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Date: October 19, 2000
Refer to: ER2000-0590

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Mr. John Young, Corrective Action Project Leader
Permits Management Program
NMED – Hazardous Waste Bureau
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Santa Fe, NM 87502

HSWA LANL 5/1148/54

SUBJECT: SUBMITTAL OF VOLUNTARY CORRECTIVE ACTION (VCA) PLAN FOR POTENTIAL RELEASE SITE (PRS) 54-007(c)-99

Dear Mr. Young:

Enclosed are two copies of the VCA Plan for PRS 54-007(c)-99 for your review and concurrence. This PRS consists of Solid Waste Management Unit 54-007(c) and Area of Concern 54-007(e), both inactive and abandoned septic systems located at Technical Area-54 West. They were consolidated during the Fiscal Year 1999 Annual Unit Audit. The fact sheet for this VCA was presented to the New Mexico Environment Department's Hazardous Waste Bureau (NMED-HWB) at the monthly meeting on August 28, 2000. At this meeting, the NMED-HWB concurred that the remedial action proposed for this PRS could proceed as a VCA.

If you have any questions or comments, please contact Dave McInroy at (505) 667-0819 or John Hopkins at (505) 667-9551.

Sincerely,

Julie A. Canepa

Julie A. Canepa, Program Manager
Los Alamos National Laboratory
Environmental Restoration

Sincerely,

for Joseph H. Mace

Theodore J. Taylor, Project Manager
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Enclosure: VCA Plan for PRS 54-007(c)-99

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A Department of Energy
Environmental Cleanup Program

HSWA LANL 5/1148/54

Voluntary Corrective Action Plan for Potential Release Site 54-007(c)-99

Los Alamos
NATIONAL LABORATORY
Los Alamos, NM 87545

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EXECUTIVE SUMMARY

This voluntary corrective action (VCA) plan presents an approach for characterizing and remediating Potential Release Site (PRS) 54-007(c)-99 located within Technical Area (TA) 54 West at Los Alamos National Laboratory (the Laboratory). The PRS consists of two inactive/abandoned septic systems.

PRS 54-007(c)-99 consists of Solid Waste Management Unit (SWMU) 54-007(c) and Area of Concern (AOC) 54-007(e). SWMU 54-007(c) is the inactive septic system that served an office building (TA-54-34) and the nondestructive testing (NDT) facility (TA-54-38). The system was constructed in the late 1980s and consists of a 1500-gal. concrete septic tank and a drain line, which connect to a drain field formed by three parallel buried lines (seepage trenches) of slotted polyvinyl chloride (PVC) pipe. The drain field is approximately 4 ft deep. The NDT facility was built for the purpose of performing final verification testing and certification of radioactive transuranic (TRU) waste to be transported to the Waste Isolation Pilot Plant. Real-time radiography and neutron assay equipment housed in the facility are used to examine and certify sealed containers of TRU waste. Drums brought to the NDT for certification are swipe tested for radioactive and hazardous contamination; drums that fail the test are not allowed inside the facility. The drums have never been opened or breached and the contents spilled in the facility.

AOC 54-007(e) is the inactive septic system that served the former animal-holding facility, TA-54-1015. The system consists of a 1500-gal. concrete septic tank (TA-54-9) and a drain line connected to a drain field formed by three parallel seepage trenches of slotted PVC pipe. The two drain fields [for 54-007(c) and 54-007(e)] are connected. The animal-holding facility was constructed in the mid-1960s. Until the late 1980s, the facility housed animals used by the Laboratory's biomedical research program. In 1992, the facility was remodeled as an analytical laboratory for environmental samples.

Both septic systems were abandoned in place in 1992 when the facilities they served were tied into the Laboratory's Sanitary Waste Systems Consolidation. Because the two septic system drain fields are connected, received similar waste streams (sanitary wastewater), and are located near each other, they were consolidated in Fiscal Year 1999 during the annual unit audit with the New Mexico Environment Department Hazardous and Radioactive Materials Bureau.

The PRS addressed in this VCA plan was first investigated in 1995 as part of a Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) of former Operable Unit 1148. However, the nature and extent of potential contamination were not determined, and the data have not been presented in an RFI report. The septic systems are located on a mesa top, and waste remains in the tanks. It is an Environmental Restoration Project best management practice (BMP) to properly and consistently manage inactive/abandoned septic systems in accordance with applicable regulatory requirements and thereby mitigate potential environmental issues that may remain if the systems are not addressed, regardless of RFI results. The proposed corrective actions meet the requirements of the accelerated corrective action checklist and will result in a final remedy and a recommendation of no further action for the PRS.

The objectives of this VCA are to

- characterize, remove, and dispose of the waste remaining in each septic tank,
- collect supplemental subsurface soil samples in and around the drain fields,
- determine the nature and extent of soil contamination (if present) using the existing and supplemental data,
- assess the potential human health and ecological risks to the environment from each septic system, and
- remediate (by excavation) as necessary, the inactive/abandoned septic systems.

Confirmatory samples will be collected from any excavation. After VCA activities are complete, the site will be restored, and BMPs will be installed as needed. The waste will be disposed of in accordance with applicable regulatory requirements.

Sampling data from this VCA will be compared to Environmental Protection Agency Region VI industrial preliminary remediation goals after nature and extent have been defined; the results will be used to determine whether any soil removal will be necessary. If remediation of the soils and/or drain fields is required, cleanup levels will be derived for the contaminants.

Sampling of the septic tanks for waste characterization occurred during late August 2000, removal and disposal activities and characterization and confirmatory sampling are planned for November 2000, and the VCA report will be published during Fiscal Year 2001. A summary of the VCA is presented in Table ES-1.

Table ES-1
VCA Summary Table

SWMU/AOC Number	Description	HSWA[a,b]	Radionuclide Component[c]	Proposed Action	Rationale for Recommendation
54-007(c)	Inactive/abandoned septic system	Yes	No	Septic tank removal and sampling of the drain field	No further action
54-007(e)	Inactive/abandoned septic system	No	No	Septic tank removal and sampling of the drain field	No further action

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

[b] HSWA = Hazardous and Solid Waste Amendments of 1984.

[c] Are radionuclides associated with this PRS?

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1.0 INTRODUCTION

This voluntary corrective action (VCA) plan presents an approach for characterizing and remediating a potential release site (PRS) in Technical Area (TA) 54 West at Los Alamos National Laboratory (the Laboratory) (Figure 1.0-1). The PRS [54-007(c)-99] addressed in this plan includes Solid Waste Management Unit (SWMU) 54-007(c) and Area of Concern (AOC) 54-007(e), both inactive/abandoned septic systems. They were consolidated during the Fiscal Year 1999 annual unit audit (AUA).

The purpose and scope, regulatory history, and rationale for the proposed corrective action are presented in Section 1. Section 2 presents the site description and operational history, previous field investigations, and results of previous investigations for this PRS. 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 checklist; Appendix C includes the Environmental Restoration (ER) Project Standard Operating Procedure 2.01, "Surface Water Site Assessments"; Appendix D includes the ecological checklists; and Appendix E includes the estimated costs.

1.1 Purpose and Scope

The objective of this VCA is to complete characterization and remedial actions with respect to the two septic systems. To meet this objective, the Laboratory's ER Project will conduct the following activities:

- characterize, remove, and dispose of the waste remaining in each septic tank.
- supplement previous Resource Conservation and Recovery Act (RCRA) investigatory data pertinent to the PRS with additional site characterization data, as needed. These data will be used to determine nature and extent of contamination associated with septic tank and drain field operations.
- assess human health and ecological risk, based on nature and extent of contamination from previous and supplemental data collected for the PRS.
- determine the remedial approach for the PRS, based on Environmental Protection Agency (EPA) Region VI industrial preliminary remediation goals (PRGs) and nature and extent of contamination.
- conduct removal activities, as necessary, using cost-effective, environmentally acceptable methods while minimizing waste generation and disruption to facility operations.

1.2 Regulatory History

The regulatory activities of this PRS are summarized in Table 1.2-1.

