sample results of analytes with concentrations above BVs and those with no BVs are presented in Table 2.1-3.

*Inorganic Results.* The inorganic chemical results were compared to 1999 BVs. Eight inorganics, aluminum, arsenic, barium, beryllium, calcium, chromium, copper, and magnesium, were detected above their respective BVs for tuff (Qbt 2, 3, and 4) in the borehole drilled in the outfall pit. No inorganic chemicals were detected above their respective BVs for tuff (Qbt 2, 3, and 4) in the borehole drilled adjacent to the septic tank. Lithium and stable strontium do not have Laboratory BVs. When compared to the background data set, all eight inorganics, except arsenic, were detected at concentrations greater than the range of background concentrations. The detected concentrations of arsenic (3.4 mg/kg and 3.7 mg/kg) were within the range of background concentrations (0.25 mg/kg to 5 mg/kg). Therefore, arsenic is not considered to be different from background.

Comparison of the analytical results for aluminum, barium, beryllium, chromium, and copper, as well as lithium and stable strontium to human health SALs, is relevant to a depth of 12 ft. (Calcium and magnesium are essential nutrients and not considered a risk to human health or the environment and do not have SALs.) At depths greater than 12 ft, human receptors and pathways are not present. This comparison found that none of the inorganic chemicals exceeded 0.1 of their SALs.

**Table 2.1-3**
**Analytical Results Above BVs and Those With No BVs (1993 RFI Sampling)**

| Sample ID and Depth[a] | Analyte | Result | Lab Qualifier | RFI Class | BV | SAL | Units |
|---|---|---|---|---|---|---|---|
| ***Location 21-1681 (septic tank)*** | | | | | | | |
| AAA4179 (0–60 in.) | Lithium | 8.4 | | Inorganic | N.A.[b] | 1500 | mg/kg |
| | Strontium | 1.3 | | Inorganic | N.A. | 45000 | mg/kg |
| AAA4180 (0–60 in.) | Lithium | 3.9 | | Inorganic | N.A. | 1500 | mg/kg |
| | Strontium | 1.5 | | Inorganic | N.A. | 45000 | mg/kg |
| AAA4181 (60–120 in.) | Lithium | 10.9 | | Inorganic | N.A. | 1500 | mg/kg |
| | Plutonium-239 | 0.02 | | Radionuclide | n/a[c] | 24 | pCi/g |
| | Strontium | 1 | | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 0.07404 | J[c] | Radionuclide | 0.03 | 260 | pCi/g |
| AAA4182 (120–180 in.) | Americium-241 | 0.014 | | Radionuclide | n/a | 22 | pCi/g |
| | Lithium | 5.5 | | Inorganic | N.A. | 1500 | mg/kg |
| | Strontium | 1.3 | | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 0.18746 | J | Radionuclide | 0.03 | 260 | pCi/g |
| AAA4183 (180–240 in.) | Lithium | 1.3 | | Inorganic | N.A. | 1500 | mg/kg |
| | Tritium | 0.10176 | J | Radionuclide | 0.03 | 260 | pCi/g |
| ***Location 21-1680 (pit)*** | | | | | | | |
| AAA4173 (0–30 in.) | Americium-241 | 0.025 | | Radionuclide | 0.013 | 22 | pCi/g |
| | Plutonium-239 | 0.373 | | Radionuclide | 0.054 | 24 | pCi/g |
| AAA4176 (30–60 in.) | Aluminum | 7750 | | Inorganic | 7340 | 75000 | mg/kg |
| | Barium | 62.7 | | Inorganic | 46 | 5200 | mg/kg |
| | Beryllium | 1.9 | | Inorganic | 1.21 | 150 | mg/kg |
| | Chromium | 14.5 | | Inorganic | 7.14 | 30 | mg/kg |
| | Copper | 9.8 | | Inorganic | 4.66 | 2800 | mg/kg |
| | Magnesium | 1910 | | Inorganic | 1690 | n/a | mg/kg |
| | Strontium | 32.3 | | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 0.06633 | J | Radionuclide | 0.03 | 260 | pCi/g |
| AAA4177 (60–90 in.) | Aluminum | 11400 | | Inorganic | 7340 | 75000 | mg/kg |
| | Barium | 280 | | Inorganic | 46 | 5200 | mg/kg |
| | Beryllium | 1.9 | | Inorganic | 1.21 | 150 | mg/kg |
| | Calcium | 10600 | | Inorganic | 2200 | n/a | mg/kg |
| | Chromium | 7.6 | | Inorganic | 7.14 | 30 | mg/kg |
| | Copper | 12 | | Inorganic | 4.66 | 2800 | mg/kg |
| | Magnesium | 3350 | | Inorganic | 1690 | n/a | mg/kg |
| | Strontium | 62 | | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 0.22388 | J | Radionuclide | 0.03 | 260 | pCi/g |

**Table 2.1-3 (continued)**

| Sample ID and Depth[a] | Analyte | Result | Lab Qualifier | RFI Class | BV | SAL | Units |
|---|---|---|---|---|---|---|---|
| *Location 21-1680 (pit) (continued)* | | | | | | | |
| AAA4178 (90–120 in.) | Aluminum | 8390 | | Inorganic | 7340 | 75000 | mg/kg |
| | Barium | 188 | | Inorganic | 46 | 5200 | mg/kg |
| | Calcium | 12600 | | Inorganic | 2200 | n/a | mg/kg |
| | Copper | 7.3 | | Inorganic | 4.66 | 2800 | mg/kg |
| | Magnesium | 2770 | | Inorganic | 1690 | n/a | mg/kg |
| | Strontium | 58.5 | | Inorganic | N.A. | 45000 | mg/kg |
| | Tritium | 0.27567 | J | Radionuclide | 0.03 | 260 | pCi/g |

[a] The 0- to 60-in. depth is in soil/tuff. The 60- to 120-in. and 120- to 240-in. depths are in tuff.
[b] N.A. = not available.
[c] n/a = not applicable.
[d] J = estimated value.

*Radionuclide Results.* Three radionuclides, americium-241, plutonium-239, and tritium, were detected above their respective 1999 background/fallout values for soil or tuff (Qbt 2, 3, and 4) in the boreholes drilled in the outlet pit and adjacent to the septic tank. Comparison of the analytical results to SALs found that none of the radionuclides exceeded SALs.

*Organic Results.* No volatile or semivolatile organic compounds were detected.

### Summary of Results of Previous Investigations

The available data for PRS 21-024(f) indicate that a release has occurred to the environment from the septic tank system. None of the inorganic and radionuclide chemicals detected above background or the organic chemicals detected in the soil were above human health SALs. No contamination that warrants removal of soil has been identified. However, the farthest samples collected down gradient had the highest concentration; therefore, the extent of the contamination has not been adequately defined.

## 2.2 PRS C-21-015

### 2.2.1 Site Description and Operational History

PRS C-21-015 (Figure 2.1-2) is described as the former Building TA-21-45. This site was proposed for NFA in the TA-21 RFI work plan (LANL 1991, 7680). Subsequent archival research and field observation indicate that a concrete sump and possible underground pipes were left in place after the building was removed in 1954 (Francis 1996, 63125) and that operational history is different than what was known at the date NFA was proposed.

This building, originally situated at 15th Street and Trinity Drive, was moved and set on piers on the north side of DP Road across from the DP laundry building, TA-21-20, in July 1947 (Francis 1996, 63125). Initially, the building was used for safety training. In 1949, alterations were made to Building TA-21-45 for the Industrial Wastes Studies Group. The northwest restroom of the building was converted to transfer waste to and from the DP laundry building by way of steel pipes (Blackwell 1953, 63127). The conversion included an 8 ft x 6 ft x 4 ft pit that drained to a 3 ft x 3.5 ft x 2.5 ft concrete sump within the former

restrooms, with the liquid waste-handling equipment positioned over these features (Francis 1999, 63126). The steel pipe that came up and out of the sump was routed underground to a depth of approximately 3 ft and ran 110 ft to the west where it was routed aboveground and attached to an overhead steam line. The steam line and the pipe passed over DP Road and continued above ground into the laundry building and laundry sump (Francis 1999, 63126). The aboveground section of the steel pipe is no longer in place; this VCA is concerned only with the sump and the underground section of the pipe. The laundry sump discharged to the MDA V seepage pits (Francis 1999, 63126). The DP laundry [PRS 21-018(b)] was used to launder personal protective clothing and other cloth materials that had been contaminated with radionuclides.

Building TA-21-45 was declared free of contamination and removed in August 1954 by the Conwell Electric Company (Francis 1999, 63125). The concrete sump and pipes were reportedly abandoned in place in 1954 (Blackwell 1953, 63127).

### 2.2.2 Previous Field Investigations

There have been no previous field investigations of PRS C-21-015.

### 2.2.3 Results of Previous Investigations

There have been no previous field investigations of PRS C-21-015.

## 3.0 BASIS FOR CLEANUP LEVELS

The primary objectives of this VCA are to collect additional samples to define the nature and extent of contamination at these two PRSs and to remove the septic tank and sump along with the associated drain lines. Because nature and extent of contamination have not yet been adequately defined, it is not clear if soil removal will be required as part of this VCA. Cleanup levels for human health and ecological concerns have not been developed at this time. If required, proposed cleanup levels will be submitted to NMED HRMB for review as an addendum to this plan.

Following the proposed sampling, the data collected at these PRSs (previous and proposed data) will be evaluated using SALs and ecological screening levels (ESLs) to determine if an unacceptable risk remains at this site. If an unacceptable risk to human health and/or the environment is identified and remediation is warranted, cleanup levels that will be protective of human health and the environment will be developed. For human health, the cleanup levels for nonradionuclides will be based upon probable future land use and will be calculated using the most current guidance from EPA. Both the TA-21 work plan and land transfer proposals assume future land use of TA-21 to be industrial. Cleanup levels for radionuclides will be derived for the probable land use using the RESRAD computer code. For ecological purposes, cleanup levels may be derived from the ESLs. Cleanup levels used in any remediation conducted at these PRSs will be presented along with the rationale and equations in the VCA completion report for these PRSs.

## 4.0 PROPOSED CORRECTIVE ACTION

### 4.1 Conceptual Model

The conceptual model for PRSs 21-024(f) (septic tank and outfall) and C-21-015 (sump) describes two primary contaminated media. Contaminated media from both PRSs may be subsurface soil/tuff; other contaminated media from PRS 21-024(f) would be surface soil at the outfall. Potential pathways from

subsurface releases to potential receptors would be complete only if the soil or tuff was excavated and brought to the surface. In such a case, the potential pathways would be similar to those of a surface soil release, i.e., dermal contact, inhalation of fugitive dust, and incidental ingestion of soil. Downward migration in the vadose zone of contaminants would be limited by a lack of hydrostatic pressure, and the lack of saturated conditions in the area would restrict both horizontal and vertical migration. Therefore, a complete pathway to the regional aquifer, which is located approximately 1000 ft below the PRS structures, is unlikely. In addition, there are no seeps or springs nearby that would indicate the presence of perched alluvial aquifers. In DP canyon, approximately 1500 ft east of PRS 21-024(f), the deep well LADP-4 was drilled in 1993 to a depth of 800 ft. No perched groundwater was found. Approximately 100 ft and 350 ft further east in the canyon bottom alluvium, wells LAUZ-1 and LAUZ-2, respectively, encountered alluvial water at approximately 4.5 ft below the surface. Approximately 4000 ft further east is DP Spring, which flows from the south-facing slope to DP Canyon.

In the area of the septic system outfall, the primary transport mechanism may be surface water runoff. In addition, migration of contaminants as particulates or fugitive dust may have occurred as a result of the air pathway (i.e., wind). Erosion and mass wasting are not considered viable migration pathways because the area is well vegetated with stable slopes, and no evidence of erosion is present. Potential pathways from releases to the surface soil are primarily dermal contact, inhalation of fugitive dust, and incidental ingestion of soil. Potential receptors would be hikers and trail users in the vicinity of the outfall and DP Canyon. Additionally, this land may be transferred from DOE control to new owners in the future. A result of this new ownership may be changes in land uses, such as commercial or light industrial. In such cases, individuals associated with the businesses would be potential receptors by way of the same or additional pathways. Figure 4.1-1 presents the conceptual model for human receptors for PRSs 21-024(f) and C-21-015.

The ecological conceptual site model (ECSM) identifies which exposure pathways represent major, minor, unlikely, or no pathway to ecological receptors (terrestrial and aquatic). In general, exposure pathways to terrestrial receptors can occur through air (inhalation or deposition of vapors or particulates), surface soil (root uptake, rain splash on plants, food web transport by way of plants and/or animals, incidental ingestion of soil, dermal contact with soil, and external radiation), and surface water or active channel sediments (root uptake, rain splash on plants, food web transport to plants and animals, incidental ingestion of sediment, dermal contact with sediment, and external radiation from sediment). Exposure pathways to aquatic receptors include bioconcentration of contaminants from uptake by aquatic organisms from water or sediment, bioaccumulation from uptake by aquatic organisms from water or sediment, and external irradiation from sediment.

For PRS 21-024(f), the major soil-related exposure pathways include food web transport because some chemicals of potential ecological concern are potential bioaccumulators and incidental ingestion of soil for terrestrial animals. Minor soil-related exposure pathways include inhalation/deposition of particulates or fugitive dust for plants and animals and root uptake/rain splash for terrestrial plants. Pathways related to respiration of vapors and dermal contact are considered unlikely for exposure to surface soils. There is no pathway for external irradiation because no gamma-emitting radionuclides are present. No potential pathways from water and/or sediment are present because there are no surface water systems on the mesa top, and the stream channel in DP Canyon is ephemeral. No pathways exist for aquatic receptors because there are no permanent aquatic communities present near the outfall, in the drainage, or in the canyon below and for a distance of at least 100 yards upstream or downstream from the drainage. The ECSM for the outfall portion of PRS 21-024(f) and the associated rationale are presented in Part C of the ecological scoping checklist (Appendix D).

