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Summary Report on Potential Sources of Perchlorate Found in Perched-Intermediate and Regional Groundwater beneath the Los Alamos and Pueblo Canyon Watershed

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Prepared by the Environmental Programs Directorate

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Summary Report on Potential Sources of Perchlorate Found in Perched-Intermediate and Regional Groundwater beneath the Los Alamos and Pueblo Canyon Watershed

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1.0 INTRODUCTION

This report summarizes potential sources of perchlorate detected in perched-intermediate groundwater monitoring well R-6i and regional groundwater monitoring well R-4. This summary is being submitted to the New Mexico Environment Department (NMED) pursuant to the Los Alamos National Laboratory's (hereafter, the Laboratory's) June 8, 2007, letter response (LANL 2007, 097006) to NMED's April 9, 2007, letter on the Los Alamos watershed Periodic Monitoring Report (NMED 2007, 095494) The summary compiles information from numerous sources including the Comprehensive Environmental Assessment and Response Program report (DOE 1987, 008663), the Laboratory's potential release site (PRS) database, interviews, and numerous work plans and reports as cited in the attached table (Table 1).

The evaluation of potential sources included a query of the PRS database using keywords such as "perchlorate" and "perchloric acid," and because of its use in plutonium processing, the keywords "radiochemistry experiments," "nuclear chemistry research," and "plutonium processing" were also used. The query also included "perchlorate data detects" to identify sites that have detected perchlorate as a contaminant during recent investigations. If the data are published in a report, that report is referenced in the table. Specific information on quantities or period of usage was not found for some of the sites because detailed records pertaining to perchlorate were apparently not kept. However, current knowledge of how perchlorate was used and the conceptual model for fate and transport helps focus the review of potential sources. Information on radioactive materials and radionuclides, including the results of sampling and analysis of radioactive constituents, is voluntarily provided to the New Mexico Environment Department in accordance with U.S. Department of Energy policy.

2.0 SUMMARY OF FINDINGS

A review of all the potential sources identified multiple solid waste management units (SWMUs) within Technical Areas (TAs) 01, 21, and 45 that involved use or releases of perchlorate into the environment (Table 1). To contemplate the relation of these potential sources with the detections of perchlorate in R-6i and R-4, a simple conceptual model is proposed.

Transport of contaminants to the perched-intermediate and regional groundwater zones beneath the Laboratory at detectable concentrations appears to occur when three primary fate and transport factors are aligned. These factors are (1) substantial contaminant mass, (2) liquid release into a canyon typically through an outfall, and (3) a persistent aqueous driver to move the contaminants through the vadose zone.

R-6i

Perched-intermediate groundwater monitoring well R-6i is located near the eastern end of DP mesa near the confluence of DP and Los Alamos Canyons (Figure 1). The well is screened within a perched zone that was initially identified during drilling of nearby water-supply well Otowi-4. A review of potential sources in that part of the watershed suggests that the outfall from building 21-257 known as SWMU 21-011(k) is the most likely source of the perchlorate contamination observed in R-6i because it received and discharged wastewater from plutonium processing operations at TA-21 (Table 1). The outfall discharged between 1952 and 1986. The presence of elevated tritium in R-6i also suggests 21-011(k) as a likely source because the same outfall was known to have had significant tritium contamination in the wastewater. While drilling to install a perched-intermediate groundwater monitoring well (LADP-5) at a location approximately midway between R-6i and the 21-011(k) outfall, no perched-

intermediate groundwater was encountered, suggesting that the infiltration pathway is within DP Canyon east of the LADP-5 location.

Numerous other perchlorate sources were identified in the vicinity of R-6i including some of the material disposal areas (MDAs) at TA-21 (e.g., MDA T). These sites are not eliminated as potential sources; however, the conditions thought necessary for deep transport at detectable concentrations may not be present at those sites. Ongoing investigations and corrective measures evaluations at those sites will further resolve their significance as potential sources of groundwater contamination.

R-4

Regional groundwater monitoring well R-4 is located in Pueblo Canyon (Figure 1). The well is screened within the upper portion of the regional aquifer. A review of potential sources of perchlorate contamination at R-4 points to the outfall into Acid Canyon [Consolidated Unit 1-002(b)-00] where untreated wastewater from plutonium processing operations in TA-01 was released into the canyon from 1943 to 1951 (Table 1). Tritium is another indicator of the Acid Canyon source since it is also known to have been in effluent in considerable quantities during those same years. The infiltration pathway is within the Pueblo/Acid Canyon drainage upgradient of the R-4 location. The western limit of significant infiltration is somewhat constrained by the absence of perchlorate in Test Well-4 and R-2 to the west. Los Alamos County's water supply well Otowi-1, located approximately 2 mi to the east (down groundwater gradient), has detectable perchlorate, suggesting a relation to the perchlorate identified in R-4. The perchlorate levels detected in Otowi-1 have remained relatively constant over the past 7 yr since perchlorate measurements began.