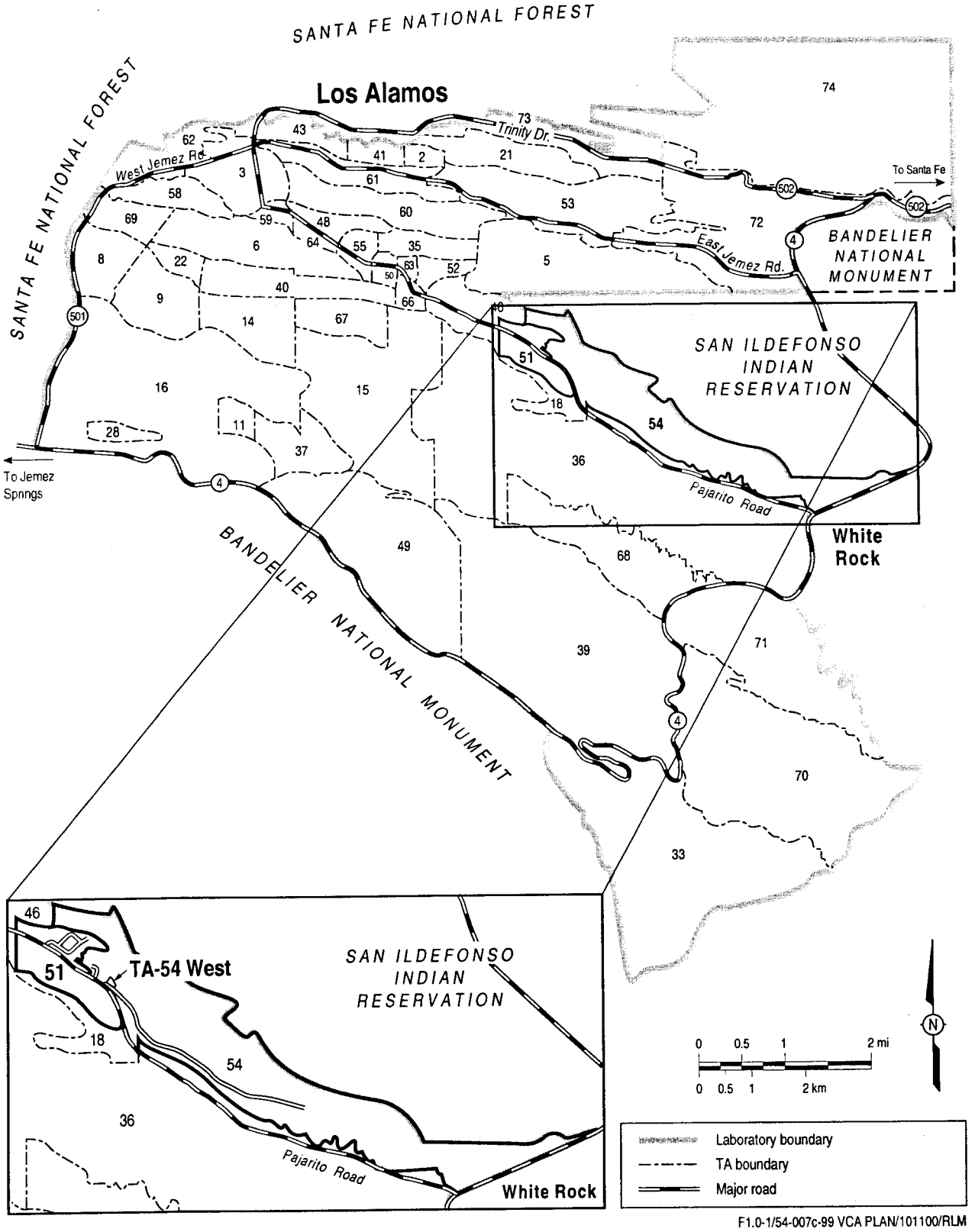

Figure 1.0-1. Location of TA-54 West within the Laboratory

Table 1.2-1
Regulatory Activity for PRS 54-007(c)-99

Date	Activity	Document
October 1987	Identification of SWMU 54-007(c) and AOC 54-007(e) during the Comprehensive Environmental Assessment and Response Program investigation	"Phase I: Installation Assessment, Los Alamos National Laboratory" (DOE 1987, 8663 and 8664)
May 1992	Submittal of RFI[a] work plan for OU[b] 1148	"RFI Work Plan for Operable Unit 1148" (LANL 1992, 7669)
December 1993	Approval of RFI work plan for OU 1148	"RFI Work Plan for OU 1148, Approval Los Alamos National Laboratory NM0890010515," (Davis 1993, 38812)

[a] RFI = RCRA facility investigation.
[b] OU = operable unit.

1.3 Rationale for Proposed Corrective Action

The septic systems included in PRS 54-007(c)-99 are located on Department of Energy (DOE) property that will remain under institutional control for the foreseeable future. It is an ER Project best management practice (BMP) to properly manage inactive/abandoned septic systems in accordance with applicable regulatory requirements and thereby mitigate potential environmental issues that may remain if the systems are not addressed, regardless of RFI results. The septic systems are located on a mesa top, and waste remains in the tanks. Therefore, as a final and obvious remedy, the septic tanks will be removed, the drain lines plugged, and the areas around the connected drain fields characterized and remediated, if necessary, to levels protective of humans and the ecosystem.

The corrective actions proposed herein will meet the requirements of the accelerated corrective action checklist provided in Appendix B. The industrial land-use assumption is straightforward, and EPA Region VI industrial PRGs are appropriate. The nature and extent of chemicals of potential concern (COPCs) will be determined during the accelerated site characterization to supplement the 1995 RFI data and will be used to determine risk to human health and ecosystems. Treatment, storage, and disposal (TSD) facilities are available for each potential waste type, and the cost and implementation time period is reasonable.

2.0 PREVIOUS SITE CHARACTERIZATION

2.1 Site Description and Operational History

PRS 54-007(c)-99 consists of SWMU 54-007(c) and AOC 54-007(e). SWMU 54-007(c) is the inactive septic system that served an office building (TA-54-34) and the nondestructive testing (NDT) facility (TA-54-38) (Figure 2.1-1). The system was constructed in the late 1980s and consists of a 1500-gal. concrete septic tank and a drain line, which connect to a drain field formed by three parallel buried lines (seepage trenches) of slotted polyvinyl chloride (PVC) pipe. The drain field is approximately 4 ft deep. The NDT facility was built for the purpose of performing final verification testing and certification of radioactive transuranic (TRU) waste to be transported to the Waste Isolation Pilot Plant. Real-time radiography and neutron assay equipment housed in the facility are used to examine and certify sealed containers of TRU waste. Drums brought to the NDT for certification are swipe tested for radioactive and hazardous contamination; drums that fail the test are not allowed inside the facility. The drums have never been opened or breached and the contents spilled in the facility.