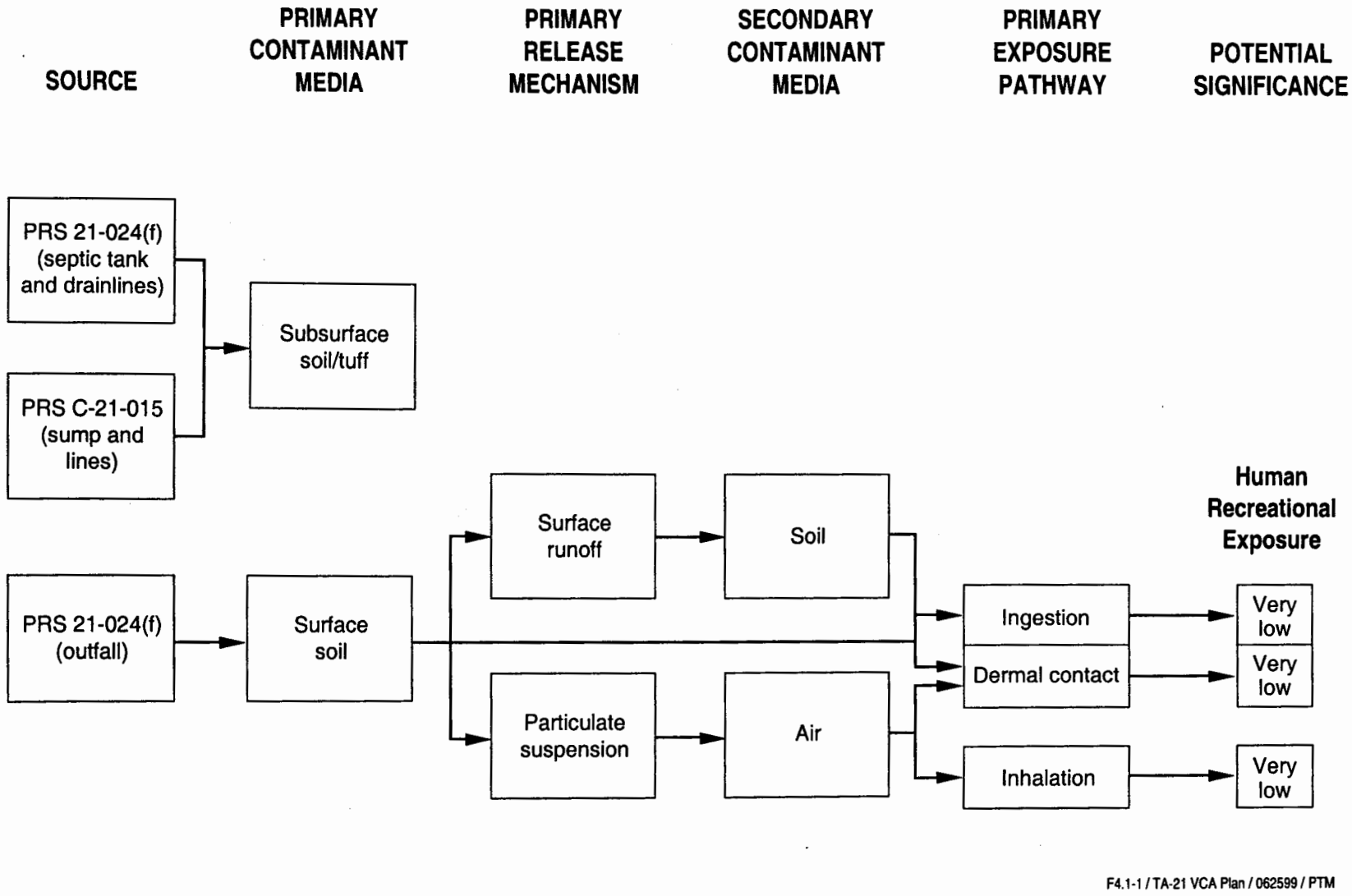



**Figure 4.1-1. Conceptual model of contaminant transport at PRSs 21-024(f) and C-21-015**

For PRS C-21-015, the sump is located below the surface, making surface releases unlikely. Minor soil-related exposure pathways may include root uptake/rain splash for terrestrial plants, food web transport, and incidental ingestion of soil. The pathways related to inhalation/deposition of particulates or fugitive dust and external irradiation are considered unlikely for exposure to surface soils. There is no pathway for respiration of vapors. There are also no potential pathways from water and/or sediment because there are no surface water systems on the mesa top and surface releases are unlikely. No pathways exist for aquatic receptors because there are no aquatic communities present in the vicinity of the sump. The ephemeral stream channel in DP Canyon is approximately 250 ft north of the PRS location. The ECSM for the sump at PRS C-21-015 and the associated rationale are presented in Part C of the ecological scoping checklist (Appendix D).

## 4.2 Supplemental Sampling

Two sampling events will be conducted before excavation takes place. First, sampling will be conducted to determine the nature of the contamination within the septic tank and the concrete sump. Second, sampling will be conducted to determine the extent of the contamination within the septic system's outfall area. Field screening will be performed to ensure worker health and safety, to comply with Laboratory waste minimization policies, and to guide selection of possible soil-sampling locations. Soil will be screened using an organic vapor monitor for volatile organic vapors, and soil and possible waste will be screened for ionizing radiation using an alpha probe and a beta/gamma probe. The excavation area and septic tank will be screened for flammable gases using a combustible gas indicator. All field-screening instruments will be calibrated and checked by the site safety officer, as required.

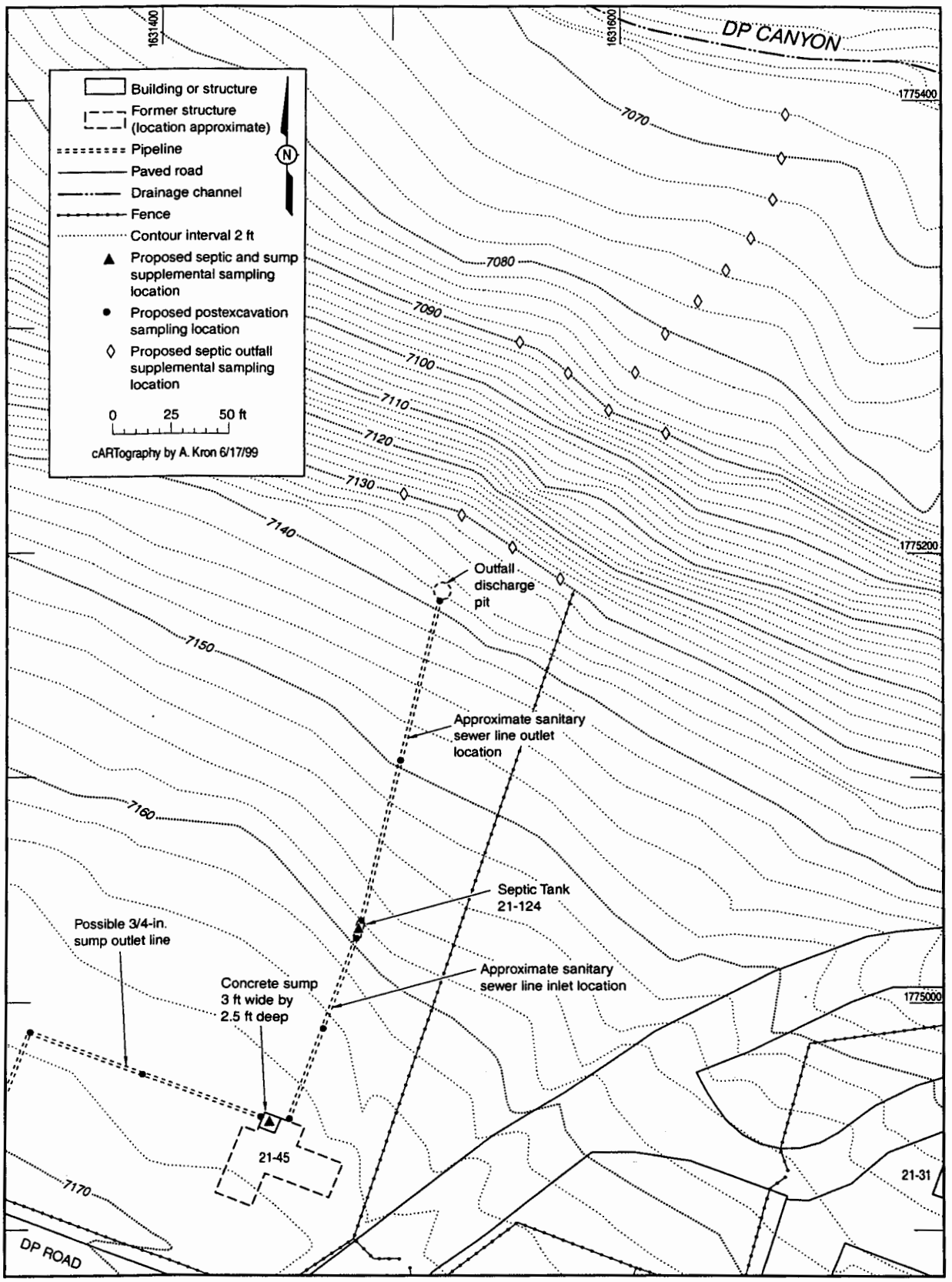
### 4.2.1 Septic Tank and Sump Supplemental Sampling

After the overlying soil is removed, samples will be taken from the septic tank. The types of samples is dependant on the tank contents. If the septic tank contains fill material, a hand auger will be used to sample at three levels (0–2 ft, 2–4 ft, 4–6 ft). If sludge (semisolid) or liquid is found at the bottom of the septic tank, the bottom of the tank will be scraped with an implement to gather a representative sample. A hand auger will be used to collect two samples from the sump; one from the 1.5-ft to 2-ft interval and one from the bottom of the sump at approximately 2 ft to 2.5 ft. Hand-auger samples will be collected according to ER-SOP-6.10 (current version), "Hand Auger and Thin-Wall Tube Sampler." Figure 4.2-1 presents the proposed locations where the samples will be collected, and Table 4.2-1 lists these proposed samples.

All samples collected from the sump and the septic tank will be sent to an off-site, fixed laboratory; a full suite analysis will be performed including PCBs, inorganics (including mercury), volatile and semivolatile chemicals, soil pH, and radionuclides (gamma-emitting radionuclides by gamma spectrometry, tritium, isotopic plutonium, isotopic uranium, isotopic thorium, and strontium-90). The septic tank data will be used to identify analytes for the septic system outfall soil samples.

### 4.2.2 Septic System Outfall Supplemental Sampling

Approximately 16 sample locations will be identified on the outfall slope from the septic system and will be sampled (Figure 4.2-2). As the figure illustrates, there are two identifiable topographic areas on this slope. The upper slope is steep, with two drainage areas. This high-gradient area has thin soil with forest litter overlying Unit 3 of the Tshirege Member of the Bandelier tuff. The lower slope is a low-gradient fan deposit with a shallow gully. The fan deposits locally bury young ponderosa pines (post-Laboratory age).




Sources: FIMAD G107662 5/14/99; LASL 1949, ENG4C-660 Sh. 1 of 2

F4.2-1 / TA-21 VCA Plan / 071099 / PTM

**Figure 4.2-1. Proposed septic and sump supplemental sampling locations**

**Table 4.2-1**
**Septic and Sump Samples**

| Sample Location | Sample Depth | Sample Description |
|---|---|---|
| Septic tank (semisolid material) | Bottom of septic tank | Material scraped off bottom of septic tank |
| Sump | 1.5–2 ft | Sample collected the bottom 1.5–2 ft of the sump |
| Sump | 2–2.5 ft | Sample collected the bottom six inches of the sump |
| Septic tank (fill material) | 0–2 ft | Top of septic tank |
| Septic tank (fill material) | 2–4 ft | Middle of septic tank |
| Septic tank (fill material) | 4–6 ft | Bottom of septic tank |

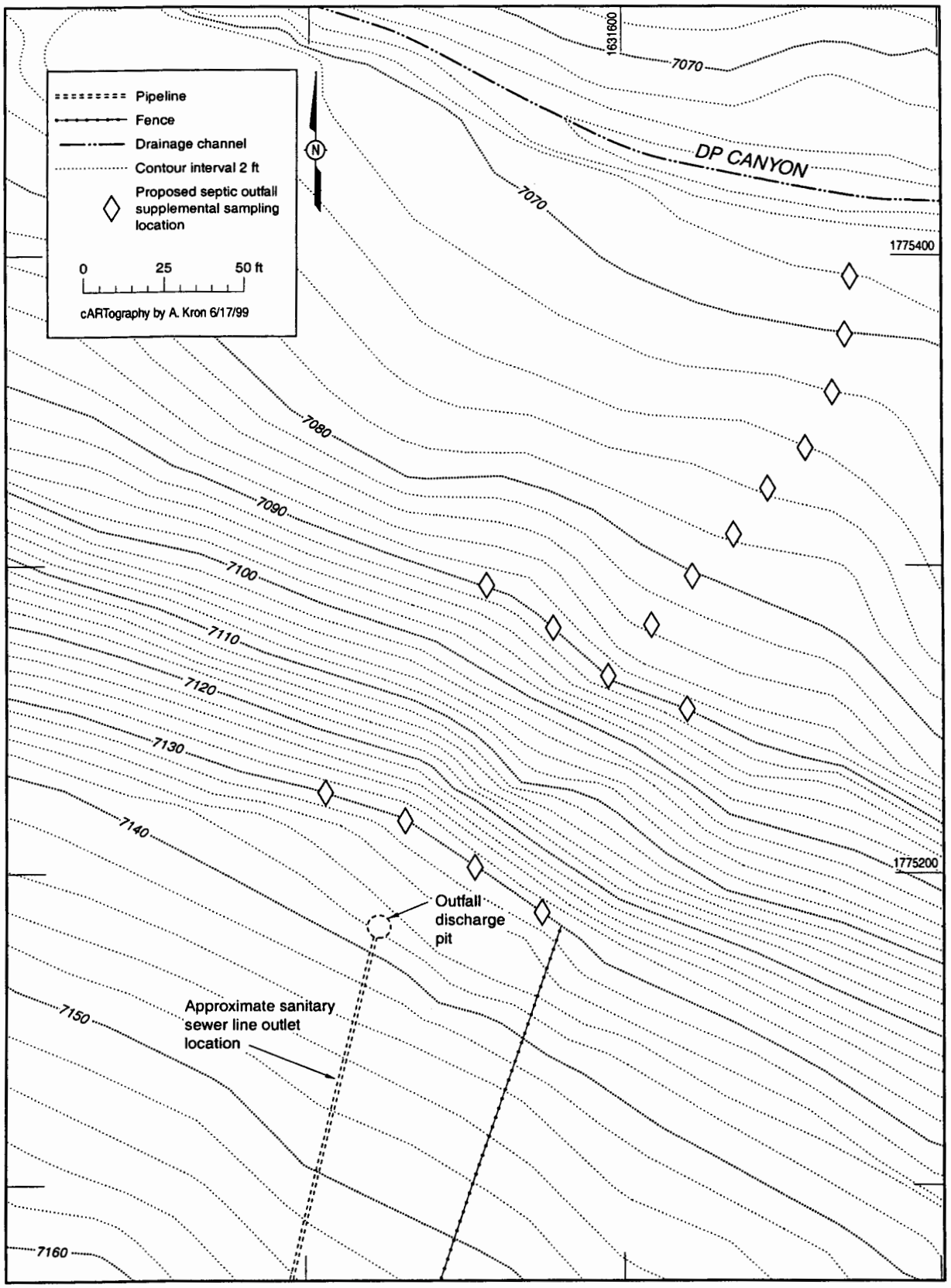
The upper slope will be sampled to bedrock in areas of greatest soil deposition. This depth is expected to be 6 in. or less. Sample locations on the lower slope will all be located within the gully and will be hand dug to a 2- to 3-ft depth. Samples will be collected based on the observed stratigraphy. If complex stratigraphy is encountered, each distinct stratigraphic layer will be sampled. Several ponderosa pines will be cored to determine their age to confirm that sediments younger than the age of potential release are sampled. DP Canyon reach data will be used in combination with the outfall sampling to assess nature and extent of contamination.

These samples will be collected using the spade and scoop method according to ER-SOP-6.09 (current version), "Spade and Scoop Method for Collection of Soil Samples." All samples collected from these locations will be sent to an off-site, fixed laboratory and analyzed. The types of analyses to be performed on these samples will be based on the analytical results from the supplemental samples.

## 4.3 Cleanup Activities

The cleanup activities proposed in this VCA plan are limited to the removal of the septic tank, sump, and associated drain lines because available characterization data have not identified any contamination that warrants soil remediation. The extent of the cleanup activities at these PRSs will depend on the extent and levels of contamination found in the supplemental sampling of the outlet pipe, septic tank, the sump, and the septic tank outfall. If supplemental sampling data identify contamination that poses an unacceptable risk to human health and the environment, cleanup levels will be derived and remediation of the contaminated soil will be conducted. The final cleanup activities and the derivation of the cleanup levels will be described in detail in the VCA completion report for these PRSs.

Soil overlying the outlet and inlet pipes for the septic tank and sump will be removed and field screened during excavation. It is thought that these pipes are at a depth of 4 ft. Soil overlying the septic tank and pipes is not expected to be contaminated because this system was gravity driven and not under pressure. Any liquid from leaks in the system would have seeped below these structures. However, soil overlying the outlet pipe from the concrete sump may be contaminated because this pipe was probably pressure driven. All soil overlying the sump outlet pipe will be temporarily placed on plastic sheeting and covered while representative soil samples are analyzed. Depending on the results of the analyses, the soil will be transported off site and disposed of at a proper facility or placed back in the trench when the excavation has been completed. Waste management is discussed in detail in Section 6.