3.0 REFERENCES

The following list includes all documents cited in the main text of this report. Parenthetical information following each reference provides the author(s), publication date, and ER ID number. This information is also included in text citations. ER ID numbers are assigned by the Environmental Programs Directorate's Records Processing Facility (RPF) and are used to locate the document at the RPF and, where applicable, in the master reference set.

Copies of the master reference set are maintained at the NMED Hazardous Waste Bureau; the U.S. Department of Energy–Los Alamos Site Office; the U.S. Environmental Protection Agency, Region 6; and the Directorate. The set was developed to ensure that the administrative authority has all material needed to review this document, and it is updated with every document submitted to the administrative authority. Documents previously submitted to the administrative authority are not included.

Ahlquist, A.J., A.K. Stoker, and L.K. Trocki, December 1977. "Radiological Survey and Decontamination of the Former Main Technical Area (TA-1) at Los Alamos, New Mexico," Los Alamos Scientific Laboratory report LA-6887, Los Alamos, New Mexico. (Ahlquist et al. 1977, 005710)

Buckland, C., December 6, 1957. "Final Health Clearance of Various Buildings in TA-01 Located South of Trinity Drive," Los Alamos Scientific Laboratory memorandum to DJ. Bolton, Los Alamos, New Mexico. (Buckland 1957, 003289)

Buckland, C.W., February 16, 1973. "Summary of Records Search for Radioactivity Remaining in TA-1, Acid Waste Lines, TA-10, TA-45, and Acid Canyon Below TA-45," Los Alamos Scientific Laboratory memorandum to D.D. Meyer from C.W. Buckland, Los Alamos, New Mexico. (Buckland 1973, 058138)

DOE (U.S. Department of Energy), October 1987. "Phase I: Installation Assessment, Los Alamos National Laboratory," Comprehensive Environmental Assessment and Response Program, draft, Vol. 1, Environment and Health Division, Environmental Programs Branch, Albuquerque Operations Office, Albuquerque, New Mexico. (DOE 1987, 008663)

Drager, H.W., June 11, 1946. "Preliminary Survey of Sewer System," Los Alamos Scientific Laboratory memorandum to E.R. Jette from H.W. Drager, Los Alamos, New Mexico. (Drager 1946, 001562)

LANL (Los Alamos National Laboratory), May 1991. "TA-21 Operable Unit RFI Work Plan for Environmental Restoration," Vol. II (Chapters 14 to 16), Los Alamos National Laboratory document LA-UR-91-962, Los Alamos, New Mexico. (LANL 1991, 007529)

LANL (Los Alamos National Laboratory), May 1991. "TA-21 Operable Unit RFI Work Plan for Environmental Restoration," Vol. III (Chapters 17 to Appendix G), Los Alamos National Laboratory document LA-UR-91-962, Los Alamos, New Mexico. (LANL 1991, 007680)

LANL (Los Alamos National Laboratory), May 1992. "RFI Work Plan for Operable Unit 1079," Los Alamos National Laboratory document LA-UR-92-850, Los Alamos, New Mexico. (LANL 1992, 007668)

LANL (Los Alamos National Laboratory), June 8, 2007. "Los Alamos National Laboratory's Proposal for Perchlorate Evaluation in Los Alamos/Pueblo Canyons," Los Alamos National Laboratory letter (ER2007-0345) to J.P. Bearzi (NMED-HWB) from S. Stiger (Environmental Programs Associate Director) and D. Gregory (DOE Federal Project Director), Los Alamos, New Mexico. (LANL 2007, 097006)

NMED (New Mexico Environment Department), April 9, 2007. "Periodic Monitoring Report for Los Alamos Watershed Sampled July 24 Through August 10, 2006," New Mexico Environment Department letter to D. Gregory (DOE LASO) and D. McInroy (LANL) from J.P. Bearzi (NMED HWB), Santa Fe, New Mexico. (NMED 2007, 095494)