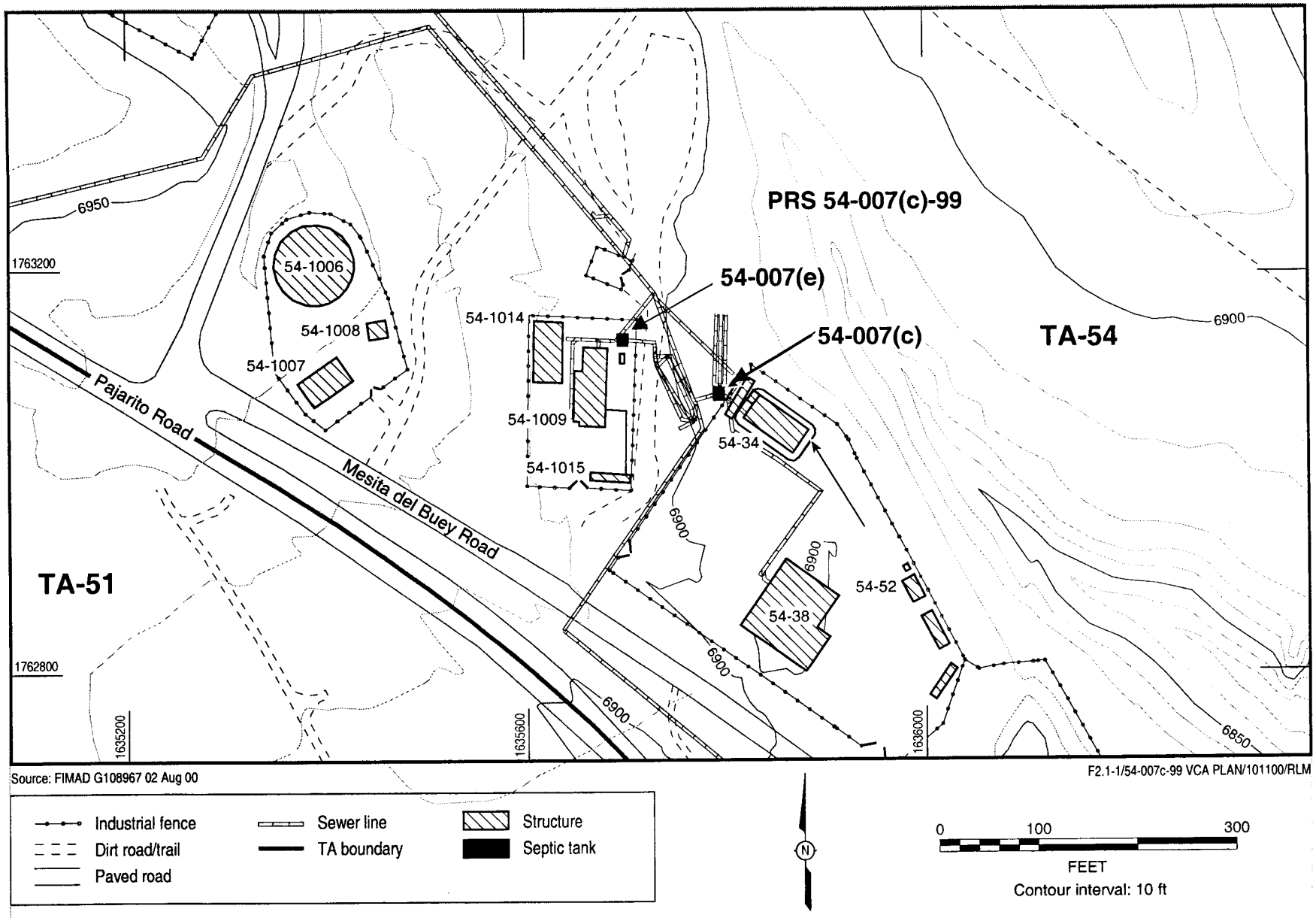

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Figure 2.1-1. Locations of SWMU 54-007(c) and AOC 54-007(e), septic systems

AOC 54-007(e) is the inactive septic system that served the former animal-holding facility, TA-54-1015 (Figure 2.1-1). The system consists of a 1500-gal. concrete septic tank (TA-54-9) and a drain line connected to a drain field formed by three parallel seepage trenches of slotted PVC pipe. The two drain fields [for 54-007(c) and 54-007(e)] are connected. The animal-holding facility was constructed in the mid-1960s and, until the late 1980s, housed animals used by the Laboratory's biomedical research program. In 1992, the facility was remodeled as an analytical laboratory for environmental samples.

Both septic systems were abandoned in place in 1992 when the facilities they served were tied into the Laboratory's Sanitary Waste Systems Consolidation (SWSC). Because the two septic systems have connected drain fields, received similar waste streams (sanitary wastewater), and are located near each other, they were consolidated in Fiscal Year 1999 during the AUA with the New Mexico Environment Department (NMED) Hazardous and Radioactive Materials Bureau.

2.2 Previous Field Investigations

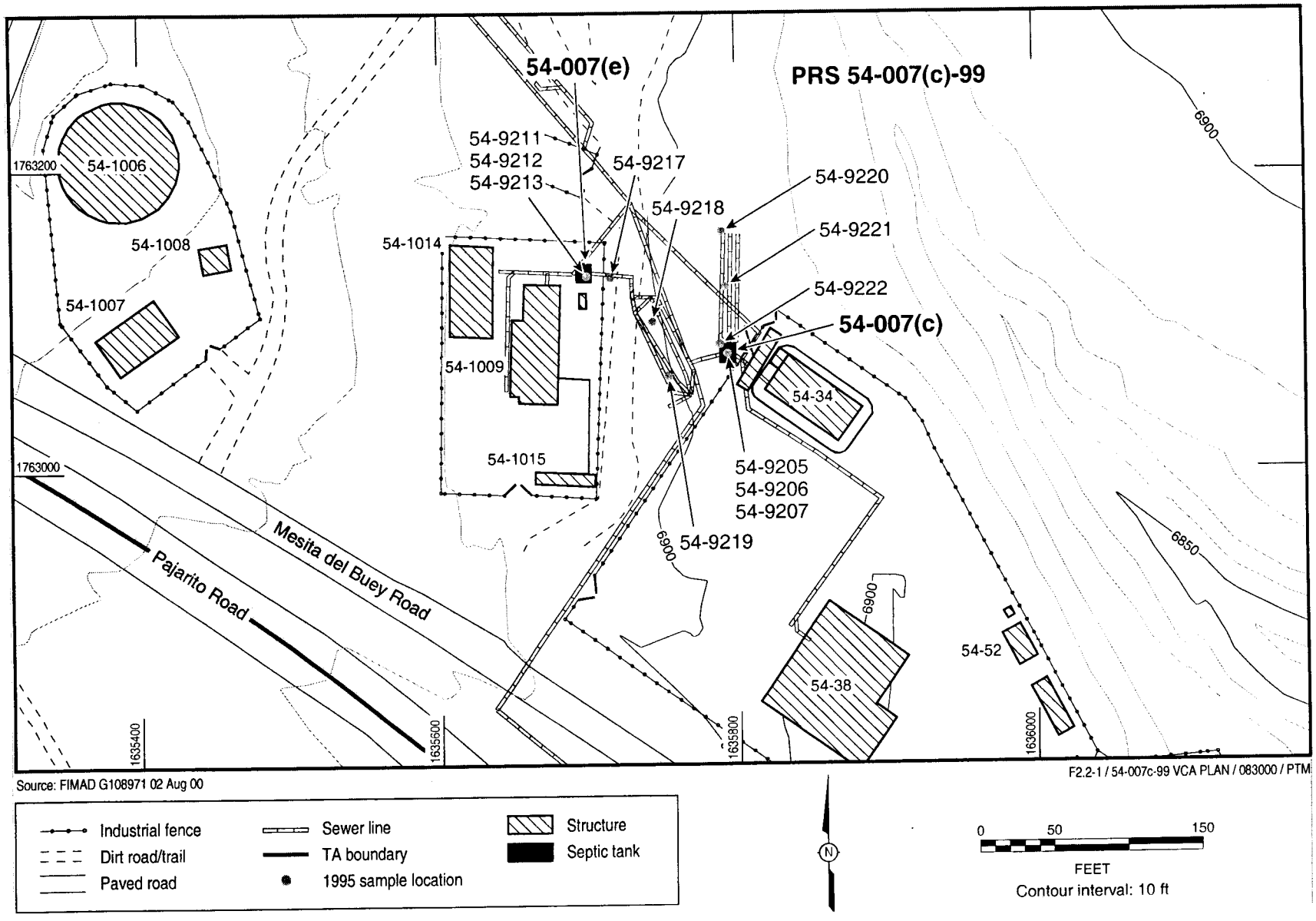
The septic systems were investigated during a 1995 RFI in accordance with the OU 1148 RFI work plan (LANL 1992, 7669). However, the nature and extent of potential contamination were not determined, and the data have not been presented in an RFI report. Sample locations are shown in Figure 2.2-1. As part of that RFI, the contents of the septic tanks were sampled and analyzed for waste characterization purposes. Subsurface soils adjacent to the drain lines and the drain fields were also sampled and analyzed. The analytical suite for the sludge and soil samples included gross alpha, beta, and gamma; pesticides/ polychlorinated biphenyls (PCBs); volatile organic compounds (VOCs); semivolatile organic compounds (SVOCs); and total (target analyte list [TAL]) metals.

2.3 Results from Previous Investigations

A review of the 1995 RFI analytical results in Tables 2.3-1 and 2.3-2 indicates that there are insufficient data to determine if radionuclides are above background levels in the sludge samples. The data do show extremely low concentrations of several VOCs and SVOCs in the septic tank sludges and soils in the vicinity of the connected drain fields. No inorganic chemicals were detected above Laboratory background values. The 1995 sludge data and the August 2000 sludge data (discussed in Section 4.2.1) will be used for waste characterization purposes and to define the analytical suite for site characterization samples.