Sources: FIMAD G107662 5/14/99; LASL 1949, ENG4C-660 Sh. 1 of 2

F4.2-2 / TA-21 VCA Plan / 071099 / PTM

**Figure 4.2-2. Proposed septic outfall supplemental sampling locations**

The sump, septic tank, and their outlet and inlet pipes will be excavated, and placed in roll off bins. These items will be transported off site and disposed of at a proper waste facility, based on the analytical results.

The trench floors will be examined during excavation of the sump, tank, and pipes. Field instrument readings and field observations of pre-existing breaks in the pipes, septic tank, or sump walls and areas of soil discoloration will be used to identify areas of possible contamination. Identified areas of possible contamination will be sampled at two depths for analysis. If no areas of possible contamination are noted, soil samples will be collected at the beginning, middle, and end of the inlet and outlet pipes and immediately beneath the septic tank where the inlet and outlet pipes join this structure. If possible, sample locations will be biased toward any nearby fractures in the tuff. All samples will be sent to an off-site, fixed laboratory for analysis. The types of analyses to be performed on these samples will be based on the analytical results from the supplemental samples. Contaminated soil will be excavated and loaded directly into the appropriate waste container.

All activities will be conducted according to the site-specific plans prepared for the site. These plans include this VCA plan, the Storm Water Pollution Prevention plan, the site-specific health and safety plan, and the Waste Characterization Strategy form.

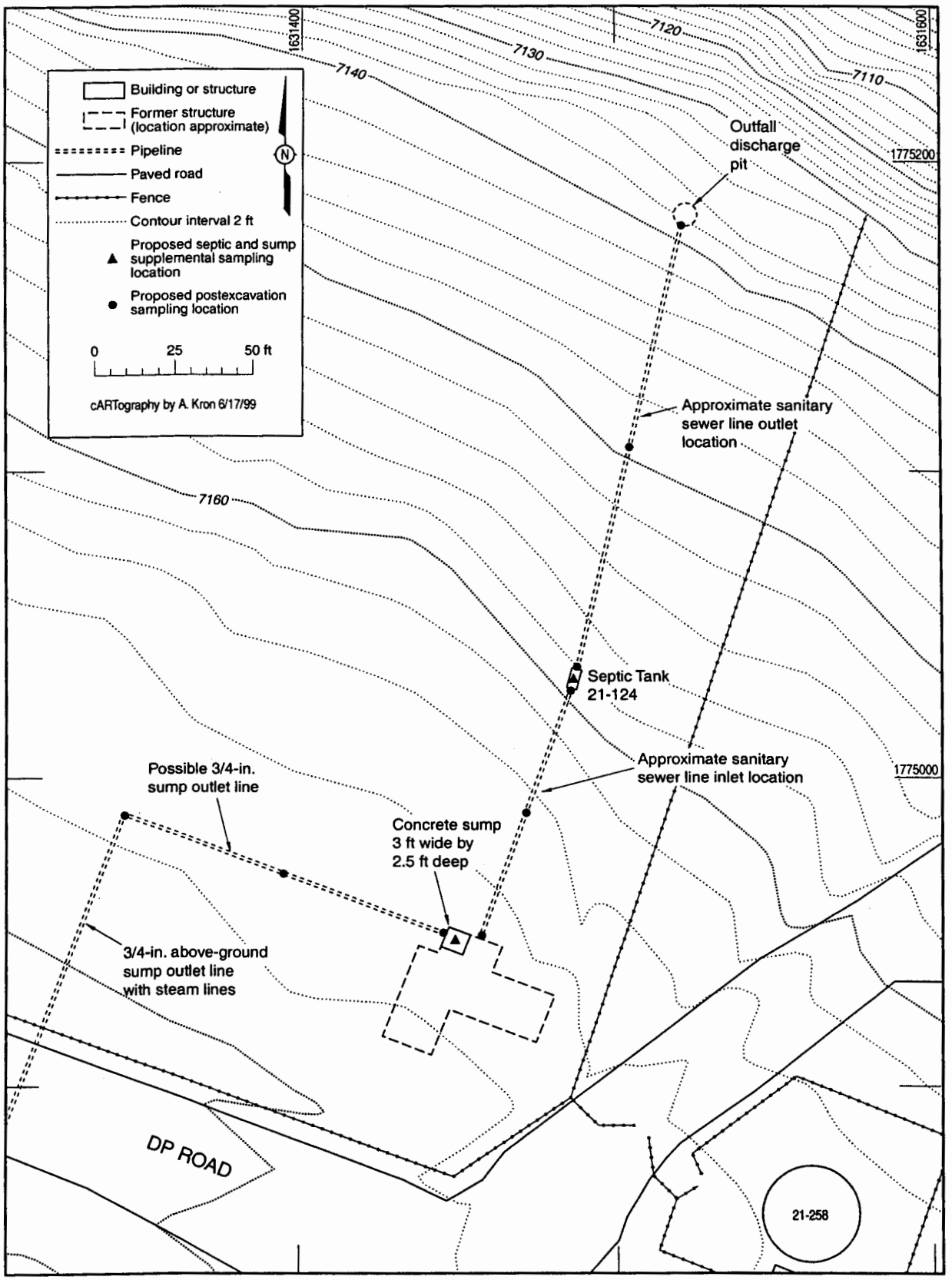
### 4.4 Site Restoration

Before activities begin, photographs, field sketches, and/or video documentation will be prepared to record the conditions of the site. Upon completion of VCA activities, the site will be restored to its preinvestigation contours and seeded with a mix of short-rooted grasses. Stormwater best management practices will be installed as needed during and after completion of remedial activities and inspected and maintained in accordance with ER requirements.

## 5.0 CONFIRMATORY SAMPLING

### 5.1 Confirmatory Sampling for PRS 21-024(f)

Figure 5.1-1 presents proposed postexcavation confirmatory sampling locations. This figure does not identify possible postexcavation confirmatory sampling locations within the septic outfall because the available data do not indicate excavation is warranted, and the supplemental sampling in the outfall area has not yet occurred. If the supplemental sampling in the outfall indicates excavation is required, confirmation samples will be collected after the excavation is completed. All trench floors will be field examined during excavation. Field instrument readings and field observations of pre-existing breaks in the pipes, septic tank or sump walls, fractured areas in the underlying tuff, and areas of soil discoloration will be used to identify areas of possible contamination. Identified areas of possible contamination will be sampled at two depths from the bottom of the excavation (0–12 in. and 12–24 in.). These two depths have been chosen to confirm if contamination is present on the trench floor or to ascertain the extent of any contamination. If no areas of possible contamination are noted, soil samples will be collected at each end and in the middle of the inlet and outlet pipes. The sampling locations will be moved to a nearby fracture within the tuff if one is evident. Table 5.1-1 identifies the type, depth, and description of samples proposed to be collected beneath the septic system inlet and outlet pipes.




Sources: FIMAD G107662 5/14/99; LASL 1949, ENG4C-660 Sh. 1 of 2

F5.1-1 / TA-21 VCA Plan / 071099 / PTM

**Figure 5.1-1. Proposed postexcavation confirmation sampling locations**

**Table 5.1-1**
**Septic Tank, Inlet Pipe, and Outlet Pipe Sample Locations**

| Sample Type | Sample Depth | Sample Description |
|---|---|---|
| Subsurface | Immediately below inlet to tank (0–12 in.) | Collected from the south end of the imprint of the excavated tank beneath the connection to the inlet pipe, media may be fill or tuff |
| Subsurface | Immediately below inlet to tank (12–24 in.) | Collected from the south end of the imprint of the excavated tank beneath the connection to the inlet pipe, media may be fill or tuff |
| Subsurface | Approximately 40 ft. south of tank immediately below excavated inlet pipe (0–12 in.) | Collected from media immediately below excavated inlet pipe, approximately half way between septic tank location and former building location |
| Subsurface | Approximately 40 ft. south of tank immediately below excavated inlet pipe (12–24 in.) | Collected from media immediately below excavated inlet pipe, approximately half way between septic tank location and former building location |
| Subsurface | Approximately 80 ft. south of tank, immediately below end of excavated inlet pipe (0–12 in.) | Collected from media immediately below excavated inlet pipe, at the end of the pipe |
| Subsurface | Approximately 80 ft. south of tank, immediately below end of excavated inlet pipe (12–24 in.) | Collected from media immediately below excavated inlet pipe, at the junction of the septic tank inlet pipe and the former building (the end of the inlet pipe) |
| Subsurface | Immediately below septic tank (0–12 in.) | Collected from the center of the imprint of the excavated tank. media may be fill or tuff |
| Subsurface | Immediately below septic tank (12–24 in.) | Collected from the center of the imprint of the excavated tank, media may be fill or tuff |
| Subsurface | Immediately below outlet to tank (0–12 in.) | Collected from the north end of the imprint of the excavated tank beneath the connection to the outlet pipe, media may be fill or tuff |
| Subsurface | Immediately below outlet to tank (12–24 in.) | Collected from the north end of the imprint of the excavated tank beneath the connection to the outlet pipe, media may be fill or tuff |
| Subsurface | Approximately 80 ft. north of tank immediately below excavated outlet pipe (0–12 in.) | Collected from media immediately below excavated outlet pipe, approximately halfway between septic tank location, and septic tank outfall pit |
| Subsurface | Approximately 80 ft. north of tank immediately below excavated outlet pipe (12–24 in.) | Collected from media immediately below excavated outlet pipe, approximately halfway between septic tank location, and septic tank outfall pit |
| Subsurface | Approximately 160 ft. north of tank, immediately below end of excavated outlet pipe (0–12 in.) | Collected from media immediately below excavated outlet pipe, approximately 160 ft north of septic tank location (the end of the outlet pipe) |
| Subsurface | Approximately 160 ft. north of tank, immediately below end of excavated outlet pipe (12–24 in.) | Collected from media immediately below excavated outlet pipe, approximately 160 ft north of septic tank location (the end of the outlet pipe) |

## 5.2 Confirmatory Sampling for PRS C-21-015

Figure 5.1-1 presents proposed postexcavation confirmatory sampling locations for this PRS. The trench floor from the excavation of the steel pipes will be field examined. Field instrument readings and field observations of pre-existing breaks in the pipe, fractured areas in the underlying tuff, and areas of soil discoloration will be used to identify areas of possible contamination. Identified areas of possible contamination will be sampled at two depths from the bottom of the excavation, (0–12 in. and 12–24 in.).

These two depths have been chosen to ascertain if contamination is present on the trench floor and to determine extent of any contamination that is present. If no areas of possible contamination are noted, soil samples will be collected at each end and in the middle of the underground portion of the sump line trench. If obvious fractures in the tuff are noted near these locations, the samples will be collected so as to include these fractures. Table 5.2-1 identifies the type, depth, and description of samples proposed to be collected beneath the sump line.

**Table 5.2-1**
**Sump and Outlet Pipe Samples**

| Sample Type | Sample Depth | Sample Description |
|---|---|---|
| Subsurface | Immediately below sump outlet pipe (0–12 in.) | Approximately 0 ft west of the sump and 6 ft north of the sump |
| Subsurface | Immediately below sump outlet pipe (12–24 in.) | Approximately 0 ft west of the sump and 6 ft north of the sump |
| Subsurface | Immediately below sump outlet pipe (0–12 in.) | Approximately 35 ft west of the sump |
| Subsurface | Immediately below sump outlet pipe (12–24 in.) | Approximately 35 ft west of the sump |
| Subsurface | Immediately below sump outlet pipe (0–12 in.) | Approximately 70 ft west of the sump |
| Subsurface | Immediately below sump outlet pipe (12–24 in.) | Approximately 70 ft west of the sump |
| Subsurface | 0–12 in. | Beneath the sump |
| Subsurface | 12–24 in. | Beneath the sump |

## 6.0 WASTE MANAGEMENT

### 6.1 Estimated Types and Volumes of Waste

Five separate waste streams are anticipated from this VCA. The waste streams, expected waste types, and volumes are summarized in Table 6.1-1. Waste stream descriptions, including the principal components of the waste and any uncertainties in volume calculations, are described in the paragraphs that follow.

**Table 6.1-1**
**PRSs 21-024(f) and C-21-015 Waste Streams, Types, and Volumes**

| Waste Stream | Waste Type | Anticipated Volume |
|---|---|---|
| Metal and concrete debris | Solid, potentially low-level waste | 6 $yd^3$ |
| Tank contents | Solid/sludge (semisolid) potentially low-level waste | 10 $yd^3$ |
| Contaminated soil | Solid potentially low-level waste | 100 $yd^3$ |
| Decontamination water | Liquid, potentially low-level waste | <25 gal. |
| Plastics, personal protective equipment (PPE), sampling waste | Solid, potentially low-level waste | 10 $yd^3$ |

*Metal and Concrete Debris.* This waste stream includes the septic tank and its VCP inlet and outlet pipes and the concrete sump and its associated pipes. The volume calculation assumes that some of the items will remain essentially intact but others (i.e., concrete sump or clay pipe) will be broken into sections or rubble to facilitate removal.

Characterization will be based on results of sampling residual materials in the debris (e.g., tank contents). Because of the lack of prior characterization knowledge, this waste stream could range from nonradioactive/nonhazardous to either low-level waste or mixed low-level waste depending on the outcome of sampling and analysis results.

*Tank Contents (Solid/Sludge).* This waste stream includes tank contents such as fill material or sludge. If the tank contents are semisolids (sludge) or liquid, absorbent will be added to eliminate any free liquids in the waste stream. Characterization of the waste will be determined by direct sampling of the tank contents. The volume estimate assumes the tank has been backfilled.

*Contaminated Soil.* This waste stream could include radioactively contaminated soils that are excavated both above and below the inlet and outlet pipes of the septic tank and soils below and above the outlet pipe for the concrete sump, as well as any soils requiring removal from the pit outfall area. Because of the lack of prior characterization knowledge, this waste stream could range from nonradioactive/nonhazardous to either low-level waste or mixed low-level waste depending on the sampling and analysis results. The quantity estimates for this waste stream are based on the volume of the soil above the steel sump pipe (2 ft wide x 3 ft deep x 110 ft). An additional 12 cubic yards is estimated as originating beneath the inlet/discharge pipes given an average excavation of 2 ft wide x 0.5 ft deep along the entire length of the pipes. Resulting soil volumes were increased by 20% to account for volume expansion. There is considerable uncertainty in these quantity estimates because of the potential for encountering unexpected conditions in the field.

*Decontamination Water.* This waste stream consists of solutions generated from the on-site decontamination of tools, excavation equipment, sampling equipment, and personnel. The anticipated volume of decontamination water is based on a minimum amount of wet decontamination. It is expected that the majority of decontamination will be performed with dry techniques. Decontamination solutions will be characterized to demonstrate compliance with waste acceptance criteria at the TA-50 Radioactive Liquid Waste Treatment Facility.

*Plastics, PPE, and Sampling Wastes.* This waste stream will include various types of plastic sheeting (e.g., tarps, and contamination control covers), disposable gloves, and sampling supplies such as plastic scoops, plastic bags, jars, and dry decontamination waste. Plastics, PPE, and sampling-related wastes have the potential to become contaminated through direct contact with contaminated environmental media and debris. Characterization of this waste will be determined from the contamination levels found in the soil and debris waste streams.

## 6.2 Method of Management and Disposal

This section describes the planned methods of managing the waste from the time of generation to final disposal.

*Metal and Concrete Debris.* Metal and concrete debris will be loaded into an appropriate roll-off container, based on the list of analytes identified during the supplemental sampling. Disposal site requirements will

be determined once sample results from the metal and concrete debris have been evaluated. It is anticipated that the debris will be characterized as a solid low-level waste and transported for disposal at TA-54 Area G disposal facility. If the debris is characterized as hazardous waste (i.e., mixed low-level waste), then the option of off-site shipment to a licensed mixed-waste disposal facility will be evaluated.