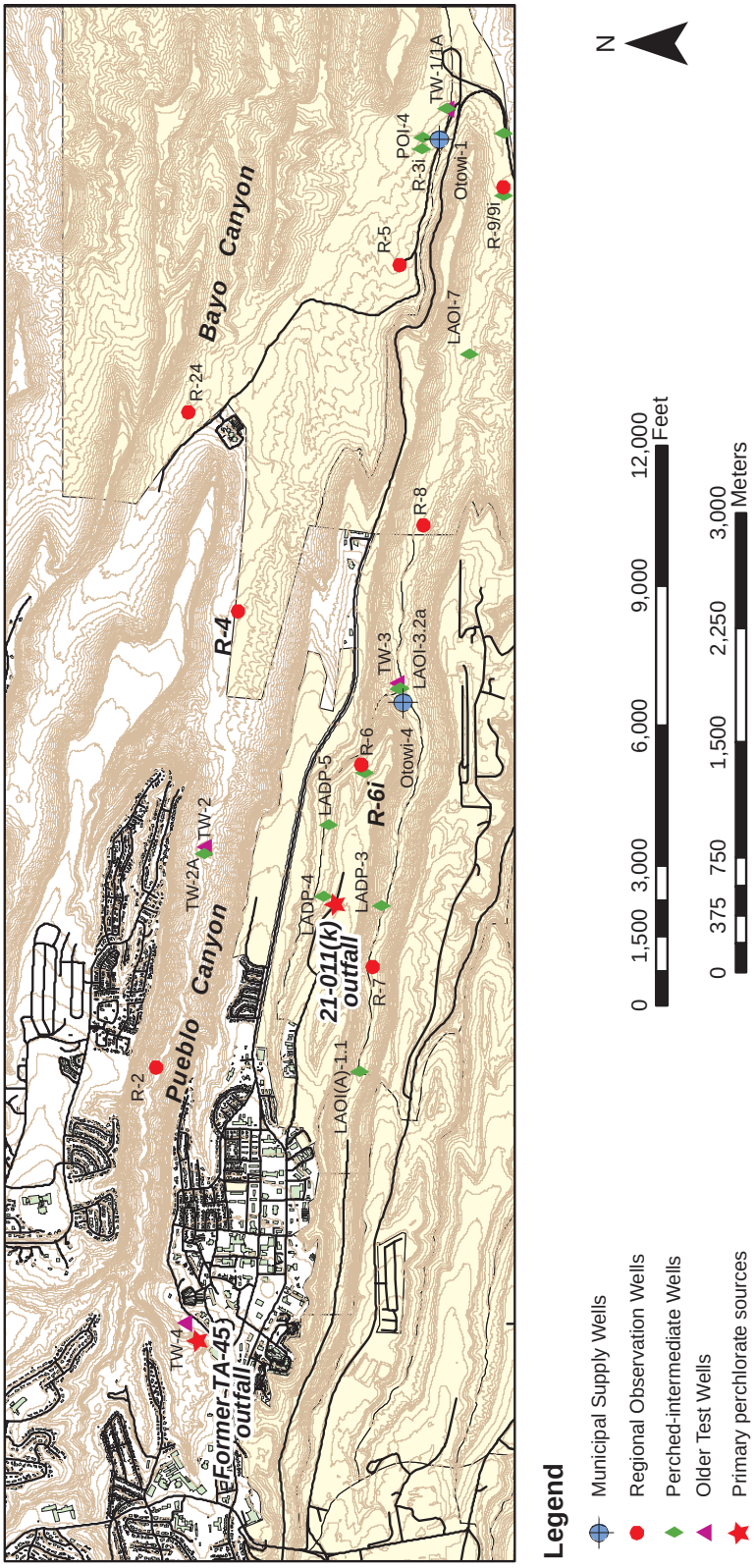


Figure 1 Los Alamos and Pueblo Canyon watershed showing perched-intermediate and regional groundwater monitoring wells. The locations of the primary perchlorate sources for deep groundwater contamination are also shown.

Table 1
Detailed Summary of Perchlorate Sources in the Los Alamos and Pueblo Canyon Watershed