3.0 BASIS FOR CLEANUP LEVELS

Cleanup levels will be determined by the results of the human health risk screens, human health risk assessments, ecological risk assessments (ERAs), and/or, in some cases, by statute or regulatory mandate. Because the PRS is located on DOE property used by the Laboratory, the anticipated future land use is industrial. Therefore, cleanup levels for the PRS that are protective of human health will be based on EPA Region VI industrial PRGs. The COPCs will be identified in the screening assessment for human health, and cleanup levels will be developed for each COPC. Cleanup levels protective of ecological receptors and the ecosystems they represent will be derived using information from the ecological scoping process, which identifies chemicals of potential ecological concern and potential complete exposure pathways, and an ERA, if warranted. The scoping process and the screening ERA will be prepared in accordance with ERA guidance developed specifically for the Laboratory (Kelly et al. 1998, 57916). The ER Project is committed to working closely with DOE and NMED staff during the implementation of this VCA plan and preparation of the completion report to confirm future land-use scenarios and determine corresponding cleanup levels.



2.2-1. Sample locations at PRS 54-007(c)-99

Table 2.3-1
Organic Analytes and Gross Radiation Detected at 54-007(c)

Request	Sample ID	Location ID	Depth (in.)	Analyte	Result	Units
1643	0554-95-2035	54-9220	48–58	Trichlorofluoromethane	0.003	mg/kg
1645	0554-95-2035	54-9220	48–58	Gross beta radiation	27.4	pCi/g
1643	0554-95-2036	54-9221	48–58	Bis(2-ethylhexyl) phthalate	0.064	mg/kg
1643	0554-95-2036	54-9221	48–58	Trichlorofluoromethane	0.0072	mg/kg
1643	0554-95-2037	54-9222	72–80	Bis(2-ethylhexyl) phthalate	0.07	mg/kg
1643	0554-95-2037	54-9222	72–80	Trichlorofluoromethane	0.006	mg/kg
1645	0554-95-2037	54-9222	72–80	Gross beta radiation	22.9	pCi/g
1643	0554-95-2038 (dup)	54-9222	72–80	Bis(2-ethylhexyl) phthalate	0.058	mg/kg
1643	0554-95-2038 (dup)	54-9222	72–80	Trichlorofluoromethane	0.0094	mg/kg
1645	0554-95-2038 (dup)	54-9222	72–80	Gross beta radiation	26	pCi/g

Note. The matrix for all samples listed in this table is soil in the drain field.

Table 2.3-2
Organic Analytes and Radiation Detected at 54-007(e)

Request	Sample ID	Location ID	Depth (in.)	Analyte	Result	Units
1640	0554-95-2028	54-9217	38–48	Gross beta radiation	31.1	pCi/g
1638	0554-95-2029	54-9218	38–48	Benzo(a)anthracene	0.031	mg/kg
1638	0554-95-2029	54-9218	38–48	Benzo(b)fluoranthene	0.043	mg/kg
1638	0554-95-2029	54-9218	38–48	Benzo(k)fluoranthene	0.04	mg/kg
1638	0554-95-2029	54-9218	38–48	Bis(2-ethylhexyl) phthalate	0.16	mg/kg
1638	0554-95-2029	54-9218	38–48	Chrysene	0.036	mg/kg
1638	0554-95-2029	54-9218	38–48	Fluoranthene	0.048	mg/kg
1638	0554-95-2029	54-9218	38–48	Pyrene	0.038	mg/kg
1638	0554-95-2029	54-9218	38–48	Toluene	0.002	mg/kg
1640	0554-95-2029	54-9218	38–48	Gross beta radiation	25.4	pCi/g
1640	0554-95-2030	54-9219	52–60	Gross beta radiation	23.1	pCi/g
1640	0554-95-2031	54-9219	52–60	Gross beta radiation	22.2	pCi/g

Note. The matrix for all samples listed in this table is soil in the drain field.

4.0 PROPOSED CORRECTIVE ACTION

The proposed corrective action for each inactive septic system is based on the waste characterization results of the sludge remaining in each septic tank, the findings of the previous site investigations, the findings of the proposed supplemental site investigation activities discussed in Section 4.2.1, and current ER Project BMPs. In general, a phased approach will be conducted based on the following activities:

- The conceptual model of potential contaminant transport will be applied.

- The waste remaining in each septic tank will be characterized, removed, and disposed of in accordance with applicable regulatory requirements. These data will be used to define the analytical suite for supplemental and/or confirmatory site characterization samples.
- The tanks will be removed and confirmatory samples collected from each excavation.
- The nature and extent of contamination of soil in the drain fields will be determined from previous RFI and supplemental sample collection and analyses. Data will be used to assess human health and ecological risk. Risk results will be used to identify areas for remediation, as necessary.

4.1 Conceptual Model

The conceptual model (Figure 4.1-1) for PRS 54-007(c)-99 specifies subsurface soil as the primary potential contaminated media. These septic systems were gravity driven and not under pressure. Soil overlying the septic tanks and drain lines is not expected to be contaminated. The potential release mechanisms would be potential leaks from septic tanks and the intended release from the slotted PVC lines used to construct the drain field and spread tank liquids to the subsurface. The analytical data from characterization of the liquids and sludges remaining in the septic tanks would be representative of the subsurface soil beneath the septic tanks, drain lines, and drain fields and of the drain lines and drain fields themselves.

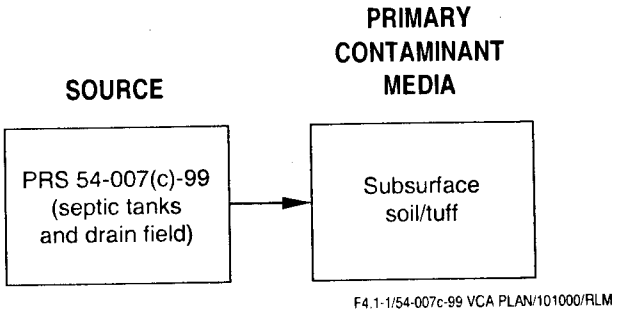


Figure 4.1-1. Conceptual model of contaminant transport at PRS 54-007(c)-99

During the 1995 RFI, samples were collected at a 5-ft depth (1 ft below the drain field seepage lines) adjacent to each of the drain fields. To determine nature and extent of contamination, supplemental samples will be collected at a 6-ft depth (2 ft below the drain field seepage lines) along both sides of each drain field.

Possible pathways from subsurface releases to potential human receptors would be complete only if contaminated soil or tuff was excavated and brought to the surface. 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 of contaminants in the vadose zone 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.

For PRS 54-007(c)-99, the only complete exposure pathway is root uptake from the drain fields. The ecological conceptual site model and the associated rationale are presented in Part C of the ecological scoping checklists (Appendix D).

4.2 Sampling

This VCA includes two supplemental sampling events. The first was conducted in late August 2000 to complete the characterization of waste remaining in the septic tanks. The second will be conducted to complete the determination of the nature and extent of contamination within and around the drain fields. 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. An organic vapor monitor will be used to screen soil for volatile organic vapors, and an alpha probe and a beta/gamma probe will be used to screen soil and possible waste for ionizing radiation. A combustible gas indicator will be used to screen the excavation areas and septic tanks for flammable gases. The site safety officer will calibrate and check all field-screening instruments, as required.