*Tank Contents (Solid/Sludge).* The fill material or sludge will be placed into an appropriate roll-off container, based on the analytes identified during the waste characterization sampling. It is anticipated that the waste will be characterized as solid low-level waste and transported for disposal at TA-54, Area G. If the debris is characterized as hazardous waste, i.e., mixed low-level waste, then the option of off-site shipment to a licensed mixed-waste disposal facility will be evaluated.

*Contaminated Soil.* Potentially contaminated soils will be placed on plastic sheeting and covered until analytical results are received. Soil with contaminant concentrations that are below the sites' cleanup levels will be returned to the excavation. Contaminated soils will be packaged in 55-gal. drums or roll-off containers depending on the final volume of the waste stream. Final disposal of contaminated soils is expected to be at TA-54 Area G, provided it is low-level waste.

*Decontamination Water.* Decontamination solutions will be collected daily in 55-gal. steel or poly (bung-type) drums approved by the US Department of Transportation. Dry decontamination processes will be used to clean the equipment when it is removed from the site. It is possible that one 55-gal. drum for decontamination solutions will be sufficient to complete this VCA. Wet decontamination will only be used if it is determined that the dry decontamination is insufficient to clean the equipment fully. Drums containing liquids will be stored in secondary containment. Liquid waste samples will be collected for characterization. Radioactively contaminated liquids will be transported to the TA-50 Radioactive Liquid Waste Treatment Facility for disposal.

*Plastics, PPE, and Sampling Wastes.* Plastics, PPE, and miscellaneous sampling wastes will be collected in lined, 55-gal. drums and stored in a segregated low-level waste storage area. If feasible, the large plastic liners and tarps may be surveyed for release as nonradioactive material. Otherwise the drums will be transported to TA-54 Area G for disposal.

## 7.0 PROPOSED SCHEDULE AND UNCERTAINTIES

The field work portion of this VCA is expected to begin on June 18, 1999, and end November 24, 1999 (Table 7.0-1). Seven days are allotted to hold a site readiness review, train, mobilize, sample, and demobilize during the pre-excavation sampling field session. Laboratory analysis for the pre-excavation sampling of the septic tank and sump is 15 days.

Fifteen days are allotted for excavations and confirmatory sampling of the site, 30 days are allotted for the laboratory to analyze the confirmation samples. This time line should be achievable assuming that all laboratory analysis can be completed within this time period and that the confirmation samples provide evidence that contamination is not present or is present at acceptable risk levels. In addition, it is not known what type or amount of contamination will be found within the septic tank. If a large quantity of solid or liquid waste is found within the septic tank, a longer period of time may be necessary to remove this material and to remove the tank.

**Table 7.0-1**
**VCA Field Work Schedule**

| Activity | Workday Duration | Start | Finish |
|---|---|---|---|
| Readiness review/preparation and characterization sampling | 1 day | 6/18/99 | 7/12/99 |
| Preparation and precharacterization sampling | 5 days | 7/19/99 | 7/23/99 |
| Laboratory analysis | 15 days | 7/23/99 | 8/13/99 |
| Excavation and confirmatory sampling | 15 days | 8/23/99 | 9/13/99 |
| Laboratory analysis | 40 days | 8/30/99 | 10/20/99 |
| Waste management/disposal | 64 days | 8/23/99 | 11/24/99 |
| Site restoration | 5 days | 11/3/99 | 11/10/99 |
| **Overall** | **145 days** | **6/18/99** | **11/24/99** |

Sixty-four days have been allotted for all waste sampling, analysis, disposition, and disposal. This schedule should be achievable if laboratory analysis and waste disposition decisions can be completed in a timely fashion and if a proper waste disposal facility can be confirmed.

Five days have been allotted for site restoration activities. If excavation is needed to clean up the outfall portion of the septic system, more restoration may be needed. In addition, if site restoration is more extensive than straw bale erosion controls, backfilling, grading and reseeding of the site, a longer period of time may be needed. The VCA completion report will be prepared in Fiscal Year 2000

## 8.0 REFERENCES

The following list includes all references cited in this document. Parenthetical information following each reference provides the author, publication date, and the environmental restoration record identification (ER ID) number. This information also is included in the citations in the text. ER ID numbers are assigned by the Laboratory's ER Project to track records associated with the Project. These numbers can be used to locate copies of the actual documents at the ER Project's Records Processing Facility and in the ER Project reference library titled "Reference Set for Material Disposal Areas, Technical Area 21."

Copies of the reference library are maintained at the New Mexico Environment Department Hazardous and Radioactive Materials Bureau; the Department of Energy Los Alamos Area Office; United States Environmental Protection Agency, Region VI; and the ER Project Material Disposal Areas Focus Area. This library is a living document that was developed to ensure that the administrative authority (AA) has all the necessary material to review the decisions and actions proposed in this document. However, documents previously submitted to the AA are not included in the reference library.

Blackwell, C., October 12, 1953. "Old Safety Training Building on DP Road," Los Alamos Scientific Laboratory letter to J. Bolton, Los Alamos, New Mexico. (Blackwell 1953, ER ID 63127)

EPA (US Environmental Protection Agency), April 10, 1990. Module VIII of RCRA Permit No. NM0890010515, EPA Region VI, issued to Los Alamos National Laboratory, Los Alamos, New Mexico, effective May 23, 1990, EPA Region VI, Hazardous Waste Management Division, Dallas, Texas. (EPA 1990, ER ID 01585)

EPA (US Environmental Protection Agency), undated. "Region 9 Preliminary Remediation Goals (PRGs)," memorandum from S. J. Smucker, Regional Toxicologist, Technical Support Team, San Francisco, California. (EPA 1998, ER ID 58751.1)

Francis, W., April 6, 1999. "A History of the 1949 Alterations to Building TA-21-45," Los Alamos National Laboratory memorandum EM/ER-RAFA:99-025 to G. McMath, Los Alamos, New Mexico. (Francis 1999, ER ID 63126)

Francis, W., July 1, 1996. "TA-21 Building 45," ERM Program Management Company telephone log from Linnea Wahl, Los Alamos, New Mexico. (Francis 1996, ER ID 63125)

LANL (Los Alamos National Laboratory), October 1987. "TA-23-Nu Site," Los Alamos CEARP Phase I draft report," Los Alamos, New Mexico. (LANL 1987, ER ID 39998.63)

LANL (Los Alamos National Laboratory), May 1991. "TA-21 Operable Unit RFI Work Plan for Environmental Restoration," Volumes III, Los Alamos National Laboratory report LA-UR-91-962, Los Alamos, New Mexico. (LANL 1991, ER ID 7680)

LANL (Los Alamos National Laboratory), February 28, 1994. "Phase Report 1C, TA-21 Operable Unit RCRA Facility Investigation, Outfalls Investigation," Los Alamos National Laboratory report LA-UR-94-228, Los Alamos, New Mexico. (LANL 1994, ER ID 59051)

LANL (Los Alamos National Laboratory), January 1995. "Phase Report Addendum 1B and 1C Operable Unit 1106 RCRA Facility Investigation," Los Alamos National Laboratory report LA-UR-94-4360, Los Alamos, New Mexico. (LANL 1995, ER ID 52350)

LANL (Los Alamos National Laboratory), September 22, 1995. "Voluntary Corrective Action Completion Report for Potential Release Sites, Group 2," Los Alamos National Laboratory report, Job #93069-043-00, Los Alamos, New Mexico. (LANL 1995, ER ID 49964.47).

# Appendix A

*List of Acronyms*

## APPENDIX A LIST OF ACRONYMS

| | |
|---|---|
| BV | background value |
| COPC | chemical of potential concern |
| DOE | US Department of Energy |
| ECSM | ecological conceptual site model |
| EPA | US Environmental Protection Agency |
| ER | environmental restoration |
| ESL | ecological screening level |
| HSWA | Hazardous and Solid Waste Amendments of 1984 |
| Laboratory | Los Alamos National Laboratory |
| n/a | not applicable |
| N.A. | not available |
| NFA | no further action |
| PCB | polychlorinated biphenyl |
| PPE | personal protective equipment |
| PRS | potential release site |
| RCRA | Resource Conservation and Recovery Act |
| RFI | RCRA facility investigation |
| SAL | screening action level |
| SOP | standard operating procedure |
| TA | technical area |
| VCA | voluntary corrective action |
| VCP | vitrified clay pipe |

# Appendix B

*VCA Checklist and Field Work Authorization Form*

Accelerated Corrective Action (ACA)
Checklist and Field Work Authorization Form
PRS Nos. 21-024(f) HSWA and AOC C-21-015

| Yes | No | |
|---|---|---|
| X | | Fact sheet describing planned activities is complete and attached to checklist |
| X | | COPC(s) for HH, ECO, or other requirements are known or will be determined during accelerated site characterization |
| X | | Nature and extent of contamination is defined or accelerated site characterization is planned as part of this action to define nature and extent and guide cleanup. |
| | X | Cleanup levels/PRGs are appropriate. |
| X | | Remedy is obvious |
| X | | Time for removal is less than 6 months. |
| X | | Remedy is final. |
| | X | Land use assumptions are straightforward. |
| X | | Treatment, Storage, Disposal Facilities are available for waste type and volume. |
| X | | Cleanup cost is reasonable for the planned action, and meets accelerated decision logic criterion for decision to proceed with ACA. |
| X | | Briefing for NMED is required.* |
| Explain criteria not checked above: Cleanup levels are not currently in VCA Plan, but will be derived and submitted to NMED as an addendum to this plan, if needed. (DD) | | |
| The TA-21 RFI Work Plan and land transfer proposal assume land use for TA-21 will be industrial. | | |
| *VCA Fact Sheet provided to NMED on May 19, 1999 and verbally approved by John Keiling of NMED on June 3, 1999. | | |

Upon reviewing the Accelerated Corrective Action Fact Sheet and the criteria checklist above, the appropriate Accelerated Corrective Action approach for the PRS(s) is:

| | |
|---|---|
| VCA | X |
| VCM | |

| Signature of UC-LANL, DOE-LAAO, and NMED-HRMB Representative | Date |
|---|---|
| UC Guy McMath | 7-12-99 |
| DOE Joseph Mar | 7-12-99 |
| NMED - Memo to file documents John Keiling's approval of the VCA upon review of VCA Fact Sheet. | June 3, 1999 |

The undersigned have reviewed the final plan and believe that it fully satisfies the appropriate Accelerated Corrective Action Approach.

| Signature of UC-LANL and DOE-LAAO Representative | Date |
|---|---|
| UC Dale Dayman | 7/13/99 |
| DOE Joseph H. Mar | 7-13-99 |

| Action | Date | Correspondence ID |
|---|---|---|
| VCA/VCM plan submitted to NMED | 7/15/99 | |
| NOD or RSI Received from NMED | | |
| LANL Response to NOD or RSI | | |
| NMED Approval to VCA/VCM Plan | | |

After reviewing VCA/VCM Plan, for the site(s) listed above, and believing that the ACA process and VCA/VCM criteria have been met, I authorize the fieldwork to proceed.

DOE ER Program Manager _____ Date _____

**PRS 21-024(f) and C-21-015 Voluntary Corrective Action Fact Sheet**

**Removal of Underground Septic System and Sump**

**SRS: 35**

**Erosion Matrix Score: 17**

**Description And History**

PRS 21-024(f) is an abandoned septic system and outfall that served building TA-21-45. Building TA-21-45 served as the military driver's license office/safety training building in the mid-1940's. The Laboratory's Industrial Waste Studies Group converted the building for use as a laboratory in 1949 for the development of methods to recover radionuclides and metals from various waste streams generated at TA-21. The historical record is incomplete; however, the building was sold for salvage intact in August 1954 indicating the building was uncontaminated. The apparent operating period as a laboratory was 1949 to 1954. The septic tank (TA-21-124), the associated inlet and outlet lines, and the discharge pit were abandoned in place in 1954.

PRS C-21-015 is described as the former building TA-21-45. This site was proposed for NFA in the TA-21 RFI Work Plan. Subsequent archival research and field observation indicates that a cement sump was left in place after the building was removed. The sump was located in the northwest portion of the building. This sump and other waste facilities were installed as part of a building conversion in 1949 as noted above. The sump had a buried ¾" steel outlet line leading to the west approximately 70 feet. At this point the line was routed above ground and was attached to existing above ground lines crossing DP Road and terminated at the main DP Laundry (TA-21-20) sump. It is not clear from existing drawings how the ¾" line was routed to the sump located in the laundry. However, it is reasonable to assume the line followed the existing above ground steam system into the building and to the main sump of the laundry. The laundry sump discharged to the MDA-V seepage pits. A detailed site map is being developed and will be included in the Voluntary Corrective Action (VCA) Plan.

**Contaminants**

Based on the results of sampling events conducted in 1988, 1992, and 1993, several contaminants of potential concern (COPCs) were identified. The COPCs include radionuclides, inorganic and organic compounds.

PRS 21-024(f) was sampled in 1988, 1992, and 1993. In 1988, the center of the outlet pit was sampled. Mercury, cesium-137, plutonium-239/240 and tritium were reported at concentrations slightly above Laboratory-wide background levels. In addition, low concentrations of oil and grease were detected. In 1992 a radiological survey of the area was performed in the vicinity of the discharge pit. The outfall discharge area was sampled in 1992 at three locations at three intervals (0-6 in., 6-12 in., and 12-18 in.) per location. The survey indicated background levels of alpha, gamma, and low-energy gamma emitters. The sample analyses indicate americium-241; plutonium-239 and strontium-90 are present at or above Laboratory-wide background levels. The above baseline radionuclides are well below their respective SALs, except for the 0-6 in. sample from the farthest down slope (north) sample location (location ID 21-1432). This sample showed a plutonium-239 concentration detected at 14 pCi/g. Semi-volatile and

volatile organic analyte concentrations were below their detection limits. In 1993, two boreholes were drilled and sampled. One borehole was drilled just south of the septic tank (21-124), to a depth of 20'. Samples were taken at five-foot intervals for a total of four samples. The second borehole was drilled in the center of the outlet pit to a depth of 10'. Samples were taken here every two and a half feet for a total of four samples. Low levels of radionuclides were detected at depth; however, there are no radionuclide background levels at depth with which to compare these results. Inorganic analytes from the borehole samples indicated concentrations at or below background UTLs and the applicable SALs. No volatile or semi-volatile organic analytes were reported above their detection limits. Analytical results from the near-surface samples indicate a contaminant release from PRS 21-024(f). No samples have been collected from within the septic tank.

No samples have been collected from PRS C-21-015, but recently acquired historical information (partly described above) indicates that contaminated wastewater may have been pumped from sump at this PRS to MDA V across the DP Road. It is unknown whether a release from this system occurred.

**Rationale**

The sites are located on the mesa top and the outfall discharge area for PRS 21-024(f) extends down a steep slope leading into DP Canyon. At PRS 21-024(f), available data indicate the extent of contamination down the drainage has not been bounded because the 0-6 in. sample taken at location ID 21-1432 is the most distant point sampled and has the highest concentration of plutonium-239. Because of the contaminants found in the discharge area, the contents of the septic tank are now considered to require examination to determine if radioactive or hazardous wastes remain.

The recent discovery of information related to the change in operations at building TA-21-45 (PRS C-21-015), changes the understanding of operations conducted there, and indicates the need to assess any residual contamination that may be present. Specifically, sampling of the abandoned sump and its lines is needed.

This work is proposed as a voluntary corrective action because the remedial alternatives are obvious and well understood. The planned transfer of this portion of TA-21 to Los Alamos County encourages removal of the abandoned septic system as a good management practice regardless of the outcome of the proposed additional investigations. If the contaminants identified in previous investigations are found in the surface or subsurface at levels requiring action, removal is the best remedial alternative.