TA	Parent Consolidated Unit	Discrete PRS	Brief Description	Operation (from PRS database)	Perchlorate Related Activities	Reference	Root Reference	Notes
TA-00		00-017	Waste lines	Inactive underground industrial waste line system that transported process chemical and radiological wastes from TA-43 and TA-48 to former wastewater treatment plant at TA-45.	Waste lines transported waste from radiochemistry site at TA-48 to TA-45 wastewater treatment plant.	PRS database		
TA-01	01-001(a)-99	01-001(u)	Septic system waste line	Sanitary waste lines associated with J-2 Building (Building 1-115) which was used for radiochemistry work. The waste line connected J-2 Building with the main western sanitary waste line.	J-2 Building was used for radiochemistry experiments.	PRS database	RFI Work Plan for OU 1078, LA-UR-92-0838. Ahlquist, J. et al. "Radiological Survey and Decontamination of the Former Main Technical Area, TA-1, at Los Alamos, NM," LASL report LA-6887, December 1977.	
					In CEARP, "TA-1 housed ...plutonium chemistry, physics research, uranium machining and heat treatment, radiochemistry, medical research...Most of the work that continued involved improving and evaluating nuclear explosives." The CEARP also reports, "The sanitary sewers from TA-01 were reported to be radioactively contaminated in 1946. During the 1975-1976 remedial action, radionuclides were observed in sanitary drain lines in trenches that had served sanitary lines, and in sanitary septic tanks."	CEARP 1987 Phase I: Installation Assessment, Volume 1 of 2 (DOE 1987, 008663)	Drager, H.W. 1946 "Preliminary Survey of Sewer System," LASL memorandum to E.J. Jette. June 11, 1946. (Drager 1946, 001562) Buckland, C,. 1957 "Final Health Clearance of Various Buildings in TA-1 Located South of Trinity Drive," LASL memorandum to J. Bolton, December 6, 1957. Buckland, C., 1973. "Summary of Records Search for Radioactivity Remaining in TA-1 Acid Waste Lines, TA-10, TA-45, and Acid Canyon below TA-45," LASL memorandum to D. Meyer, February 16, 1973, LASL (Buckland 1973, 058138) "LASL Ten Year Decontamination/ Decommissioning Site Plan, FY1980-FY1989," LASL document, July 1977. Ahlquist, J. et al. "Radiological Survey and Decontamination of the Former Main Technical Area, TA-1, at Los Alamos, NM," LASL report LA-6887, December 1977	See CEARP 1987, TA-1 Main Technical Area, p.TA1-1 and Section "TA1-5-ST-I-HW/RW (Septic tanks and sanitary waste lines)," p. TA1-8
9966333TA-02		02-005	Drift loss, cooling tower blowdown	Potential soil contamination resulting from drift loss of potassium dichromate from the Omega West Reactor cooling tower (structure 02-49) from 1957 to mid-1970s.	Omega West Reactor cooling tower. Perchlorate detected in sampling.	PRS database	RFI Work Plan for OU 1098, LA-UR-93-3825	

TA	Parent Consolidated Unit	Discrete PRS	Brief Description	Operation (from PRS database)	Perchlorate Related Activities	Reference	Root Reference	Notes
TA-02		02-010	Former building location	Residual soil contamination associated with a former chemical shack (structure 02-03) that contained a hot cell to reprocess uranyl nitrate solution from the Water Boiler Reactor	Contained hot cell for reprocessing of uranyl nitrate solution from Water Boiler Reactor. Perchlorate detected in sampling (see HIR for Middle Los Alamos Canyon Aggregate Area, LA-UR-05-8339).	PRS database	RFI Work Plan for OU 1098, LA-UR-93-3825	
					The CEARP reports, "A small 'chem shack', TA-2-3, was located to the east of the main reactor building, TA-2-1. It was used for a variety of purposes involving radioactive material with areas of contamination reading up to 75 mR/h. The plumbing was believed to contain uranyl nitrate and the exhaust stack was suspected to be contaminated with perchloric acid."	CEARP 1987 Phase I: Installation Assessment, Volume 1 of 2 (CEARP 1987, 008663)	LASL. 1971. Standard Operating Procedures, July 15, 1971, in CEARP files at LANL. Buckland, Carl. 1971. "Radioactive Contamination Survey of TA-2-3," LASL memorandum to S.E. Russo, April 30, 1971.	See CEARP 1987, Section "TA2-1-CA-A/I-HW/RW (Reactors and associated facilities), p. TA2-5. (DOE 1987, 008663)
TA-21		21-002(b)	Container storage	Former drum storage structure (structure 21-38) located east of a former shop (Building 21-31)	CEARP says the DP West Facility was used for the production of metals and alloys of transuranic elements and measuring the chemical and physical properties of the metals and alloys.	CEARP 1987 Phase I: Installation Assessment, Volume 1 of 2 (DOE 1987, 008663)	Garde, Raymond et al., 1982. "Los Alamos DP West Plutonium Facility Decontamination Project 1978-1981," LANL report LA-9513-MS-UC-70, September 1982.	See CEARP 1987, Section "TA21-1-CA-i/A-RW/HW (Buildings, ducts, utility trenches, and associated facilities), p.TA21-8.(DOE 1987, 008663)
TA-21	21-003-99	21-003	Container storage - RCRA Unit	PCB-container storage area associated with Building 21-61 which was constructed in 1950 to support classified plutonium research.	Building 21-61 supported plutonium research.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume II, LA-UR-91-962 (LANL 1991, 007529)	
					CEARP says the DP West Facility was used for the production of metals and alloys of transuranic elements and measuring the chemical and physical properties of the metals and alloys.	CEARP 1987 Phase I: Installation Assessment, Volume 1 of 2 (DOE 1987, 008663)	Garde, Raymond et al., 1982. "Los Alamos DP West Plutonium Facility Decontamination Project 1978-1981," LANL report LA-9513-MS-UC-70, September 1982.	See CEARP 1987, Section "TA21-1-CA-i/A-RW/HW (Buildings, ducts, utility trenches, and associated facilities), p.TA21-8. (DOE 1987, 008663)
TA-21		21-009	Waste treatment laboratory	Former waste treatment laboratory (Building 21-33) in which perchloric acid was used and may have contaminated the exhaust hoods.	Waste treatment laboratory (Building 21-33) used perchloric acid.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume II, LA-UR-91-962	