4.2.1 Sampling of Septic Tanks

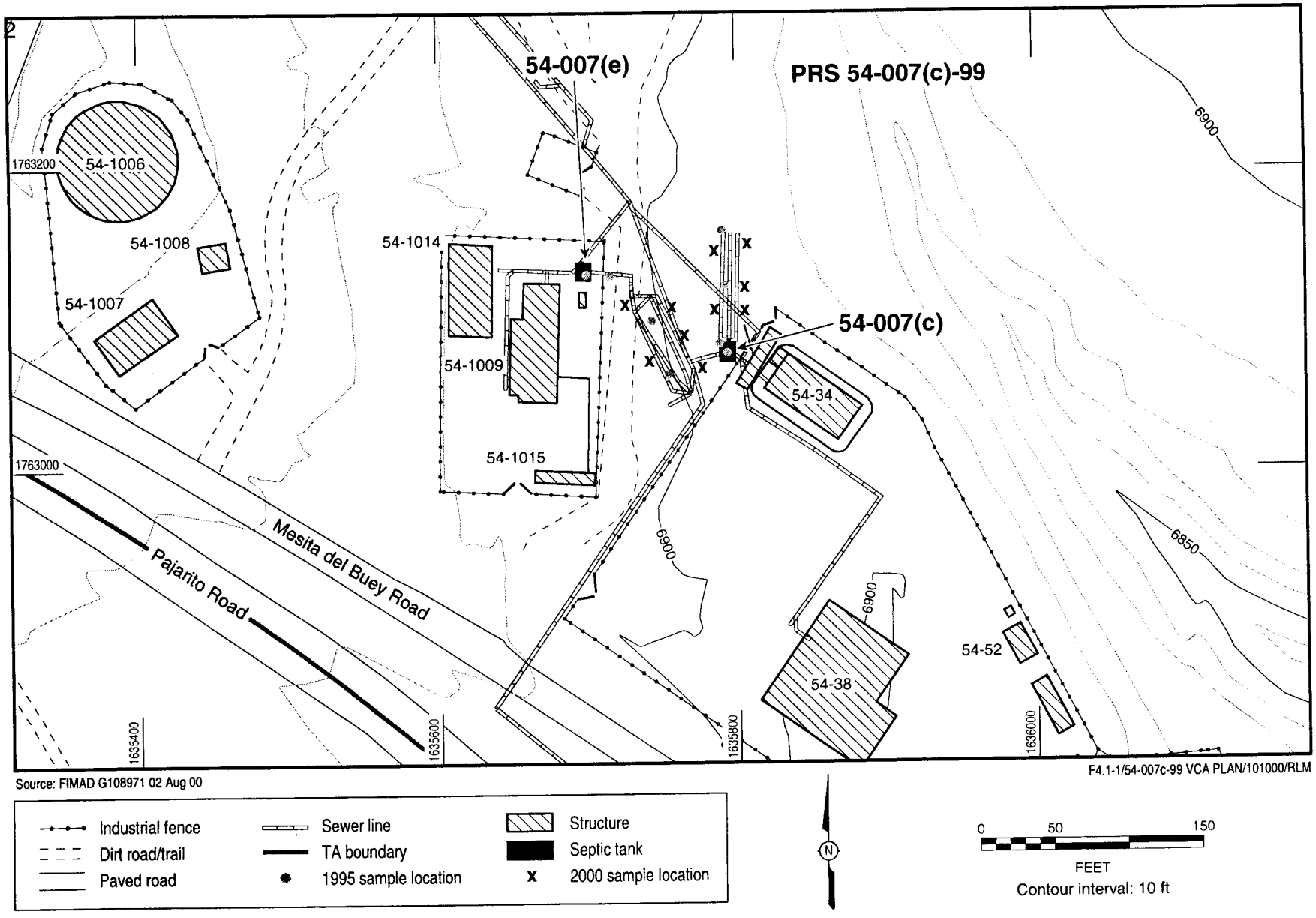
Samples were collected in August 2000 through each septic tank's sampling port. Liquid samples were collected at two levels (0–2 ft, 2–4 ft) and were composited. Sludge (semisolid) found at the bottom of each of the septic tanks was scraped with an implement to gather a representative sample. All samples collected from the septic tanks were sent to an off-site fixed laboratory. A full suite analysis was performed; it included pesticides/PCBs, TAL/ toxicity characteristic leaching procedure metals (liquids/sludges), VOCs, SVOCs, soil pH, and radionuclides (gamma-emitting radionuclides by gamma spectrometry, tritium, isotopic plutonium, and isotopic uranium). Data indicate that the sludge and water remaining in both septic tanks at PRS 54-007(c)-99 is considered industrial wastewater because of the presence of extremely low concentrations of hazardous constituents (VOCs). Radionuclides were not detected at levels above background in either tank. These data will be used to determine the proper disposal route for liquids and sludges, the analytes for the supplementary sampling of the drain fields, and the confirmation sampling of any excavated areas.

4.2.2 Sampling of Drain Fields

Each septic tank is attached to a drain field, and the two drain fields are interconnected. The descriptions and layouts of the drain fields were discussed in Section 2.1. Drain field subsurface soil samples will be collected from the locations shown in Figure 4.2-1. The sampling locations were selected to supplement the 1995 RFI sampling data. Ten hand auger holes will be advanced in and around the drain fields and along the connecting lines to a depth of approximately 6 ft (immediately below the perforated pipe in bedding soils). A 1-ft interval of core (from the 5- to 6-ft depth) will be screened, and 10 samples (one from each core) will be collected. A minimum of six 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 septic tank sludge samples and will therefore include VOCs, SVOCs, and soil pH.

4.3 Cleanup Activities

Results from sampling conducted during this investigation will determine the extent of cleanup activities required at the site. Based on waste characterization results, the liquid and sludge will be removed from both tanks and placed in appropriate containers for disposal as industrial wastewater. The inlet and outlet lines of each tank will be cut and plugged, and the septic tank will be removed and transported for disposal at Rio Rancho. The final cleanup activities and the derivation of the cleanup levels will be described in detail in a completion report for PRS 54-007(c)-99. Confirmatory sampling is discussed in Section 5, and waste management is discussed in detail in Section 6. All field activities will be conducted in accordance with this VCA plan, the site-specific health and safety plan, and the Waste Characterization Strategy Form.



4.2-1. Proposed supplemental sample locations at PRS 54-007(c)-99

4.4 Site Restoration

Before VCA activities begin, photographs, field sketches, and/or video documentation will be prepared to record the conditions of the sites. After completion of activities, the site will be restored to preinvestigation contours and seeded with a mix of native grasses recommended by ESH-20. BMPs to control stormwater run-on and runoff will be installed, as needed, until vegetation is reestablished.

5.0 CONFIRMATORY SAMPLING

Both tanks will be removed, and confirmatory samples will be collected from each tank excavation. Field instrument readings and field observations of preexisting breaks in the inlet or outlet lines and the septic tanks, fractured areas in the underlying tuff, and areas of soil discoloration will be used to identify areas of possible contamination. Identified areas will be sampled at two depths from the bottom of each excavation (0–12 in. and 12–24 in.). These two depths have been chosen to confirm if contamination is present in either excavation floor and to ascertain the extent of any contamination. If no areas of possible contamination are noted, soil samples will be collected beneath each inlet and outlet connection and from the imprints of the septic tanks. Table 5.0-1 identifies the depths and descriptions of proposed samples beneath the septic system drain lines and tanks. All samples will be sent to an off-site fixed laboratory for analysis; types of analyses will be based on the analytical results from the septic tank samples.

Table 5.0-1
Confirmatory Sample Depths and Descriptions

Depth (in.)	Description
0–12	Collected from the south end of each tank excavation beneath the connection to the inlet pipe, media may be fill or tuff
12–24	Collected from the south end of each tank excavation beneath the connection to the inlet pipe, media may be fill or tuff
0–12	Collected from the center of each tank excavation, media may be fill or tuff
12–24	Collected from the center of each tank excavation, media may be fill or tuff
0–12	Collected from the north end of each tank excavation beneath the connection to the outlet pipe, media may be fill or tuff
12–24	Collected from the north end of each tank excavation beneath the connection to the outlet pipe, media may be fill or tuff

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
Waste Streams, Types, and Volumes at PRS 54-007(c)-99

Waste Stream	Waste Type	Anticipated Volume
Concrete and other debris	Solid waste	3 yd^3
Tank contents	Industrial wastewater	1000 gal.
Contaminated soil	Solid waste, potentially hazardous	10 yd^3
Decontamination water	Liquid waste	55 gal.
Plastics, personal protective equipment (PPE), sampling waste	Solid waste	2 yd^3

Concrete and Other Debris. This waste stream includes both septic tanks. The volume calculation assumes that the concrete tanks will be broken up. Therefore, this waste stream will include nonradioactive/nonhazardous solid waste.

Tank Contents. A trash pump will be used to remove the liquid and sludge in the tanks. Characterization of the waste has been completed by direct sampling of the tank contents.

Contaminated Soil. This waste stream could contain soils contaminated with hazardous constituents that may be excavated below both septic tanks and around the connected drain fields. This waste stream could be either solid waste or hazardous waste, depending on the analytical results. The quantity estimates for this waste stream are based on 10% of the volume of the soil beneath/around the septic tank. An additional 4 yd^3 is estimated as originating beneath the drain lines along the entire length of the drain lines associated with both septic systems. 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. 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.