**Voluntary Corrective Action**

The corrective action at this site includes performing radiological surveys and collecting samples to determine the extent of contamination in the outfall discharge area. In addition, the septic tank, the tank's VCP 4" clay inlet and outlet lines, and the cement sump and its associated lines will be removed regardless of their contaminant levels. Additional surveys will be performed and samples collected to determine if there has been a release from these structures and if so the nature and extent. The building footprint of PRS C-21-015 will also be sampled. If a release has occurred, contaminated soil and tuff will be removed. Cleanup levels will developed for inclusion in the VCA Plan and will be appropriate for the anticipated land use being proposed by Los Alamos County and the Pueblo (commercial land use). Details of the excavation have not been finalized, but it is currently anticipated that these

activities will be completed using a combination of heavy equipment and hand tools. The surrounding environment is partially to fully covered with oak, juniper, and ponderosa pine. Growth removal will be minimized to the extent possible. Site restoration will require the installation of straw bale erosion control fencing, backfill, grading and reseeding with a mix of short rooted grasses.

**Anticipated Waste Types and Volumes**

Four separate waste streams are anticipated from this VCA. The expected waste types, and volumes are presented in the following table. Waste stream descriptions, including the principal components of the waste and any uncertainties in volume calculations are included.

| Waste Stream | Waste Type | Anticipated Volume |
|---|---|---|
| Reinforced Concrete Debris | Solid, potentially LLW | 6 $yd^3$ |
| Contaminated Soil | Solid LLW | 200 $yd^3$ |
| Decontamination Water | Liquid, potentially LLW | Less than 25 gallons |
| Plastics, PPE, Sampling Waste | Solid, potentially LLW | Less than 5 $yd^3$ |

**Estimated Cost**

The cost of remedial activities, including planning, cleanup, waste disposal, sites restoration, and report preparation is estimated to be $550,000.

**Schedule**

The field work portion of this VCA is expected to begin in the summer of 1999 (mid-July), and take approximately two and half months to complete. The VCA report will be completed in FY 2000.

**Reference List of Past Plans, Reports, NODs, RSI, etc.**

- RFI Work Plan for Operable Unit TA-21 (LAUR-91-962), Subsection 15.9, May 1991.
- Phase Report IC - TA-21 Operable Unit RCRA Facility Investigation – Outfalls Investigation (LA-UR-94-228), Subsection 8.6, February 1994.
- Phase Report Addendum 1B and 1C – Operable Unit 1106 – RCRA Facility Investigation (LA-UR-94-4360), Subsection 3.2, February 1995.

# Appendix C

*Standard Operating Procedure 2.01*

# Los Alamos National Laboratory

**Environment, Safety & Health Division**
**ESH-18 Water Quality & Hydrology Group**

# Surface Water Assessment
# Erosion Matrix for PRS 21-024(f)

| CRITERIA EVALUATED | Value | Erosion/Sediment Transport Potential Low 0.1 | Medium 0.5 | High 1.0 | Calculated Score |
|---|---|---|---|---|---|
| **Site Setting (43)** | | | | | |
| On mesa top | 1 | Defined based on topographic setting | | | |
| Within bench of canyon | 4 | | | | 4.0 |
| Within the canyon floodplain but not watercourse | 13 | | | | |
| Within bottom of canyon channel in watercourse | 17 | | | | |
| Estimated % ground and canopy cover | 13 | >75% | 25-75% | <25% | 6.5 |
| Slope | 13 | 0-10% | 10-30% | >30% | 6.5 |
| **Surface Water Factors-Run-off (46)** | | | | | |
| Visible evidence of runoff discharging? (Yes/No) | 5 | If no, score of 0 for runoff section. | | | 5.0 |
| | | If yes, score 5 and proceed with section. | | | |
| Where does runoff terminate? | 19 | Other | Bench Setting | Drainage/Wetland | 1.9 |
| Has runoff caused visible erosion? (Yes/No) | 22 | Sheet | Rill | Gully | 0.0 |
| | | If no, score as 0. If yes, calculate as appropriate. | | | |
| **Surface Water Factors-Run-on (11)** | | | | | |
| Structures adversely affecting run-on (Yes/No) | 7* | If yes, score as 7. If no, score as 0. | | | 0.0 |
| Current operations adversely impacting (Yes/No) | 4 | If yes, score as 4. If no, score as 0. | | | 0.0 |
| Natural drainages onto site (Yes/No) | 7* | If yes, score as 7. If no, score as 0. | | | 7.0 |
| **Select either structures or natural drainages.* | | | | | |
| **MAX. POSSIBLE EROSION MATRIX SCORE:** | **100** | | | **Total Score** | 30.9 |

REVISED PART B

Report Printed 6/25/99 11:58:12 AM.

# Los Alamos National Laboratory
# SURFACE WATER
# SITE ASSESSMENT

Revised Part B. Please discard previous.

## SITE INFORMATION

**1a) PRS Number** 21-024(f) **1b) Structure Number** **1c) FMU Number** 80

**2. Date/Time (M/D/Y H:M am/pm)** 5/18/99

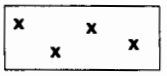
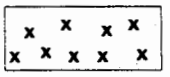
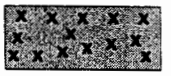
## SITE SETTING (check all that apply)

**3.** (●) **On mesa top (a).** ( ) **In the canyon floor, but not in an established channel (c).**

(●) **Within a bench of a canyon (b).** ( ) **Within established channel in the canyon floor (d).**

**Explanation:** Outfall pipe terminates at edge of bench into seepage pit on south side of DP Canyon, northwest of blue water storage tank - 150 yards.

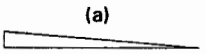
**4.** Estimated ground and/or canopy cover at site: (deciduous leaves, pine needles, rocks, vegetation, trees, structures, asphalt, etc.)

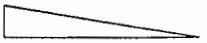
(illustration) (a)  (b)  (c) 

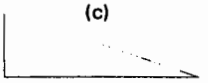
*Estimated % of ground/canopy cover:* ( ) 0% to 25% (●) 25% to 75 ( ) 75% to 100

**Explanation:** Moderate cover of pine needles and rocks; no grass; some pine trees surrounding the area.

**5.** Steepest slope at the area impacted:

(a)  ( ) Less than 10%

(b)  (●) 10% to 30%

(c)  ( ) 30% and greater

**Explanation:** Gradual slope to canyon edge or rim.

## RUNOFF FACTORS

**Y / N**

☑ ☐ **6. Is there visible evidence of runoff discharging from site? If yes, answer a) - c) below:**

☐ ☑ 6a) Is runoff channelized? If yes, describe ( ) Man-made channel. ( ) Natural channel.

**Explanation:** Mostly sheetflow with a drainage swale in the vicinity.

**RUNOFF FACTORS, CONT'D**

6b) Where does evidence of runoff terminate?

- ( ) **Drainage or wetland (name)** DP Canyon
- ( ) **Within bench of canyon setting (name)**
- (•) **Other (i.e., retention pond, meadow, mesa top)** mesa top and seepage pit at end of pipe

**Explanation:** Sheet flow from area appears to rarely reach the mesa edge if ever.

**Y / N**

☐ ☑ 6c) Has runoff caused visible erosion at the site? If yes, explain below ( ) Sheet ( ) Rill ( ) Gully

**Explanation:** None observed.

**RUN-ON FACTORS**

**Please rate the potential for storm water to run on to this site: (Check EITHER #7 or #9)**

☐ ☑ **7.** Are structures (i.e., buildings, roof drains, parking lots, storm drains) creating run-on to the site?

**Explanation:** None

☐ ☑ **8.** Are current operations (i.e., fire hydrants, NPDES outfalls) adversely impacting run-on to the site?

**Explanation:** None

☑ ☐ **9.** Are natural drainage patterns directing stormwater onto site?

**Explanation:** Minimal upslope sheetflow.

**ASSESSMENT FINDING:**

☐ ☑ **10. Based on the above criteria and the assessment of this site, does soil erosion potential exist? (REFER TO EROSION POTENTIAL MATRIX.)**

Veenis, Steve

**11. Signature of Water Quality/Hydrology Representative**

SW Initials of independent reviewer.

Check here when information is entered in database: ☑

**This page is for ESH-18 notes, recommendations, and photos.**

| | Y | N | |
|---|---|---|---|
| 12. a) | ○ | ● | Is there visible trash/debris on the site? |
| b) | ○ | ● | Is there visible trash/debris in a watercourse? |

**Description of existing BMPs:**

| |
|---|
| |

○ ○ Are BMPs being properly maintained? If no, describe in "Other Internal Notes."

○ ○ Are BMPs effectively keeping sediment in place and reducing erosion potential?

**OTHER INTERNAL NOTES:**

Site was re-evaluated to reflect the outfall, septic and drainline. The original assessment was completed on 09/30/1997 and had an erosion matrix score of (17.0).

# Los Alamos National Laboratory

**Environment, Safety & Health Division**
**ESH-18 Water Quality & Hydrology Group**

# Surface Water Assessment
# Erosion Matrix for PRS C-21-015

| CRITERIA EVALUATED | Value | Erosion/Sediment Transport Potential Low 0.1 | Medium 0.5 | High 1.0 | Calculated Score |
|---|---|---|---|---|---|
| **Site Setting (43)** | | | | | |
| On mesa top | 1 | Defined based on topographic setting | | | 1.0 |
| Within bench of canyon | 4 | | | | |
| Within the canyon floodplain but not watercourse | 13 | | | | |
| Within bottom of canyon channel in watercourse | 17 | | | | |
| Estimated % ground and canopy cover | 13 | >75% | 25-75% | <25% | 6.5 |
| Slope | 13 | 0-10% | 10-30% | >30% | 1.3 |
| **Surface Water Factors-Run-off (46)** | | | | | |
| Visible evidence of runoff discharging? (Yes/No) | 5 | If no, score of 0 for runoff section. | | | 5.0 |
| | | If yes, score 5 and proceed with section. | | | |
| Where does runoff terminate? | 19 | Other | Bench Setting | Drainage/Wetland | 1.9 |
| Has runoff caused visible erosion? (Yes/No) | 22 | Sheet | Rill | Gully | 0.0 |
| | | If no, score as 0. If yes, calculate as appropriate. | | | |
| **Surface Water Factors-Run-on (11)** | | | | | |
| Structures adversely affecting run-on (Yes/No) | 7* | If yes, score as 7. If no, score as 0. | | | 0.0 |
| Current operations adversely impacting (Yes/No) | 4 | If yes, score as 4. If no, score as 0. | | | 0.0 |
| Natural drainages onto site (Yes/No) | 7* | If yes, score as 7. If no, score as 0. | | | 7.0 |
| **Select either structures or natural drainages.* | | | | | |
| **MAX. POSSIBLE EROSION MATRIX SCORE:** | **100** | | | **Total Score** | 22.7 |

Report Printed 6/25/99 11:58:43 AM.

# Los Alamos National Laboratory
## SURFACE WATER
## SITE ASSESSMENT

**SITE INFORMATION**

**1a) PRS Number** C-21-015 **1b) Structure Number** **1c) FMU Number** 80

**2. Date/Time (M/D/Y H:M am/pm)** 5/18/99

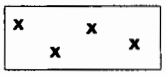
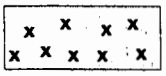
**SITE SETTING (check all that apply)**

**3.** (●) **On mesa top (a).** ( ) **In the canyon floor, but not in an established channel (c).**

( ) **Within a bench of a canyon (b).** ( ) **Within established channel in the canyon floor (d).**

**Explanation:** Generally north trending towards DP Canyon. Former sump location.

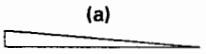
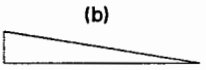
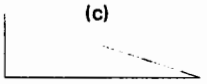
**4.** Estimated ground and/or canopy cover at site: (deciduous leaves, pine needles, rocks, vegetation, trees, structures, asphalt, etc.)

(illustration) (a)  (b)  (c)

*Estimated % of ground/canopy cover:* ( ) 0% to 25% (●) 25% to 75 ( ) 75% to 100

**Explanation:** Mixed vegetation with some local bare spots.

**5.** Steepest slope at the area impacted:

(a)  (b)  (c) 

(●) Less than 10% ( ) 10% to 30% ( ) 30% and greater

**Explanation:** Mostly flat near sump location.

**RUNOFF FACTORS**

**Y / N**

☑ ☐ **6. Is there visible evidence of runoff discharging from site? If yes, answer a) - c) below:**

☐ ☑ 6a) Is runoff channelized? If yes, describe ( ) Man-made channel. ( ) Natural channel.

**Explanation:** Minimal evidence of sheetflow run off from site.

**RUNOFF FACTORS, CONT'D**

6b) Where does evidence of runoff terminate?

- ○ **Drainage or wetland (name)** DP Canyon
- ○ **Within bench of canyon setting (name)**
- ◉ **Other (i.e., retention pond, meadow, mesa top)** Mesa top

**Explanation:** Infiltration mostly to mesa top.

**Y / N**

☐ ☑ 6c) Has runoff caused visible erosion at the site? If yes, explain below ○ Sheet ○ Rill ○ Gully

**Explanation:** None observed

**RUN-ON FACTORS**

**Please rate the potential for storm water to run on to this site: (Check EITHER #7 or #9)**

☐ ☑ **7.** Are structures (i.e., buildings, roof drains, parking lots, storm drains) creating run-on to the site?

**Explanation:**

☐ ☑ **8.** Are current operations (i.e., fire hydrants, NPDES outfalls) adversely impacting run-on to the site?

**Explanation:**

☑ ☐ **9.** Are natural drainage patterns directing stormwater onto site?

**Explanation:** Natural upslope sheetflow run-on.

**ASSESSMENT FINDING:**

☐ ☑ **10. Based on the above criteria and the assessment of this site, does soil erosion potential exist? (REFER TO EROSION POTENTIAL MATRIX.)**

Veenis, Steve

**11. Signature of Water Quality/Hydrology Representative**

SV Initials of independent reviewer.