TA	Parent Consolidated Unit	Discrete PRS	Brief Description	Operation (from PRS database)	Perchlorate Related Activities	Reference	Root Reference	Notes
TA-21		21-011(k)	Outfall	Outfall discharge that carried industrial wastewater from the new industrial waste treatment plant (Building 21-257) through two holding tanks (structures 21-112 and -113) to a discharge point on the south slope of DP Canyon. The wastes were liquids remaining after treatment of plutonium process effluents and potentially contained a variety of radioactive and chemical constituents.	CEARP says the DP West Facility was used for the production of metals and alloys of transuranic elements and measuring the chemical and physical properties of the metals and alloys. Perchlorate detected in sampling (See Los Alamos/Pueblo Investigation Report, LA-UR-04-2417).	CEARP 1987 Phase I: Installation Assessment, Volume 1 of 2 (DOE 1987, 008663)	Garde, R. et al., 1982. "Los Alamos DP West Plutonium Facility Decontamination Project 1978-1981," LANL report LA-9513-MS-UC-70, September 1982.	See CEARP 1987, Section "TA21-1-CA-i/A-RW/HW (Buildings, ducts, utility trenches, and associated facilities), p.TA21-8.
TA-21		21-013(c)	Surface disposal site	Former surface disposal area located northeast of the high - temperature chemistry building (Building 21-209) at the eastern end of DP Mesa.	DP IWP states, "This inactive surface disposal area was identified as a SWMU northeast of the high temperaturechemistry building (Building 21-209)." Building 21-209 was used to house research into high temperature and actinide chemistry. p.4	DP Site Aggregate Area IWP	TA-21 OU 1106 RFI Work Plan for ER, Volume II, LA-UR-91-962 (LANL 1991, 007529)	
TA-21		21-015	Material disposal area (MDA B)	An inactive 6.03-acre disposal site. MDA B was the first common disposal area for radioactive waste generated at LANL and operated from 1945 until 1949. Potential organic chemical contaminants include perchlorates, ethers, solvents, and corrosive gases. The existing cover system at MDA B consists of asphalt surfacing and a vegetated cap.	One of the potential contaminants includes perchlorates.	PRS database	1990 SWMU Report, Volume 2 of 4 LA-UR-90-3400 RFI Report for PRS at TA-21: 21-015, MDA B, LA-UR-96-4444	
TA-21	21-018(a)-99	21-013(b)	Surface disposal site	Former surface disposal area that contains concrete building debris from 1965 demolition of a waste treatment laboratory (Building 21-33). It is possible that interior surfaces may have been contaminated with perchloric acid.	Interior surfaces of waste treatment laboratory (Building 21-33) may be contaminated with perchloric acid. Perchlorate detected in sampling (See IR for CU 21-018(a)-99, MDA V, at TA-21, LA-UR-06-6609).	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume II LA-UR-91-962	