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 septic tank liquid and sludge 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.

Concrete and Other Debris. The septic tanks will be removed and broken up. The concrete debris will be loaded into an appropriate roll-off container. The tanks will be disposed of as construction and demolition debris at Rio Rancho.

Tank Contents. The liquids and sludges will be placed into appropriate containers, based on the analytes identified during the waste characterization sampling. Characterization results indicate the contents of both tanks are industrial wastewater and will be disposed of appropriately.

Contaminated Soil. Potentially contaminated soils will be placed on plastic sheeting bermed to prevent runoff and run-on and covered until analytical results are received. Soil with contaminant concentrations that are below the sites' industrial PRGs will be returned to the excavation. Soils with concentrations above cleanup levels will be packaged in 55-gal. drums or roll-off containers depending on the final volume of the waste stream. Final disposal of any contaminated soils is expected to be at Rio Rancho or through TA-54 to an off-site TSD facility, if the soils are characterized as hazardous 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. 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. Liquids characterized as hazardous waste will be disposed of through TA-54 to an off-site TSD facility. The generation of radioactively contaminated liquids is not anticipated. Sanitary liquids will be disposed of into SWSC.

Plastics, PPE, and Sampling Wastes. Plastics, PPE, and miscellaneous sampling wastes will be collected in lined, 55-gal. drums and stored in an appropriate and segregated waste storage area. The drums will be transported through TA-54 for disposal at an appropriate facility.

7.0 PROPOSED SCHEDULE AND UNCERTAINTIES

The field work portion of this VCA is expected to begin during October 2000 and will end in November 2000 (Table 7.0-1). Collection of the septic tank waste characterization samples occurred in late August 2000. Six working days are allotted for a site readiness review, training, and mobilizing. Seven working days are allotted for excavations and confirmatory sampling of the site. Thirty working days have been allotted for all remaining waste characterization and disposal. This schedule should be achievable if laboratory analyses and waste disposition decisions can be completed in a timely fashion and if an appropriate waste disposal facility can be confirmed. Five working days have been allotted for site restoration activities. If excavation is required to remediate the drain field(s), more restoration may be needed. If site restoration is more extensive than straw bale erosion controls, backfilling, and grading and reseeding of the site, a longer period of time may be needed. The VCA completion report will be prepared and submitted to NMED Hazardous Waste Bureau (HWB) in Fiscal Year 2001.

Table 7.0-1
VCA Field Work Schedule

Activity	Workday Duration	Start	Finish
Readiness review/preparation	6 days	October 20	October 27
Review of characterization data	2 days	October 3	October 4
Excavation and confirmatory sampling	7 days	November 1	November 9
Laboratory analysis	45 days	November 10	December 22
Waste management/disposal	30 days	January 2	January 31
Site restoration	5 days	February 1	February 7
Overall	93 days	October 3	February 7

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 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 54."

Copies of the reference library are maintained at NMED-HWB; the DOE Los Alamos Area Office; US EPA Region VI; and the ER Project Material Disposal Areas Focus Area. This library is a living collection of documents 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.

Davis, A., December 14, 1993. "RFI Work Plan for OU 1148, Approval Los Alamos National Laboratory NM0890010515," Environmental Protection Agency memorandum to J. Vozella, Dallas, Texas. (Davis 1993, 38812)

DOE (US Department of Energy), October 1987. "Phase I: Installation Assessment, Los Alamos National Laboratory," Volumes 1 and 2, (draft), Comprehensive Environmental Assessment and Response Program, Albuquerque Operations Office, Albuquerque, New Mexico. (DOE 1987, 8663 and 8664)

Kelly, E., G. Gonzales, and L. Soholt, May 1, 1998. "Screening Level Ecological Risk Assessment Approach for the Environmental Restoration Project at Los Alamos National Laboratory." Los Alamos National Laboratory report LA-UR-98-1822, Los Alamos, New Mexico." (Kelly et al. 1998, 57916)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1148," Los Alamos National Laboratory report LA-UR-92-855, Los Alamos, New Mexico. (LANL 1992, 7669)

Appendix A

List of Acronyms

AA	Atomic absorption
AOC	Area of concern
AUA	Annual unit audit
BMP	Best management practice
COPC	Chemical of potential concern
EPA	US Environmental Protection Agency
ER	Environmental restoration
ERA	Ecological risk assessment
ESH	Environment, safety, and health
HWB	Hazardous Waste Bureau
Laboratory	Los Alamos National Laboratory
NDT	Nondestructive testing
NMED	New Mexico Environment Department (New Mexico Environmental Improvement Division before 1991)
OU	Operable unit
PCB	Polychlorinated biphenyl
PPE	Personal protective equipment
PRG	Preliminary remediation goal
PRS	Potential release site
PVC	Polyvinyl chloride
RCRA	Resource Conservation and Recovery Act
RFI	RCRA facility investigation
SVOC	Semivolatile organic compound
SWMU	Solid waste management unit
SWCS	Sanitary wastewater consolidation system
TA	Technical area
TAL	Target analyte list (EPA)
TRU	Transuranic
TSD	Treatment, storage, disposal
VCA	Voluntary corrective action
VOC	Volatile organic compound

Appendix B

Accelerated Corrective Action Checklist

Accelerated Corrective Action (ACA) Checklist and Field Work Authorization Form

PRS Number: 54-007(c)-99 ☒ HSWA ☐ Non-HSWA

Yes	No	
X		Fact sheet describing planned activities is complete and attached to checklist.
X		COPC(s) for human health risk (HH), ecological risk (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 to guide cleanup.
X		Cleanup levels/preliminary remediation goals (PRGs) are appropriate.
X		Remedy is obvious.
X		Time for removal is less than six months.
X		Remedy is final.
X		Land use assumptions are straightforward.
X		Treatment, Storage, and Disposal (TSD) 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:

Los Alamos
Environmental Restoration Project

Accelerated Corrective Action (ACA)
Checklist and Field Work Authorization Form

PRS Number: 54-007(c)-99 ☒ HSWA ☐ Non-HSWA

Upon reviewing the Accelerated Corrective Action Fact Sheet and the criteria checklist above, the appropriate Accelerated Corrective Action approach for the PRS(s) is (check one): ☒ VCA ☐ VCM

Signatures of the Representative for UC-Laboratory, DOE-LAAO, and NMED-HRMB:

UC: JOHN HOPKINS, FAPL, _____ 10/4/2000
(Print Name and Title, then Sign) (Date)

DOE: _____ _____
(Print Name and Title, then Sign) (Date)

NMED: _____ _____
(Print Name and Title, then Sign) (Date)

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

Signatures of the Representative for UC-LANL and DOE-LAAO

UC: Julie A. Canaan Program Manager _____ 10/4/00
(Print Name and Title, then Sign) (Date)

DOE: _____ _____
(Print Name and Title, then Sign) (Date)

Action	Date	Correspondence ID
VCA or VCM plan submitted to NMED		
NOD or RSI received from NMED		
Laboratory response to NOD or RSI		
NMED approval of VCA or VCM plan		

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

DOE ER Program Manager _____ _____
(Signature) (Date)

Los Alamos
Environmental Restoration Project

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 54-007(c)

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%	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	19.0
Has runoff caused visible erosion? (Yes/No)	22	Sheet	Rill	Gully	11.0
		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.			7.0
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.			*
**Select either structures or natural drainages.*					
MAX. POSSIBLE EROSION MATRIX SCORE:	**100**			**Total Score**	56.0

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Los Alamos National Laboratory
SURFACE WATER
SITE ASSESSMENT

SITE INFORMATION

1a) PRS Number 54-007(c) **1b) Structure Number** 54-38 **1c) FMU Number** 64

2. Date/Time (M/D/Y H:M am/pm) 5/5/00

SITE SETTING (check all that apply)

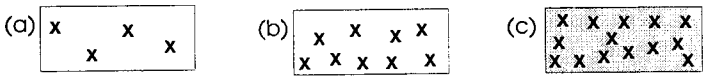
3. ◉ **On mesa top (a).** ○ **In the canyon floor, but not in an established channel (c)**

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

Explanation: Septic system (54-89) located west of building 54-34.