Check here when information is entered in database: ☑

**This page is for ESH-18 notes, recommendations, and photos.**

| | Y | N | |
|---|---|---|---|
| 12. a) | ○ | ● | Is there visible trash/debris on the site? |
| b) | ○ | ● | Is there visible trash/debris in a watercourse? |

**Description of existing BMPs:**

| | | |
|---|---|---|
| ○ | ○ | Are BMPs being properly maintained? If no, describe in "Other Internal Notes." |
| ○ | ○ | Are BMPs effectively keeping sediment in place and reducing erosion potential? |

**OTHER INTERNAL NOTES:**

# Appendix D

*Ecological Scoping Checklist*

## APPENDIX D ECOLOGICAL SCOPING CHECKLIST

## PART A—SCOPING MEETING DOCUMENTATION

| **Site ID** | PRS 21-024(f) |
|---|---|
| **Form of Site Releases (solid, liquid, vapor)**<br>**Describe all relevant known or suspected mechanisms of release (spills, dumping, material disposal, outfall, explosive testing) and describe potential areas of release. Reference locations on a map, as appropriate.** | The release from this site is liquid waste from the septic tank. The release would have been into a pit from the pipe at the outfall. The pit may have overflowed in which case the release would have been into the drainage that flows into DP Canyon. A secondary release may have been to the subsurface by way of cracks or leaks in the septic tank and pipe. This would also have been liquid waste. |
| **List of Primary Impacted Media**<br>**(Indicate all that apply.)** | Surface soil – Primary impacted media from discharge at outfall pit and potentially into canyon<br>Surface water/sediment – Not applicable<br>Subsurface – May be impacted if septic tank or piping leaked or from leaching of the discharge in the outfall pit.<br>Groundwater – Not applicable<br>Other, explain – Not applicable |
| **FIMAD Vegetation Class Based on Arcview Vegetation Coverage**<br>**(Indicate all that apply.)** | Water – Not applicable<br>Bare Ground/Unvegetated – There are some areas of bare ground between vegetated areas. These areas are often covered with pine needles and other plant litter.<br>Spruce/fir/aspen/mixed conifer – Not applicable<br>Ponderosa pine – Primary vegetation community, also ground cover of grasses and shrubs<br>Piñon juniper/juniper savannah – Not applicable<br>Grassland/shrubland – Not applicable<br>Developed – Not applicable |
| **Is T&E habitat present?**<br>**If applicable, list species known or suspected to use the site for breeding or foraging.** | The site is on the border of the core habitat for the Mexican spotted owl. This site is within an area where the owl may be assumed to forage with a moderate to low frequency.<br>This site is within an area where the potential for foraging for the peregrine falcon is moderate to low. |
| **Provide List of Neighboring/ Contiguous/ Up-Gradient Sites**<br>**Includes a brief summary of COPCs and the form of releases for relevant sites and reference a map as appropriate.**<br>**(Use this information to evaluate the need to aggregate sites for screening.)** | PRS C-21-015 is the only site in the vicinity of PRS 21-024(f). This PRS is a sump from Building TA-21-45 that pumped waste from the building to the laundry facility across DP Road to the southwest. It is located approximately 100 ft southwest of the septic tank and 400 ft from the outfall. It is not anticipated that this PRS would influence the septic tank and outfall. |
| **Surface Water Erosion Potential Information**<br>**Summarize information from SOP 2.01, including the runoff subscore (maximum of 46); terminal point of surface water transport; slope; and surface water run-on sources.** | The overall score is 30.9 with a runoff score of 6.9 (because of visible runoff from the area) and a run-on score of 7.0 (because of natural drainage onto site). The terminal point of surface water transport is DP Canyon. The slope is approximately 25-75%, with the steeper slope near the outlet pipe. |

## PART B—SITE VISIT DOCUMENTATION

| | |
|---|---|
| **Site ID** | PRS 21-024(f) |
| **Date of Site Visit** | 5/10/99 |
| **Site Visit Conducted by** | Richard Mirenda, Linda Causey, Gordon McWilliams, Gary McMath, Jayne Jones |

### *Receptor Information:*

| | |
|---|---|
| **Estimate Cover** | Relative vegetative cover (high, medium, low, none) = medium<br>Relative wetland cover (high, medium, low, none) = none<br>Relative structures/asphalt, etc. cover (high, medium, low, none) = none |
| **Field Notes on the FIMAD Vegetation Class to Assist in Ground-Truthing the Arcview Information** | The area is a combination of open areas and ponderosa pine. In some places the tuff is on the surface, in others it is several inches below the surface. Ground cover consists of grasses, shrubs, and young trees. As one goes from DP Road to the mesa top edge of DP Canyon, the vegetation increases and older ponderosa pine predominates. The ground is also covered with pine needles and litter from other plants. |
| **Field Notes on T&E Habitat (if applicable)**<br>**Consider the need for a site visit by a T&E subject matter expert to support the use of the site by T&E receptors.** | Site provides minimal habitat for foraging and no habitat for nesting for T&E species. |
| **Are ecological receptors present at the site?**<br>**(yes/no/uncertain)**<br>**Describe the general types of receptors present at the site (terrestrial and aquatic), and make notes on the quality of habitat present at the site.** | Yes. Terrestrial receptors are present in and around the PRS. Various songbirds were observed in the trees, and it is assumed that some small mammals are present. No evidence of burrowing was observed in this area, probably because of the shallow depth of the surface soil. Plant life is abundant and healthy. No aquatic receptors are present in the area or in the canyon below the PRS. |

### *Contaminant Transport Information:*

| | |
|---|---|
| **Surface Water Transport**<br>**Field notes on the erosion potential, including a discussion of the terminal point of surface water transport (if applicable)** | There is no evidence of erosion into the canyon. Any runoff probably occurs by way of sheet flow. There are several distinct drainage areas that flow into DP Canyon. The terminal point of surface water transport is the intermittent stream channel in the bottom of DP Canyon. |
| **Are there any off-site transport pathways (surface water, air, or groundwater)?**<br>**(yes/no/uncertain)**<br>**Provide explanation** | No other off-site transport pathways are present. The release of materials to the subsurface either from the septic tank or from the pit would not result in the migration of material to the groundwater. |
| **Interim action needed to limit off-site transport?**<br>**(yes/no/uncertain)**<br>**Provide explanation/ recommendation to project lead for IA SMDP.** | No. Current data do not support the implementation of an interim action at this PRS. |

### *Ecological Effects Information:*

| | |
|---|---|
| **Physical Disturbance**<br>**(Provide list of major types of disturbances, including erosion and construction activities, review historical aerial photos where appropriate.)** | The only physical disturbance is the pipe and outfall pit from the septic tank. There are no other visible disturbances in the area. |
| **Are there obvious ecological effects?**<br>**(yes/no/uncertain)**<br>**Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).** | No. The area around the septic tank, pipe, and outfall pit appear to be no different from the surrounding area. |
| **Interim action needed to limit apparent ecological effects?**<br>**(yes/no/uncertain)**<br>**Provide explanation and recommendations to mitigate apparent exposure pathways to project lead for IA SMDP.** | No. Current data do not support the implementation of an interim action at this PRS. |

### *No Exposure/Transport Pathways:*

| |
|---|
| **If there are no complete exposure pathways to ecological receptors on site and no transport pathways to off-site receptors, the remainder of the checklist should not be completed. Stop here and provide additional explanation/justification for proposing an ecological no further action recommendation (if needed). At a minimum, the potential for future transport should include likelihood that future construction activities could make contamination more available for exposure or transport.**<br>Not applicable |

### *Adequacy of Site Characterization:*

| | |
|---|---|
| **Do existing or proposed data provide information on the nature, rate, and extent of contamination?**<br>**(yes/no/uncertain)**<br>**Provide explanation**<br>**(Consider if the maximum value was captured by existing sample data.)** | The existing data do not provide adequate information on the nature, rate, and extent of contamination. The additional sampling proposed for this VCA around the septic tank, into the pit, and down the drainage is designed to define these aspects of the site. |
| **Do existing or proposed data for the site address potential transport pathways of site contamination?**<br>**(yes/no/uncertain)**<br>**Provide explanation**<br>**(Consider if other sites should aggregated to characterize potential ecological risk.)** | Yes. The sampling proposed in the VCA will address the major potential transport pathway, i.e., surface water runoff down the drainage and into DP Canyon. |

### *Additional Field Notes:*

| |
|---|
| **Provide additional field notes on the site setting and potential ecological receptors.**<br>None |

## PART C—ECOLOGICAL PATHWAYS CONCEPTUAL EXPOSURE MODEL

### Question A

**Could soil contaminants reach receptors by way of vapors?**

- **Volatility of the hazardous substance (volatile chemicals generally have Henry's Law constant >$10^{-5}$ atm-me/mol and molecular weight <200 g/mol).**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** No volatile organics were detected in the samples previously collected. Additional samples will be collected to confirm these results.

### Question B

**Could the soil contaminants reach receptors through fugitive dust carried in air?**

- **Soil contamination would have to be on the actual surface of the soil to become available for dust.**
- **In the case of dust exposures to burrowing animals, the contamination would have to occur in the depth interval where these burrows occur.**

**Answer (likely/unlikely/uncertain):** Likely

**Provide explanation:** The contamination around the septic tank would be subsurface. The area at the outfall pit and drainage would be surface in nature. The ground is covered with pine needles and litter from the overstory so fugitive dust would be a minor pathway. There is no evidence of burrowing animals probably because the depth of the soil is only a few inches before tuff is encountered.

### Question C

**Can contaminated soil be transported to aquatic ecological communities (use SOP 2.01 runoff score and terminal point of surface water runoff to help answer this question)?**

- **If the SOP 2.01 runoff score* for each PRS included in the site is equal to zero, this suggests that erosion at the site is not a transport pathway. (* Note that the runoff score is not the entire erosion potential score, rather it is a subtotal of this score with a maximum value of 46 points).**
- **If erosion is a transport pathway, evaluate the terminal point to see if aquatic receptors could be affected by contamination from this site.**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** The major off-site transport pathway is surface water runoff into DP Canyon. However, there are no aquatic ecosystems in this portion of the canyon that would receive this runoff.

## Question D

**Is contaminated groundwater potentially available to biological receptors through seeps or springs or shallow groundwater?**

- **Known or suspected presence of contaminants in groundwater.**
- **The potential for contaminants to migrate by way of groundwater and discharge into habitats and/or surface waters.**
- **Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).**
- **Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** There is no hydraulic driver for the surface or potential subsurface contamination to reach alluvial, perched, or the main aquifer. Terrestrial plants are not near the groundwater and there are no aquatic plants in the vicinity.

## Question E

**Is infiltration/percolation from contaminated subsurface material a viable transport and exposure pathway?**

- **Suspected ability of contaminants to migrate to groundwater.**
- **The potential for contaminants to migrate by way of groundwater and discharge into habitats and/or surface waters.**
- **Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).**
- **Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** There is no hydraulic driver for the surface or potential subsurface contamination to reach alluvial, perched, or the main aquifer. Terrestrial plants are not near the groundwater and there are no aquatic plants in the vicinity.

Question F

**Might erosion or mass wasting events be a potential release mechanism for contaminants from subsurface materials or perched aquifers to the surface?**

- **This question is only applicable to release sites located on or near the mesa edge.**
- **Consider the erodability of surficial material and the geologic processes of canyon/mesa edges.**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** The slope into the canyon is stable and well vegetated. There is also no evidence of erosion in this area.

Question G

**Could airborne contaminants interact with receptors through respiration of vapors?**

- **Contaminants must be present as volatiles in the air.**
- **Consider the importance of inhalation of vapors for burrowing animals.**
- **Foliar uptake of organic vapors is typically not a significant exposure pathway.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 0

**Terrestrial Animals:** 0

**Provide explanation:** No volatile organics are expected to be present.

Question H

**Could airborne contaminants interact with plants through deposition of particulates or with animals through inhalation of fugitive dust?**

- **Contaminants must be present as particulates in the air or as dust for this exposure pathway to be complete.**
- **Exposure by way of inhalation of fugitive dust is particularly applicable to ground-dwelling species that would be exposed to dust disturbed by their foraging or burrowing activities or by wind movement.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 2

**Terrestrial Animals:** 2

**Provide explanation:** Although the contamination is expected to be primarily surficial in nature, the ground is well covered with pine needles and litter from the established vegetation. In addition, there is no evidence of burrowing animals probably because of the shallow soil covering of only a few inches.

**Question I**

**Could contaminants interact with plants through root uptake or rain splash from surficial soils?**

- **Contaminants in bulk soil may partition into soil solution, making them available to roots.**
- **Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces by rain striking contaminated soils (i.e., rain splash).**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 2

**Provide explanation:** This is a complete pathway, but because of the shallow nature of the soils and the ground cover, it is not a major pathway.

**Question J**

**Could contaminants interact with receptors through food web transport from surficial soils?**

- **The chemicals may bioaccumulate in animals.**
- **Animals may ingest contaminated food items.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Animals:** 3

**Provide explanation:** There were bioaccumulators detected at this site.

**Question K**

**Could contaminants interact with receptors by way of incidental ingestion of surficial soils?**

- **Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil, or while grooming themselves clean of soil.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Animals:** 3

**Provide explanation:** This could be a major pathway because of the surficial nature of the contamination in the drainage area.

Question L

**Could contaminants interact with receptors through dermal contact with surficial soils?**

- **Significant exposure by way of dermal contact would generally be limited to organic contaminants that are lipophilic and can cross epidermal barriers.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Animals:** 1

**Provide explanation:** Suspected COPCs are not lipophilic.

Question M

**Could contaminants interact with plants or animals through external irradiation?**

- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **Burial of contamination attenuates radiological exposure.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 0

**Terrestrial Animals:** 0

**Provide explanation:** Mainly alpha-emitting radionuclides are suspected of being present in the soils. These types of radionuclides are not taken up through the skin.

Question N

**Could contaminants interact with plants through direct uptake from water and sediment or sediment rain splash?**

- **Contaminants may be taken up by terrestrial plants whose roots are in contact with surface waters.**
- **Terrestrial plants may be exposed to particulates deposited on leaf and stem surfaces by rain striking contaminated sediments (i.e., rain splash) in an area that is only periodically inundated with water.**
- **Contaminants in sediment may partition into soil solution, making them available to roots.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 0

**Provide explanation:** There are no surface water systems present on site or in the canyon below the PRS.

## Question O

**Could contaminants interact with receptors through food web transport from water and sediment?**

- **The chemicals may bioconcentrate in food items.**
- **Animals may ingest contaminated food items.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Animals:** 0

**Provide explanation:** Although there may be some bioaccumulators present at this site, there are no surface water systems present on site or in the canyon below the PRS.

## Question P

**Could contaminants interact with receptors by way of ingestion of water and suspended sediments?**

- **If sediments are present in an area that is only periodically inundated with water, terrestrial receptors may incidentally ingest sediments.**
- **Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):**

**Terrestrial Animals:** 0

**Provide explanation:** There are no surface water systems present on site or in the canyon below the PRS.

## Question Q

**Could contaminants interact with receptors through dermal contact with water and sediment?**

- **If sediments are present in an area that is only periodically inundated with water, terrestrial species may be dermally exposed during dry periods.**
- **Terrestrial organisms may be dermally exposed to water-borne contaminants as a result of wading or swimming in contaminated waters.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Animals:** 0

**Provide explanation:** There are no surface water systems present on site or in the canyon below the PRS. Contaminants are not lipophilic.

## Question R

**Could contaminants interact with plants or animals through external irradiation?**

- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **Burial of contamination attenuates radiological exposure.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):**

**Terrestrial Plants:** 0

**Terrestrial Animals:** 0

**Provide explanation:** Only alpha-emitting radionuclides are suspected of being present in the soils. These types of radionuclides are not taken up through the skin.