TA	Parent Consolidated Unit	Discrete PRS	Brief Description	Operation (from PRS database)	Perchlorate Related Activities	Reference	Root Reference	Notes
TA-21	21-021-99	21-021	Systematic release (site -wide)	Potential soil contamination resulting from historical stack emissions at TA-21.	CEARP says the DP West Facility was used for the production of metals and alloys of transuranic elements and measuring the chemical and physical properties of the metals and alloys. Perchlorate detected in sampling.	CEARP 1987 Phase I: Installation Assessment, Volume 1 of 2 (DOE 1987, 008663)	Garde, Raymond et al., 1982. "Los Alamos DP West Plutonium Facility Decontamination Project 1978-1981," LANL report LA-9513-MS-UC-70, September 1982.	See CEARP 1987, Section "TA21-1-CA-i/A-RW/HW (Buildings, ducts, utility trenches, and associated facilities), p. TA21-8. (DOE 1987, 008663)
TA-21		21-024(f)	Septic system	Former septic system that received sewage from Building 21-45 from 1947 to 1954.	CEARP says the DP West Facility was used for the production of metals and alloys of transuranic elements and measuring the chemical and physical properties of the metals and alloys. Perchlorate detected in sampling (See VCA Completion Report, SWMU 21-024(f) and AOCs C-21-015 and 21-030, LA-UR-03-5441).	CEARP 1987 Phase I: Installation Assessment, Volume 1 of 2 (DOE1987, 008663)	Garde, R.et al., 1982. "Los Alamos DP West Plutonium Facility Decontamination Project 1978-1981," LANL report LA-9513-MS-UC-70, September 1982.	See CEARP 1987, Section "TA21-1-CA-I/A-RW/HW (Buildings, ducts, utility trenches, and associated facilities), p.TA21-8. (DOE 1987, 008663)
TA-21		21-024(i)	Septic system	Former septic system that routed sewage from Building 21-152 through a septic tank to the surface southeast of a high temperature chemistry building (Building 21-209)	CEARP says the DP West Facility was used for the production of metals and alloys of transuranic elements and measuring the chemical and physical properties of the metals and alloys. Perchlorate detected in sampling (See IA Completion Report for SWMU 21-024(i) at TA-21), LA-UR-03-1546).	CEARP 1987 Phase I: Installation Assessment, Volume 1 of 2 (DOE 1987, 008663)	Garde, R. et al., 1982. "Los Alamos DP West Plutonium Facility Decontamination Project 1978-1981," LANL report LA-9513-MS-UC-70, September 1982.	See CEARP 1987, Section "TA21-1-CA-I/A-RW/HW (Buildings, ducts, utility trenches, and associated facilities), p.TA21-8. (DOE 1987, 008663)
TA-21	21-016(a)-99	21-001	Container Storage	Outdoor storage area located at southwest corner of the industrial waste treatment plant Building 21-257. The storage area was used to hold containerized radioactive sludge prior to transfer of the sludge to TA-54. The sludge may have contained hazardous constituents.	The storage area was used to hold containerized radioactive sludge prior to transfer of the sludge to TA-54.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume II LA-UR-91-962 (LANL 1991, 007529)	
TA-21	21-016(a)-99	21-010(a)	Former Building 21-35	Location of former Building 21-35 (Waste Disposal Laboratory) that was constructed as a facility for treating and disposing contaminated and liquid waste from plutonium and uranium processing laboratories at DP Site.	CEARP says the DP West Facility was used for the production of metals and alloys of transuranic elements and measuring the chemical and physical properties of the metals and alloys. Perchlorate detected in sampling (See IA Completion Report for SWMU 21-024(i) at TA-21), LA-UR-03-1546).	CEARP 1987 Phase I: Installation Assessment, Volume 1 of 2 (DOE 1987, 008663)	Garde, Raymond et al., 1982. "Los Alamos DP West Plutonium Facility Decontamination Project 1978-1981," LANL report LA-9513-MS-UC-70, September 1982.	See CEARP 1987, Section "TA21-1-CA-I/A-RW/HW (Buildings, ducts, utility trenches, and associated facilities), p.TA21-8. (DOE 1987, 008663)