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

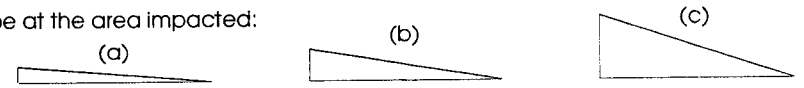
(illustration)



Estimated % of ground/canopy cov ○ 0% to 25% ◉ 25% to 75% ○ 75% to 100%

Explanation: Mixed grasses, pinon pine, volcanic tuff, soil

5. Steepest slope at the area impacted:



○ Less than 10% ◉ 10% to 30% ○ 30% and greater

Explanation: Mostly flat, but steepens about 100 feet to the north.

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, describ ○ Man-made channel. ◉ Natural channel.

Explanation: Runoff evidence throughout designated PRS boundary including matted vegetation and channelization.

RUNOFF FACTORS, CONT'D

6b) Where does evidence of runoff terminate?

- (●) **Drainage or wetland (name)** Canada del Buey
- ( ) **Within bench of canyon setting (name)**
- ( ) **Other (i.e., retention pond, meadow, mesa top)**

Explanation: Runoff terminates into tributary of Canada del Buey north of site

Y / N

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

Explanation: Rills forming due to the amount of run-on coming onto site.

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: Storm drains (asphalt channel) discharge directly onto site.

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

Explanation: No operational impact.

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

Explanation: As mentioned in #7.

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:

Misc. windblown trash found around the area.

Los Alamos National Laboratory

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

Surface Water Assessment Erosion Matrix for PRS 54-007(e)

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	9.5
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.			0.0
**Select either structures or natural drainages.*					
MAX. POSSIBLE EROSION MATRIX SCORE:	**100**			**Total Score**	23.3

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Los Alamos National Laboratory
SURFACE WATER
SITE ASSESSMENT

SITE INFORMATION

1a) PRS Number: 54-007(e) 1b) Structure Number: 54-151 1c) FMU Number: 64

2. Date/Time (M/D/Y H:M am/pm): 5/5/00

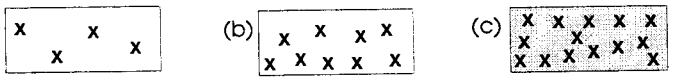
SITE SETTING (check all that apply)

3.
- (●) On mesa top (a).
- ( ) Within a bench of a canyon (b).
- ( ) In the canyon floor, but not in an established channel (c)
- ( ) Within established channel in the canyon floor (d).

Explanation: Septic system on mesa top north of 54-15 within fenced area.

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

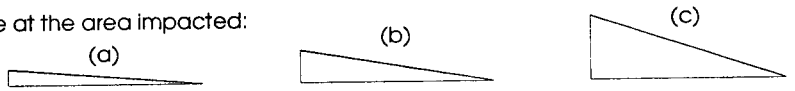
(illustration)



Estimated % of ground/canopy cov
- ( ) 0% to 25%
- (●) 25% to 75%
- ( ) 75% to 100%

Explanation: Mixed grasses, gravel, soils

5. Steepest slope at the area impacted:



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

Explanation: Generally flat with slope towards the northeast.

RUNOFF FACTORS

Y / N

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

[ ] [x] 6a) Is runoff channelized? If yes, describ ( ) Man-made channel. ( ) Natural channel.

Explanation: Sheet flow runoff towards the north. A culvert exists just north of the fenced area which allows runoff from site towards the east.

RUNOFF FACTORS, CONT'D

6b) Where does evidence of runoff terminate?

- ○ **Drainage or wetland (name)** Canada del Buey
- ◉ **Within bench of canyon setting (name)** drainage ditch
- ○ **Other (i.e., retention pond, meadow, mesa top)**

Explanation: Minor flows from site terminate into the adjacent roadside ditch.

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: No structural impacts.

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

Explanation: No operational impact.

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

Explanation: No upslope drainage.

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:

Appendix D

Ecological Scoping Checklist

D-1.0 PART A—SCOPING MEETING DOCUMENTATION

Site ID	PRS 54-007(c)-99
Form of Site Releases (solid, liquid, vapor) 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.	Liquid discharge to drain field, potential leakage from underground septic tank and lines
List of Primary Impacted Media Indicate all that apply.	*Surface soil* – Surface water/sediment – *Subsurface – Yes* Ground water – Other, explain –
FIMAD Vegetation Class Based on Arcview Vegetation Coverage Indicate all that apply.	Water – Bare ground/unvegetated – Spruce/fir/aspen/mixed conifer – Ponderosa pine – Piñon juniper/juniper savannah – Yes Grassland/shrubland – Yes Developed – Yes
Is threatened and endangered (T&E) species habitat present? If applicable, list species known or suspected that use the site for breeding or foraging.	No
Provide a list, of neighboring/contiguous/ upgradient sites; include a brief summary of COPCs and the form of releases for relevant sites, and reference a map, as appropriate. Use this information to evaluate the need to aggregate sites for screening.	None
Surface Water Erosion Potential Information Summarize information from Standard Operating Procedure 2.01, including the runoff subscore (maximum of 46), terminal point of surface water transport, slope, and surface water run-on sources.	See Appendix C.
Other Scoping Meeting Notes	

D-2.0 PART B—SITE VISIT DOCUMENTATION

Site ID	54-007(c)-99
Date of Site Visit	7/21/00
Site Visit Conducted by	Lars Soholt, John Hopkins

Receptor Information

Estimate Cover	Relative vegetative cover (high, medium, low, none) = low to high Relative wetland cover (high, medium, low, none) = none Relative structures/asphalt, etc. cover (high, medium, low, none) = low to medium cover of dirt road and disturbance
Field Notes on the FIMAD Vegetation Class to Assist in Ground-Truthing the Arcview Information	The area lies adjacent to a developed part of TA-54, which lies within native piñon juniper woodland association.
Field Notes on T&E Habitat (if applicable) 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.	No T&E species were identified in this area in the ESH ID process.
Are ecological receptors present at the site? (yes/no/uncertain) 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. Mixed grasses and forbs around septic tanks with some disturbance and gopher activity provide some foraging habitat. Over the drain field, a rich and moderately dense piñon-juniper community has developed. Signs of passerines and gopher burrowing and the richness of the drain field community indicate wildlife usage of the area. No aquatic communities occur here or nearby.

Contaminant Transport Information

Surface Water Transport Field notes should summarize the erosion potential, including a discussion of the terminal point of surface water transport, if applicable.	Drainage is toward the north, to the drain field. Runoff could terminate at the road or in the drain field just beyond the road.
Are there any off-site transport pathways (surface water, air, or ground water)? (yes/no/uncertain)	No. The releases would have been subsurface but too shallow to reach the regional aquifer. There is no known shallower ground water in this area.
Is an interim action (IA) needed to limit off-site transport? (yes/no/uncertain) Provide explanation/ recommendation for IA to project lead.	No

Ecological Effects Information

Physical Disturbance Provide list of major types of disturbances, including erosion and construction activities; review historical aerial photos where appropriate.	The area is moderately disturbed by vehicle traffic and other activities. A dirt road runs through the area.
Are there obvious ecological effects? (yes/no/uncertain) Provide an explanation and apparent cause (e.g., contamination, physical disturbance, other).	Moderate physical disturbance near the septic tanks themselves
IA needed to limit apparent ecological effects? (yes/no/uncertain) Provide explanation and recommendations for IA to mitigate apparent exposure pathways to project lead.	No

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 the likelihood that future construction activities could make contamination more available for exposure or transport.

Adequacy of Site Characterization

Do existing or proposed data provide information on the nature, rate, and extent of contamination? (yes/no/uncertain) Provide explanation (consider if the maximum value was captured by existing sample data).	Characterization will be carried out to define VCA waste streams to confirm that cleanup has occurred or that no releases occurred.
Do existing or proposed data for the site address potential transport pathways of site contamination? (yes/no/uncertain) Provide explanation (consider if other sites should be aggregated to characterize potential ecological risk).	See above

Additional Field Notes

Provide additional field notes on the site setting and potential ecological receptors.

A-3.0 PART C—ECOLOGICAL PATHWAYS CONCEPTUAL EXPOSURE MODEL

Provide answers to Questions A to V to develop the 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: Releases would be subsurface in this case; volatile chemicals would be released slowly if at all through the ground surface.

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: Releases are subsurface.

Question C

Can contaminated soil be transported to aquatic ecological communities (use SOP 2.01 run-off 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: No aquatic receptors occur in this area.