## Question S

**Could contaminants bioconcentrate in free floating aquatic, attached aquatic plants, or emergent vegetation?**

- **Aquatic plants are in direct contact with water.**
- **Contaminants in sediment may partition into pore water, making them available to submerged roots.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Aquatic Plants/Emergent Vegetation:** 0

**Provide explanation:** There are no aquatic communities present on site or in the canyon below the PRS.

## Question T

**Could contaminants bioconcentrate in sedimentary or water column organisms?**

- **Aquatic receptors may actively or incidentally ingest sediment while foraging.**
- **Aquatic receptors may be directly exposed to contaminated sediments or may be exposed to contaminants through osmotic exchange, respiration, or ventilation of sediment pore waters.**
- **Aquatic receptors may be exposed through osmotic exchange, respiration, or ventilation of surface waters.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Aquatic Animals:** 0

**Provide explanation:** There are no aquatic communities present on site or in the canyon below the PRS.

Question U

**Could contaminants bioaccumulate in sedimentary or water column organisms?**

- **Lipophillic organic contaminants and some metals may concentrate in an organism's tissues**
- **Ingestion of contaminated food items may result in contaminant bioaccumulation through the food web.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Aquatic Animals:** 0

**Provide explanation:** There are no aquatic communities present on site or in the canyon below the PRS.

Question V

**Could contaminants interact with aquatic plants or animals through external irradiation?**

- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation, thus external irradiation is typically more important for sediment-dwelling organisms.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):**

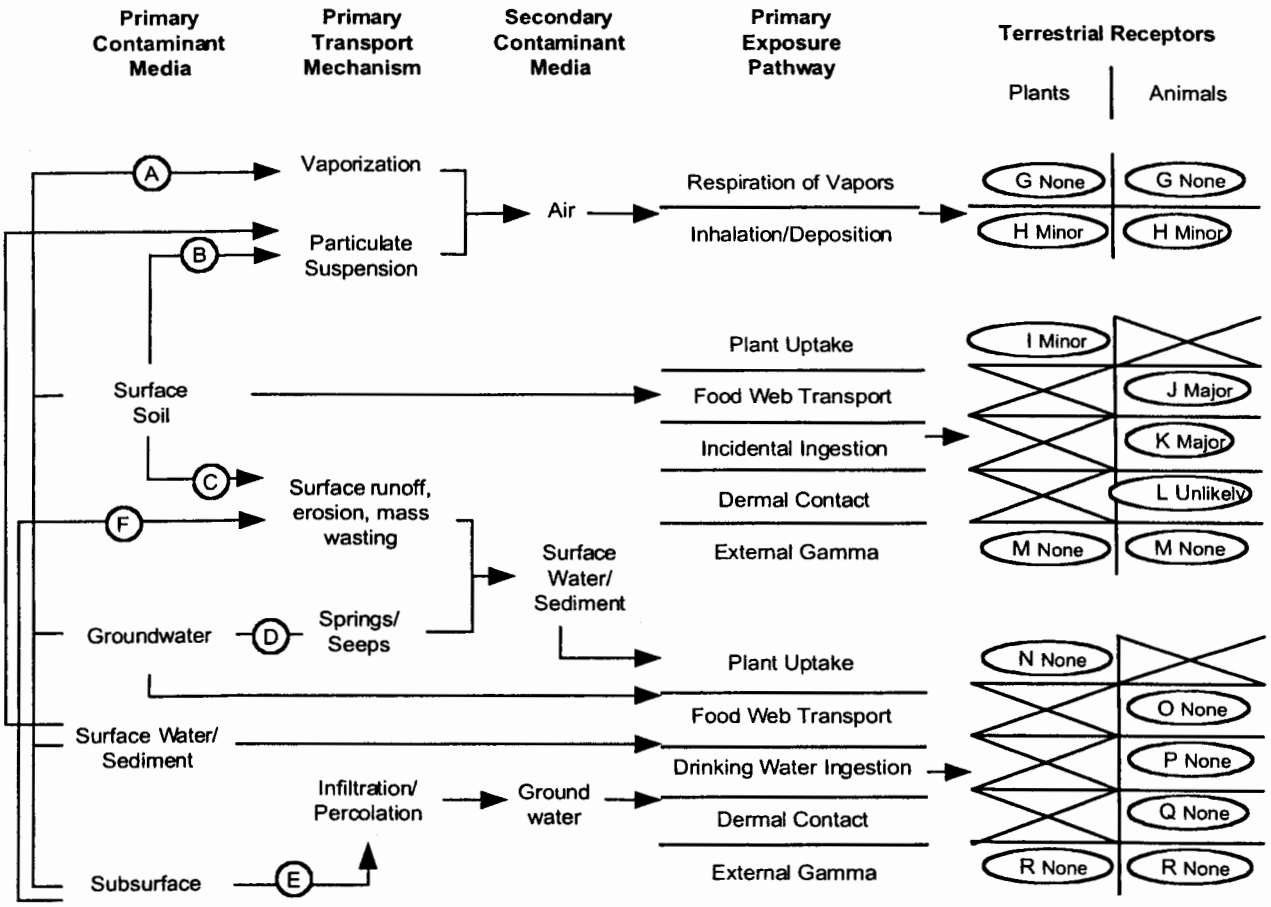
**Aquatic Plants:** 0

**Aquatic Animals:** 0

**Provide explanation:** There are no aquatic communities present on site or in the canyon below the PRS. In addition, only alpha-emitting radionuclides are suspected of being present in the soils. These types of radionuclides are not taken up through the skin.

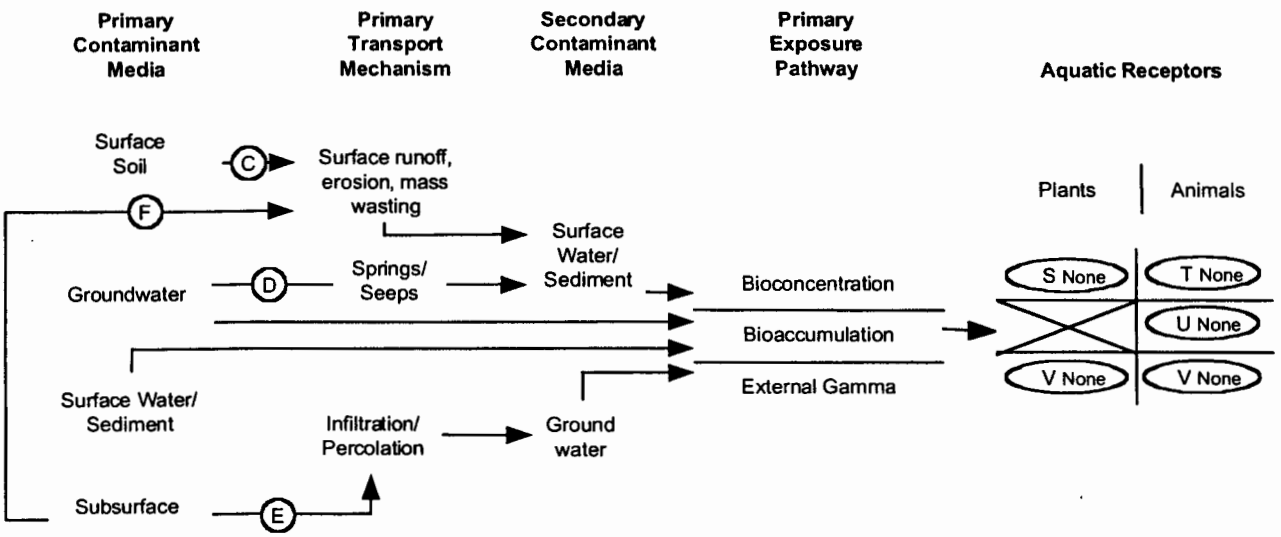
## Ecological Scoping Checklist
Terrestrial Receptors
## Ecological Pathways Conceptual Exposure Model

**NOTE:**
Letters in circles refer to questions on the Scoping Checklist



## Ecological Scoping Checklist
Aquatic Receptors
**Ecological Pathways Conceptual Exposure Model**

**NOTE:**
Letters in circles refer to questions on the Scoping Checklist



**Signatures and certifications:**

**Checklist completed by (provide name, organization and phone number):**

**Name (printed):** Richard J. Mirenda, Ph.D.
**Name (signature):** Richard Mirenda
**Organization:** MK/PMC
**Phone number:** 662-1329

**Date completed:** 5/13/99

**Verification by a member of ER Project Ecological Risk Task Team (provide name, organization and phone number):**

**Name (printed):** Gregory J. McDermott
**Name (signature):** Gregory J. McDermott
**Organization:** Neptune and Co., Inc
**Phone number:** 662-0730 x21

## PART A—SCOPING MEETING DOCUMENTATION

| Site ID | PRS C-21-015 |
|---|---|
| **Form of Site Releases (solid, liquid, vapor).**<br>**Describe all relevant known or suspected mechanisms of release (spills, dumping, material disposal, outfall, explosive testing, etc.) and describe potential areas of release. Reference locations on a map as appropriate.** | The potential release from this PRS would be liquid waste that was pumped from the sump to the laundry facility across DP Road to the southwest of the site. The potential mechanisms of release would include spillage or leaks from the sump as well as leaks from the outlet line to the laundry facility. |
| **List of Primary Impacted Media**<br>**(Indicate all that apply.)** | Surface soil – Potentially impacted but not primary media of concern<br>Surface water/sediment – Not applicable<br>Subsurface – Impacted from leaks from sump and associated outlet line<br>Groundwater – Not applicable<br>Other, explain – Not applicable |
| **FIMAD Vegetation Class Based on Arcview Vegetation Coverage**<br>**(Indicate all that apply.)** | Water – Not applicable<br>Bare Ground/Unvegetated – Much of the area is bare ground with tuff being near or at the surface.<br>Spruce/fir/aspen/mixed conifer – Not applicable<br>Ponderosa pine – The surrounding area is primarily ponderosa pine with a mixture of grass and small shrubs interspersed throughout.<br>Piñon juniper/juniper savannah – Not applicable<br>Grassland/shrubland – Not applicable<br>Developed – Not applicable |
| **Is T&E Habitat Present?**<br>**If applicable, list species known or suspected to use the site for breeding or foraging.** | The site is on the border of the core habitat for the Mexican spotted owl. This site is within an area where the owl may be assumed to forage with a moderate to low frequency.<br>This site is within an area where the potential for foraging for the peregrine falcon is moderate to low. |
| **Provide List, of Neighboring/ Contiguous/ Up-Gradient Sites**<br>**Includes a brief summary of COPCs and the form of releases for relevant sites and reference a map as appropriate.**<br>**(Use this information to evaluate the need to aggregate sites for screening.)** | PRS 21-024(f) is the only site in the vicinity of PRS C-21-015. This PRS is a septic tank from Building TA-21-45 that received waste from the building and discharged it at an outfall approximately 400 ft from the sump. The septic tank is located approximately 100 ft southeast of the sump, and it is not anticipated that this PRS would be influenced by the septic tank and outfall. |
| **Surface Water Erosion Potential Information**<br>**Summarize information from SOP 2.01, including the runoff subscore (maximum of 46); terminal point of surface water transport; slope; and surface water run-on sources.** | Overall score is 22.7 with a runoff score of 6.9 (because of visible runoff from the area) and a run-on score of 7.0 (because of natural drainage onto site). The terminal point of surface water transport is the mesa top. The slope is approximately 25-75% but is not near the mesa edge. |
| **Other Scoping Meeting Notes** | |

## PART B—SITE VISIT DOCUMENTATION

| | |
|---|---|
| **Site ID** | PRS C-21-015 |
| **Date of Site Visit** | 5/10/99 |
| **Site Visit Conducted by** | Richard Mirenda, Linda Causey, Gordon McWilliams, Gary McMath, Jayne Jones |

### *Receptor Information:*

| | |
|---|---|
| **Estimate Cover** | Relative vegetative cover (high, medium, low, none) = Low. Area is largely bare ground with some ponderosa pine trees nearby as well as small shrubs and patches of grass.<br>Relative wetland cover (high, medium, low, none) = None<br>Relative structures/asphalt, etc. cover (high, medium, low, none) = None |
| **Field Notes on the FIMAD Vegetation Class to Assist in Ground-Truthing the Arcview Information** | The area is a combination of open areas and ponderosa pine. In some places, the tuff is on the surface; in others, it is several inches below the surface. Mostly bare ground but ground cover consists of grasses, shrubs, and young trees. |
| **Field Notes on T&E Habitat (if applicable)**<br>**Consider the need for a site visit by a T&E subject matter expert to support the use of the site by T&E receptors.** | Site provides minimal habitat for foraging and no habitat for nesting for T&E species. |
| **Are ecological receptors present at the site?**<br>**(yes/no/uncertain)**<br>**Describe the general types of receptors present at the site (terrestrial and aquatic), and make notes on the quality of habitat present at the site.** | Yes. Terrestrial receptors are present in and around the PRS. Various songbirds were observed in the trees, and it is assumed that some small mammals are present. No evidence of burrowing was observed in this area, probably because of the shallow surface soil or lack of surface soil in many areas. Plant life is present but sparse. No aquatic receptors are present in the area. |

### *Contaminant Transport Information:*

| | |
|---|---|
| **Surface Water Transport**<br>**Field notes on the erosion potential, including a discussion of the terminal point of surface water transport (if applicable).** | The area is relatively flat, and there is no evidence of erosion. Any runoff probably occurs by way of sheet flow. The nearest drainage area is DP Canyon approximately 400 ft to the north. The terminal point of surface water transport is the intermittent stream channel in the bottom of DP Canyon. |
| **Are there any off-site transport pathways (surface water, air, or groundwater)?**<br>**(yes/no/uncertain)**<br>**Provide explanation** | No other off-site transport pathways are present. The release of materials to the subsurface either from the sump or the outlet line would not result in the migration of material to the groundwater. |
| **Interim action needed to limit off-site transport?**<br>**(yes/no/uncertain)**<br>**Provide explanation/ recommendation to project lead for IA SMDP.** | No. Information is not available to determine if a release has occurred. |

### *Ecological Effects Information:*

| | |
|---|---|
| **Physical Disturbance**<br>**(Provide list of major types of disturbances, including erosion and construction activities; review historical aerial photos where appropriate.)** | There are no visible disturbances in the area except for the concrete outline of the former sump. |
| **Are there obvious ecological effects?**<br>**(yes/no/uncertain)**<br>**Provide explanation and apparent cause (e.g., contamination, physical disturbance, other).** | No. The area around the sump appears to be no different from the surrounding area. |
| **Interim action needed to limit apparent ecological effects?**<br>**(yes/no/uncertain)**<br>**Provide explanation and recommendations to mitigate apparent exposure pathways to project lead for IA SMDP.** | There are no visible disturbances in the area except for the concrete outline of the former sump. |

### *No Exposure/Transport Pathways:*

| |
|---|
| **If there are no complete exposure pathways to ecological receptors on site and no transport pathways to off-site receptors, the remainder of the checklist should not be completed. Stop here, and provide additional explanation/justification for proposing an ecological no further action recommendation (if needed). At a minimum, the potential for future transport should include likelihood that future construction activities could make contamination more available for exposure or transport.**<br>Not applicable |

### *Adequacy of Site Characterization:*

| | |
|---|---|
| **Do existing or proposed data provide information on the nature, rate and extent of contamination?**<br>**(yes/no/uncertain)**<br>**Provide explanation**<br>**(Consider if the maximum value was captured by existing sample data.)** | There are no data to provide information on the nature, rate, and extent of contamination. The sampling proposed by this VCA around the sump and under the outlet line is designed to define these aspects of the site. |
| **Do existing or proposed data for the site address potential transport pathways of site contamination?**<br>**(yes/no/uncertain)**<br>**Provide explanation**<br>**(Consider if other sites should aggregated to characterize potential ecological risk.)** | Yes. The sampling proposed in the VCA will address the major potential transport pathway, i.e., surface water runoff. |

### *Additional Field Notes:*

| |
|---|
| **Provide additional field notes on the site setting and potential ecological receptors.**<br>None |

## PART C—ECOLOGICAL PATHWAYS CONCEPTUAL EXPOSURE MODEL

### Question A

**Could soil contaminants reach receptors by way of vapors?**

- **Volatility of the hazardous substance (volatile chemicals generally have Henry's Law constant >$10^{-5}$ atm-me/mol and molecular weight <200 g/mol).**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** Suspected contaminants are not volatile organics.

### Question B

**Could the soil contaminants reach receptors through fugitive dust carried in air?**

- **Soil contamination would have to be on the actual surface of the soil to become available for dust.**
- **In the case of dust exposures to burrowing animals, the contamination would have to occur in the depth interval where these burrows occur.**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** Any potential releases and contamination at this site is to the subsurface. No evidence of burrowing animals was observed probably because of the shallow nature of the soils in this area.

### Question C

**Can contaminated soil be transported to aquatic ecological communities (use SOP 2.01 runoff score and terminal point of surface water runoff to help answer this question)?**

- **If the SOP 2.01 runoff score* for each PRS included in the site is equal to zero, this suggests that erosion at the site is not a transport pathway. (* Note that the runoff score is not the entire erosion potential score, rather it is a subtotal of this score with a maximum value of 46 points).**
- **If erosion is a transport pathway, evaluate the terminal point to see if aquatic receptors could be affected by contamination from this site.**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** There is no evidence of erosion from the site. The area is relatively flat and probably would not reach DP canyon before being absorbed into the soil.