TA	Parent Consolidated Unit	Discrete PRS	Brief Description	Operation (from PRS database)	Perchlorate Related Activities	Reference	Root Reference	Notes
TA-21	21-016(a)-99	21-011(a)	Building 21-257	Industrial waste treatment plant (Building 21-257) treated liquid waste plutonium processing operations associated with DP Site. The plant discharged through an outfall [21-011(k)] to DP Canyon.	The plant treated liquid waste associated with plutonium processing.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume II, LA-UR-91-962 (LANL 1991, 007529)	
TA-21	21-016(a)-99	21-011(d)	Aboveground Tank	Two acid holding tanks (structure 21-110 and -111)	Holding tank 21-110 received acid waste from DP East and holding tank 21-111 received acid waste from DP West and from the General's Tanks which stored highly enriched plutonium solutions.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume II, LA-UR-91-962 (LANL 1991, 007529)	
TA-21	21-016(a)-99	21-011(f)	Aboveground Tank	Effluent holding tank that was prior to 1967, connected to the Waste Disposal Laboratory (Building 21-35) by underground piping and later after 1967 piping was rerouted to the industrial waste treatment plant (Building 21-257).	Tank connected to waste disposal laboratory and later industrial waste treatment plant. Before 1982 treated effluent retained in tanks for three to five days and discharged to outfall. After 1982, the effluent was pumped to TA-50 for disposal.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume II, LA-UR-91-962	
TA-22	21-016(a)-99	21-011(g)	Aboveground Tank	Effluent holding tank that was prior to 1967, connected to the Waste Disposal Laboratory (Building 21-35) by underground piping and later after 1967 piping was rerouted to the industrial waste treatment plant (Building 21-257).	Tank connected to waste disposal laboratory and later industrial waste treatment plant. Before 1982 treated effluent retained in tanks for three to five days and discharged to outfall. After 1982, the effluent was pumped to TA-50 for disposal.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume II, LA-UR-91-962	
TA-21	21-016(a)-99	21-016(a)	Material Disposal Area T	Four inactive absorption beds that were operation between 1945 and 1967 and received untreated waste from uranium- and plutonium-processing laboratories.	Beds received untreated waste from uranium- and plutonium-processing laboratories.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume II, LA-UR-91-962 (LANL 1991, 007529)	

TA	Parent Consolidated Unit	Discrete PRS	Brief Description	Operation (from PRS database)	Perchlorate Related Activities	Reference	Root Reference	Notes
TA-21	21-016(a)-99	21-016(b)	Material Disposal Area T	Former retrievable waste storage pit excavated at MDA T in 1974 between absorption beds 1 and 3. The pit received waste such as CMPs that had concentrations of plutonium-239/-240 and americium mixed with cement. The pipes were disposed of in 1984 and 1986. The pit was subsequently backfilled.	The storage pit stored pipes filled with plutonium-239/-240 and americium-241 mixed with cement.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume II, LA-UR-91-962 (LANL 1991, 007529)	
TA-21	21-023(a)-99	21-023(a)	Septic system, Building 21-3N	Former sanitary waste system. The septic tank was located between two additions to the former plutonium processing building (Building 21-3N) and reportedly served a janitor's mop sink in the CMB-4 laboratory.	The former location of the sanitary system beneath the footprint of a former plutonium processing building (Building 21-3N).	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume III, LA-UR-91-962 (LANL 1991, 007680)	
TA-21	21-023(a)-99	21-023(b)	Septic system, Building 21-3N	Former sanitary waste system that consisted of a septic tank and associated sewer lines. The system received wastewater from the shower room in the former plutonium processing building (Building 21-3N). The system was removed in 1966.	The former sanitary system received wastewater from the shower room in the former plutonium processing building (Building 21-3N).	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume III, LA-UR-91-962 (LANL 1991, 007680)	
TA-21	21-023(a)-99	21-023(d)	Septic system, Building 21-3N	Former septic system that consisted of a septic tank and outlet line. The tank collected industrial waste and sewage from Building 21-3N, a former plutonium processing building. The tank was removed in 1966.	The tank collected industrial waste and sewage from Building 21-3N, a former plutonium processing building.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume III, LA-UR-91-962 (LANL 1991, 007680)	

TA	Parent Consolidated Unit	Discrete PRS	Brief Description	Operation (from PRS database)	Perchlorate Related Activities	Reference	Root Reference	Notes
TA-21	21-006(c)-99	21-006(a)	Disposal pit	Underground seepage pit located between two laboratories (Building 21-2 and -3).The pit was used to dispose of liquids from the Hanford radioactive materials container-washing operation.	The pit disposed of liquids from a radioactive materials container washing operation and the liquids contained ethylene glycol, phosphoric acid, and plutonium.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume III, LA-UR-91-962 (LANL 1991, 007680)	
TA-21	21-006(c)-99	21-006(b)	Disposal pit	Pit that was used to dispose of ether wastes from a laboratory (Building 21-2) where a plutonium purification process used a double ether extraction. Pit outlet line ran to outfall above Los Alamos Canyon.	Pit received wastes from plutonium purification process in Building 21-2.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume III, LA-UR-91-962 (LANL 1991, 007680)	
TA-21	21-006(c)-99	21-006(c)	Disposal pit, Building 21-3	21-006(c) and 21-006(d) thought to be the same site. Seepage pit outside a bomb-cleaning room at a laboratory (Building 21-3) and received bomb electrolytic decontamination solution.	Pit received bomb electrolytic decontamination solution from a room that may have been contaminated with plutonium.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume III, LA-UR-91-962 (LANL 1991, 007680)	
TA-21	21-006(c)-99	21-006(d)	Disposal pit, Building 21-3	21-006(c) and 21-006(d) thought to be the same site. Seepage pit outside a bomb-cleaning room at a laboratory (Building 21-3) and received bomb electrolytic decontamination solution.	Pit received bomb electrolytic decontamination solution from a room that may have been contaminated with plutonium.	PRS database	TA-21 OU 1106 RFI Work Plan for ER, Volume III, LA-UR-91-962 (LANL 1991, 007680)	
TA-45	45-001-00	C-45-001	Parking lot of former treatment plant (inactive)	Former site of accidental release of plutonium-contaminated sludge	Release of plutonium-contaminated sludge.	PRS database	RFI Work Plan for OU 1079, LA-UR-92-850 (LANL 1992, 007668)	