Question D

Is contaminated ground water potentially available to biological receptors through seeps or springs or shallow ground water?

Known or suspected presence of contaminants in ground water.

- The potential for contaminants to migrate by way of ground water 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 ground water present within the root zone (~1 m depth).
- Terrestrial wildlife receptors generally will not contact ground water unless it is discharged to the surface.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: No springs occur in the area.

Question E

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

- Suspected ability of contaminants to migrate to ground water.
- The potential for contaminants to migrate by way of ground water 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 ground water present within the root zone (~1 m depth).
- Terrestrial wildlife receptors generally will not contact ground water unless it is discharged to the surface.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: The depth to the regional aquifer and low rainfall in the area are likely to preclude movement of contamination to that aquifer. No shallow ground water is known to occur here.

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 erodibility of surficial material and the geologic processes of canyon/mesa edges.

Answer (likely/unlikely/uncertain): Unlikely

Provide explanation: Site is well removed from mesa edges and not subject to mass wasting. Erosion potential is low.

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: 2

Provide explanation: Limited exposure for burrowing animals in the drain field could occur.

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: 0

Terrestrial Animals: 0

Provide explanation: Releases would be subsurface and not susceptible to aerial entrainment.

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: Roots could extend down into the drain field and take up some contaminants of concern.

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: 0

Provide explanation: No bioaccumulators were detected.

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 and 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: 0

Provide explanation: Releases would be in the subsurface.

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: 0

Provide explanation: No strong dermal absorbing compounds were detected.

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: Releases would be subsurface.

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: Subsurface releases with no aquatic habitat present

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: No aquatic habitat present

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: No aquatic habitat is present. Releases would be subsurface.

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: No strong dermal absorbers detected

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: Releases would be subsurface.

Question S

Could contaminants bioconcentrate in free-floating aquatic plants, 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: No aquatic habitat present

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: No aquatic habitat present

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: No aquatic habitat present

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):

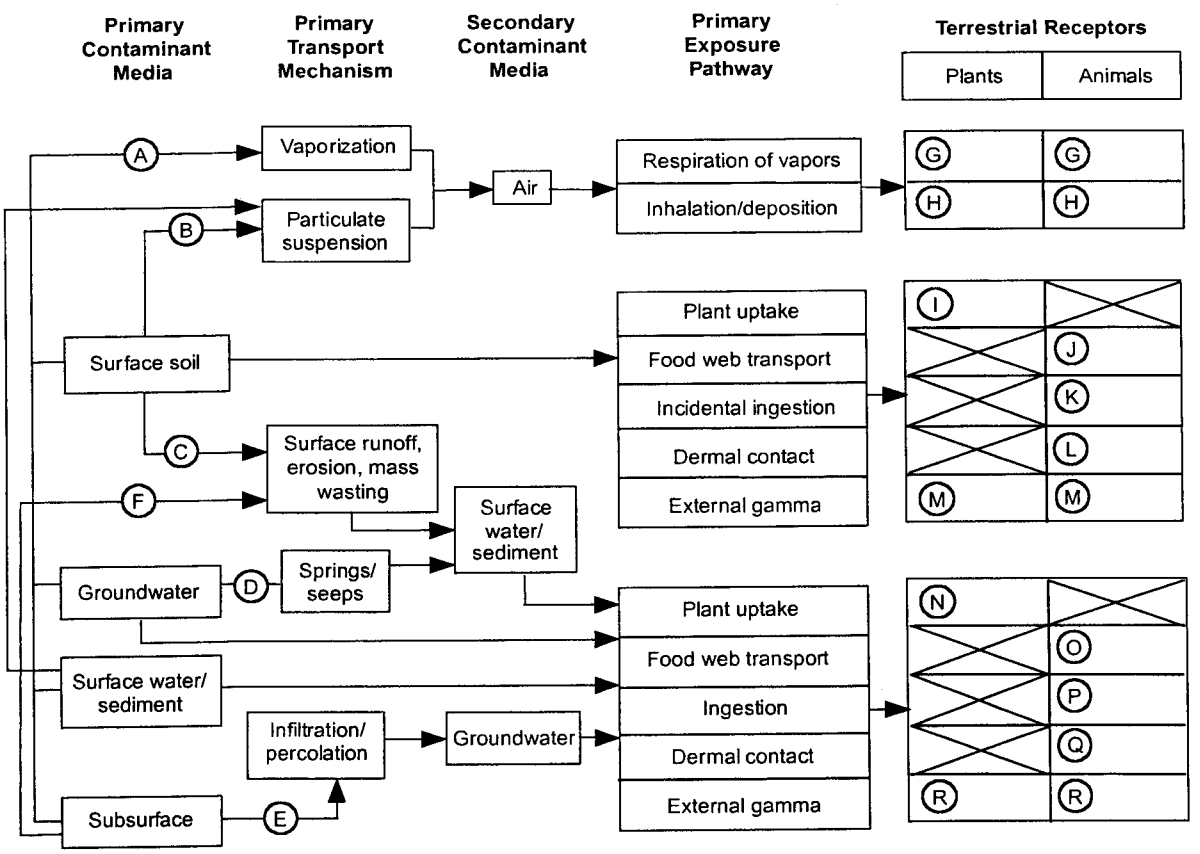
Aquatic Plants: 0

Aquatic Animals: 0

Provide explanation: No aquatic habitat present

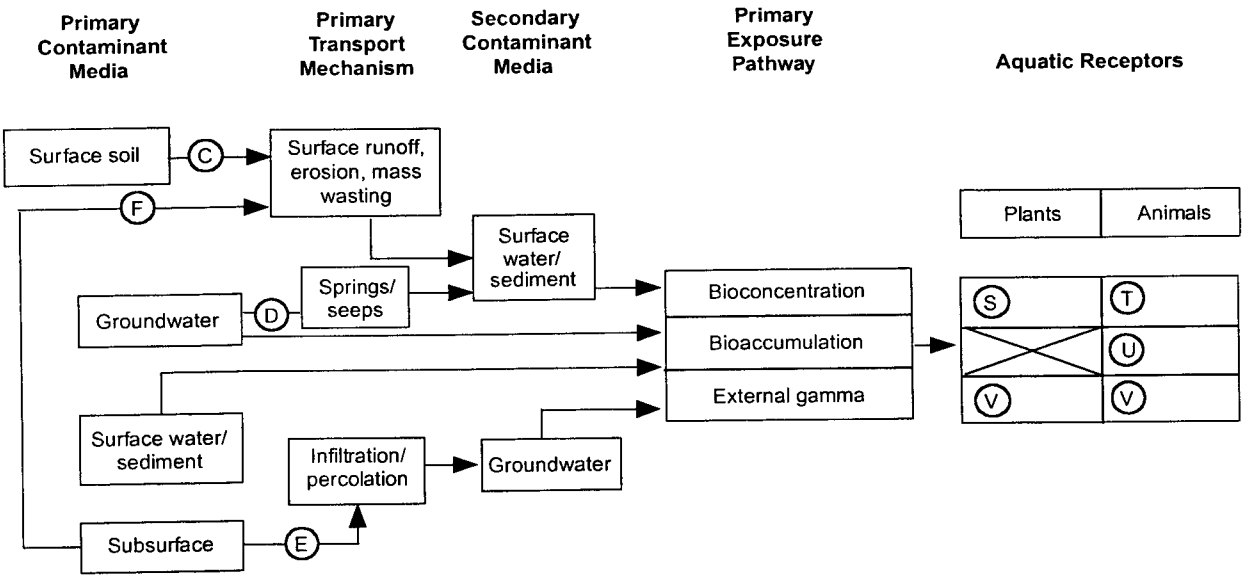
Ecological Scoping Checklist
Terrestrial Receptors
Ecological Pathways Conceptual Exposure Model

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): Lars Soholt, Ph.D.

Name (signature): [signature]

Organization: LANL E/ER

Phone number: 505/667-2256

Date completed: 7/27/00

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

Name (printed): Richard Mirenda, Ph.D.

Name (signature): [signature]

Organization: LANL EES-13

Phone number: 505/665-6953

Appendix E

Estimated Costs

The Environmental Restoration Project baseline cost estimate for removing these two septic tanks is $220,000. The estimate does not include the cost for removal of the drain field.