Question D

**Is contaminated groundwater potentially available to biological receptors through seeps or springs or shallow groundwater?**

- **Known or suspected presence of contaminants in groundwater.**
- **The potential for contaminants to migrate by way of groundwater and discharge into habitats and/or surface waters.**
- **Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).**
- **Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** There is no hydraulic driver for the surface or potential subsurface contamination to reach alluvial, perched, or the main aquifer. Terrestrial plants are not near the groundwater, and there are no aquatic plants in the vicinity.

Question E

**Is infiltration/percolation from contaminated subsurface material a viable transport and exposure pathway?**

- **Suspected ability of contaminants to migrate to groundwater.**
- **The potential for contaminants to migrate by way of groundwater and discharge into habitats and/or surface waters.**
- **Contaminants may be taken up by terrestrial and rooted aquatic plants whose roots are in contact with groundwater present within the root zone (~1 m depth).**
- **Terrestrial wildlife receptors generally will not contact groundwater unless it is discharged to the surface.**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** There is no hydraulic driver for the surface or potential subsurface contamination to reach alluvial, perched, or the main aquifer. Terrestrial plants are not near the groundwater, and there are no aquatic plants in the vicinity.

Question F

**Might erosion or mass-wasting events be a potential release mechanism for contaminants from subsurface materials or perched aquifers to the surface?**

- **This question is only applicable to release sites located on or near the mesa edge.**
- **Consider the erodability of surficial material and the geologic processes of canyon/mesa edges.**

**Answer (likely/unlikely/uncertain):** Unlikely

**Provide explanation:** Releases are not on or near the mesa edge, and no erosion is evident.

Question G

**Could airborne contaminants interact with receptors through respiration of vapors?**

- **Contaminants must be present as volatiles in the air.**
- **Consider the importance of inhalation of vapors for burrowing animals.**
- **Foliar uptake of organic vapors is typically not a significant exposure pathway.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 0

**Terrestrial Animals:** 0

**Provide explanation:** No volatile organics expected to be present.

Question H

**Could airborne contaminants interact with plants through deposition of particulates or with animals through inhalation of fugitive dust?**

- **Contaminants must be present as particulates in the air or as dust for this exposure pathway to be complete.**
- **Exposure via inhalation of fugitive dust is particularly applicable to ground-dwelling species that would be exposed to dust disturbed by their foraging or burrowing activities or by wind movement.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 1

**Terrestrial Animals:** 1

**Provide explanation:** Sump and line are mainly subsurface, so exposure by way of dust/particulates is unlikely. No evidence of burrowing animals observed in the area probably because of the shallow depth of the soils.

## Question I

**Could contaminants interact with plants through root uptake or rain splash from surficial soils?**

- **Contaminants in bulk soil may partition into soil solution, making them available to roots.**
- **Exposure of terrestrial plants to contaminants present in particulates deposited on leaf and stem surfaces by rain striking contaminated soils (i.e., rain splash).**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 2

**Provide explanation:** Vegetation is sparse in this area. Most or all of the contamination is expected to be subsurface.

## Question J

**Could contaminants interact with receptors through food web transport from surficial soils?**

- **The chemicals may bioaccumulate in animals.**
- **Animals may ingest contaminated food items.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Animals:** 1

**Provide explanation:** Most or all of the contamination is expected to be subsurface. No evidence of burrowing animals in the area.

## Question K

**Could contaminants interact with receptors by way of incidental ingestion of surficial soils?**

- **Incidental ingestion of contaminated soil could occur while animals grub for food resident in the soil, feed on plant matter covered with contaminated soil, or while grooming themselves clean of soil.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Animals:** 2

**Provide explanation:** Most or all of the contamination is expected to be subsurface. No evidence of burrowing animals in the area. Vegetation is sparse in this area.

Question L

**Could contaminants interact with receptors through dermal contact with surficial soils?**

- **Significant exposure by way of dermal contact would generally be limited to organic contaminants that are lipophilic and can cross epidermal barriers.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway):**

**Terrestrial Animals:** 1

**Provide explanation:** Potential contaminants are not expected to be lipophilic.

Question M

**Could contaminants interact with plants or animals through external irradiation?**

- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **Burial of contamination attenuates radiological exposure.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 1

**Terrestrial Animals:** 1

**Provide explanation:** Potential contaminants are expected to be alpha-emitters. These radionuclides are not taken up through the skin. Gamma-emitting radionuclides may be present at low levels.

Question N

**Could contaminants interact with plants through direct uptake from water and sediment or sediment rain splash?**

- **Contaminants may be taken-up by terrestrial plants whose roots are in contact with surface waters.**
- **Terrestrial plants may be exposed to particulates deposited on leaf and stem surfaces by rain striking contaminated sediments (i.e., rain splash) in an area that is only periodically inundated with water.**
- **Contaminants in sediment may partition into soil solution, making them available to roots.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 0

**Provide explanation:** There are no surface water systems present on or near the site.

Question O

**Could contaminants interact with receptors through food web transport from water and sediment?**

- **The chemicals may bioconcentrate in food items.**
- **Animals may ingest contaminated food items.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Animals:** 0

**Provide explanation:** There are no surface water systems present on or near the site.

Question P

**Could contaminants interact with receptors by way of ingestion of water and suspended sediments?**

- **If sediments are present in an area that is only periodically inundated with water, terrestrial receptors may incidentally ingest sediments.**
- **Terrestrial receptors may ingest water-borne contaminants if contaminated surface waters are used as a drinking water source.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Animals:** 0

**Provide explanation:** There are no surface water systems present on or near the site.

Question Q

**Could contaminants interact with receptors through dermal contact with water and sediment?**

- **If sediments are present in an area that is only periodically inundated with water, terrestrial species may be dermally exposed during dry periods.**
- **Terrestrial organisms may be dermally exposed to water-borne contaminants as a result of wading or swimming in contaminated waters.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Animals:** 0

**Provide explanation:** There are no surface water systems present on or near the site.

## Question R

**Could contaminants interact with plants or animals through external irradiation?**

- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **Burial of contamination attenuates radiological exposure.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Terrestrial Plants:** 0

**Terrestrial Animals:** 0

**Provide explanation:** There are no surface water systems present on or near the site.

## Question S

**Could contaminants bioconcentrate in free floating aquatic, attached aquatic plants, or emergent vegetation?**

- **Aquatic plants are in direct contact with water.**
- **Contaminants in sediment may partition into pore water, making them available to submerged roots.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Aquatic Plants/Emergent Vegetation:** 0

**Provide explanation:** There are no aquatic communities present on or near the site.

## Question T

**Could contaminants bioconcentrate in sedimentary or water column organisms?**

- **Aquatic receptors may actively or incidentally ingest sediment while foraging.**
- **Aquatic receptors may be directly exposed to contaminated sediments or may be exposed to contaminants through osmotic exchange, respiration, or ventilation of sediment pore waters.**
- **Aquatic receptors may be exposed through osmotic exchange, respiration, or ventilation of surface waters.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Aquatic Animals:** 0

**Provide explanation:** There are no aquatic communities present on or near the site

**Question U**

**Could contaminants bioaccumulate in sedimentary or water column organisms?**

- **Lipophillic organic contaminants and some metals may concentrate in an organism's tissues**
- **Ingestion of contaminated food items may result in contaminant bioaccumulation through the food web.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

**Aquatic Animals:** 0

**Provide explanation:** There are no aquatic communities present on or near the site

**Question V**

**Could contaminants interact with aquatic plants or animals through external irradiation?**

- **External irradiation effects are most relevant for gamma-emitting radionuclides.**
- **The water column acts to absorb radiation, thus external irradiation is typically more important for sediment dwelling organisms.**

**Provide quantification of exposure pathway (0 = no pathway, 1 = unlikely pathway, 2 = minor pathway, 3 = major pathway)**

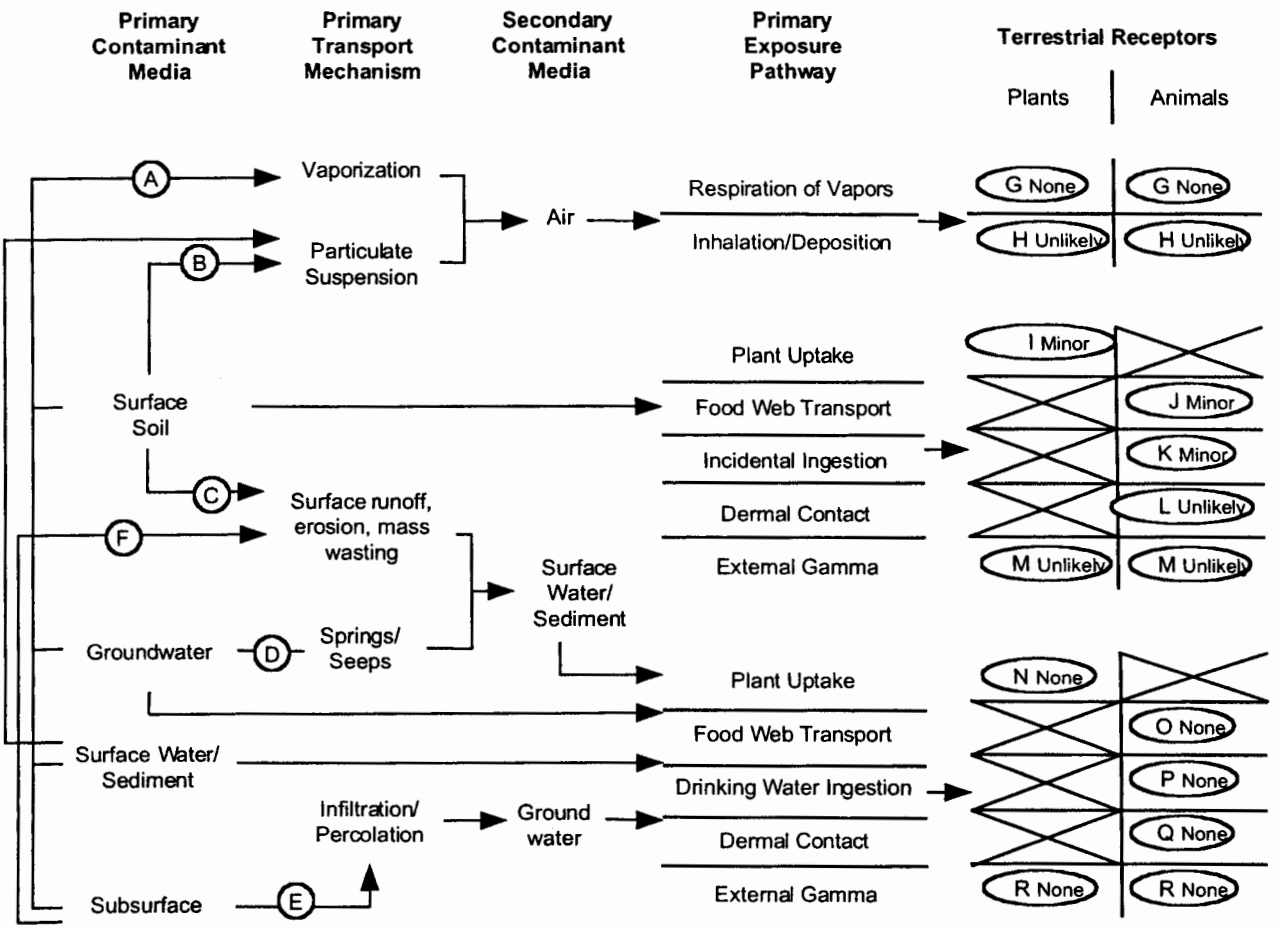
**Aquatic Plants:** 0

**Aquatic Animals:** 0

**Provide explanation:** There are no aquatic communities present on or near the site

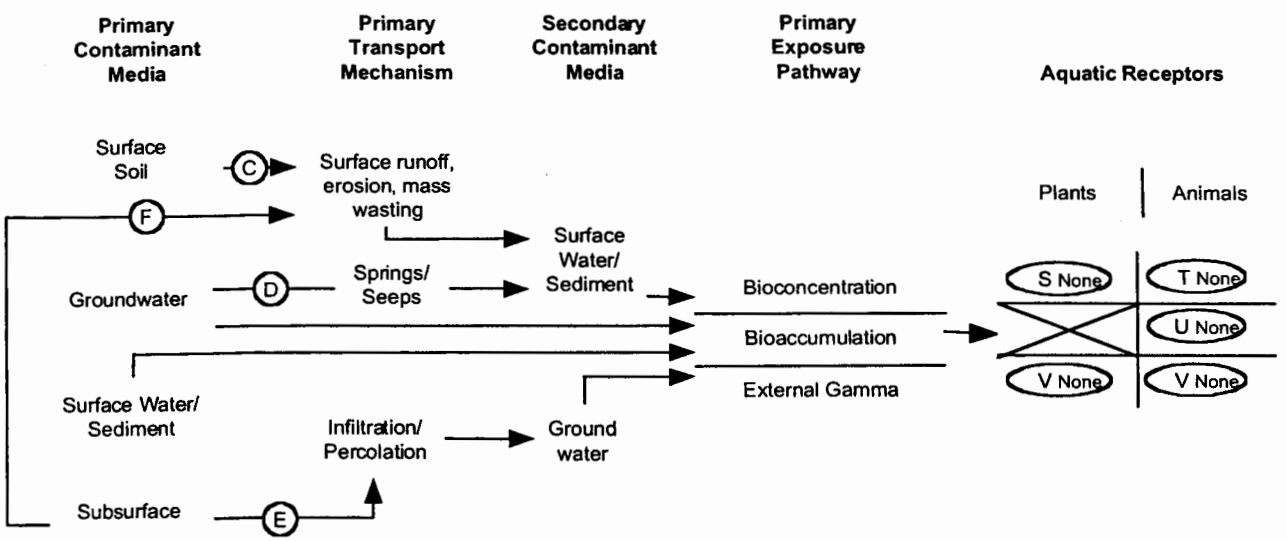
## Ecological Scoping Checklist
Terrestrial Receptors
## Ecological Pathways Conceptual Exposure Model

**NOTE:**
Letters in circles refer to questions on the Scoping Checklist



## Ecological Scoping Checklist
Aquatic Receptors
**Ecological Pathways Conceptual Exposure Model**

**NOTE:**
Letters in circles refer to questions on the Scoping Checklist



**Signatures and certifications:**

**Checklist completed by (provide name, organization and phone number):**

**Name (printed):** Richard J. Mirenda, Ph.D.
**Name (signature):** Richard Mirenda
**Organization:** MK/PMC
**Phone number:** 662-1329

**Date completed:** **5/13/99**

**Verification by a member of ER Project Ecological Risk Task Team (provide name, organization and phone number):**

**Name (printed):** Gregory J. McDermott
**Name (signature):** Gregory J. McDermott
**Organization:** Neptune and Co., Inc
**Phone number:** 662-0730 x21

# Appendix E

*Estimated Costs*

## APPENDIX E ESTIMATED COSTS

| Activity | Septic Tanks Discharge Area | Inlet and Outlet Pipes | Septic Tank | Concrete Sump | Subtotals |
|---|---|---|---|---|---|
| Prefield activities | $13,227.00 | $13,227.00 | $13,227.00 | $13,227.00 | $52,908.00 |
| Field activities | 25,681.00 | 25,681.00 | 25,681.00 | 25,681.00 | 102,724.00 |
| Waste management and disposal | 5,408.75 | 5,408.75 | 5,408.75 | 5,408.75 | 21,635.00 |
| Sampling and analyses | 5,429.50 | 5,429.50 | 5,429.50 | 5,429.50 | 21,718.00 |
| Postfield activities | 14,168.00 | 14,168.00 | 14,168.00 | 14,168.00 | 56,672.00 |
| **Total** | **$63,914.25** | **$63,914.25** | **$63,914.25** | **$63,914.25** | **$255,657.00** |