TA	Parent Consolidated Unit	Discrete PRS	Brief Description	Operation (from PRS database)	Perchlorate Related Activities	Reference	Root Reference	Notes
TA-45	45-001-00	45-001	Former RLW Treatment Plant and Associated Outfalls	Former RLW treatment plant (Building 45-2) and associated outfalls that received RLW from TAs-01,-03,-43,-48.	Former RLW treatment plant received waste from radiochemistry site at TA-48. The 1990 SWMU report states, "Influent consisted of liquids containing radionuclides, solvents, and other chemicals. Minute amounts of TNT were processed at TA-45; approximately 10 grams of TNT may have entered the sewer system over a period of several years, but no hazardous amounts of HE are believed to present at TA-45."	1990 SWMU Report, LA-UR-90-3400 , Vol. 3 of 4	Release Site Database, Task 53, TA-45, LANL, Prepared by Weston, Inc., 1989. (LANL 1989, 011984)	
TA-45	45-001-00	45-003	Waste lines	Former buried industrial waste line and associated manhole. The waste line was used to convey RLW to the TA-45 treatment plant (45-001). Plutonium was detected in subsurface soil where waste lines had entered the treatment plant, but did not exceed FUSRAP cleanup criteria.	Former RLW treatment plant received waste from radiochemistry site at TA-48. The 1990 SWMU report under 45-001 states, "Influent consisted of liquids containing radionuclides, solvents, and other chemicals. Minute amounts of TNT were processed at TA-45; approximately 10 grams of TNT may have entered the sewer system over a period of several years, but no hazardous amounts of HE are believed to present at TA-45." Also under 45-001, the SWMU report states, " The waste consisted of radioactive-mixed waste liquids generated by industrial operations."	1990 SWMU Report, LA-UR-90-3400 , Vol. 3 of 4	Release Site Database, Task 53, TA-45, LANL, Prepared by Weston, Inc., 1989. (LANL 1989, 011984)	
TA-45	45-001-00	45-002	Vehicle decontamination facility	Former decontamination facility (Building 45-1) that was used to decontaminate large equipment, filters from Sigma Building, trash dumpsters, and lead shielding bricks. Soil in the drainage outfall below Building 45-1 had elevated levels of plutonium-239.	The 1990 SWMU report states, "The waste generally consisted of residues such as dirt, oil, and grease contaminated with radionuclides removed during decontamination."	1990 SWMU Report, LA-UR-90-3400 , Vol. 3 of 4	Release Site Database, Task 53, TA-45, LANL, Prepared by Weston, Inc., 1989. (LANL 1989, 011984)	
TA-01	45-001-00	01-002(b)-00	Outfall	Former industrial waste line outfall and its drainage into Acid Canyon. From 1943-1951, discharged untreated RLW generated in laboratories and research facilities in former TA-01.	Discharged untreated RLW generated in laboratories and research facilities in former TA-01.	PRS database	RFI Work Plan for OU 1078, LA-UR-92-0838.	

TA	Parent Consolidated Unit	Discrete PRS	Brief Description	Operation (from PRS database)	Perchlorate Related Activities	Reference	Root Reference	Notes
TA-73	73-001(a)-99	73-001(a)	Landfill	Former landfill, situated north of the airport runway.	1990 SWMU report says "Approximately 100 lb of uranium is present as well as possible explosive material from pre-1959 disposal."	1990 SWMU Report, LA-UR-90-3400 , Vol. 4 of 4	Release Site Database, Task 26, TA- 0, LANL, Prepared by Weston, Inc., 1989. (LANL 1989, 011967)	